Executive Summary

Methodology for Evaluating the Effectiveness of Watershed-Scale Non-Point Source Pollution Abatement Programs

OHIO RIVER VALLEY WATER SANITATION COMMISSION

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Executive Summary

This project defines a methodology that can be used to evaluate and optimize the performance of watershed-scale nonpoint source pollution abatement programs. The methodology links the cause and effect relationship between landscape feature data and water quality data. The case study that supported development of the methodology used risk-based analyses to quantify the climatic conditions that cause nonpoint source pollution; select most appropriate management measures (BMPs) at the planning unit-scale, and characterize effectiveness of watershed-scale nonpoint source pollution abatement programs. The methodology can be used by watershed organizations throughout the country for source water assessment and protection programs (SWAPP), total maximum daily load (TMDL), and stormwater management programs.

The methodology for the evaluation of non point source pollution abatement developed in this project and illustrated in a case study in the Big Walnut Creek watershed uses a version of the USEPA watershed approach as the organizing tool within which the assessment framework can be executed. The report has been organized with Chapters that describe the various steps of the methodology in the context of the watershed approach as illustrated in Figure 1. Chapter 1 provides an introduction to the project and the case study used to develop the methodology. In Chapter 2 the relationship of the methodology and the watershed approach is defined. Chapters 3 through 9 detail the elements of the methodology that should be implemented during each phase of a watershed approach as illustrated in Figure 1. Chapter 10 of the Report provides recommendations and suggestions for the applicability of this methodology to other projects.

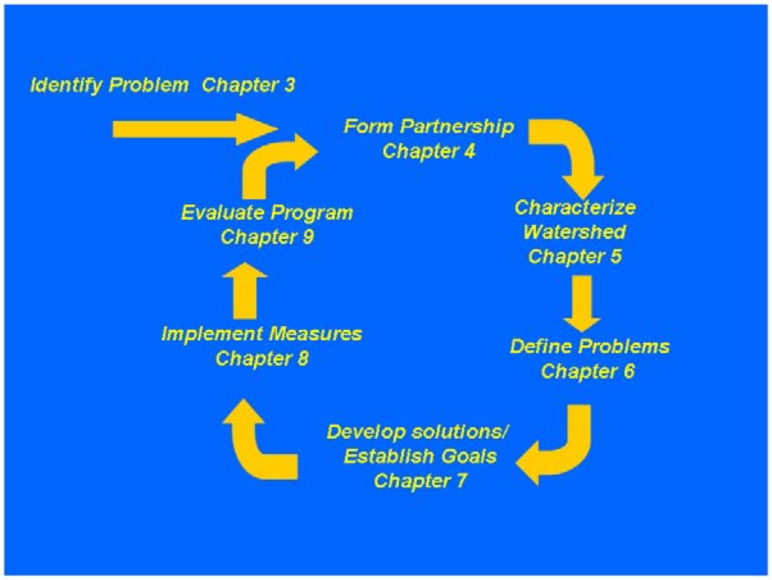

Figure 1 Generalized Watershed Approach with Reference to Report Chapters where Methodology Relevant to Each Phase is Described.

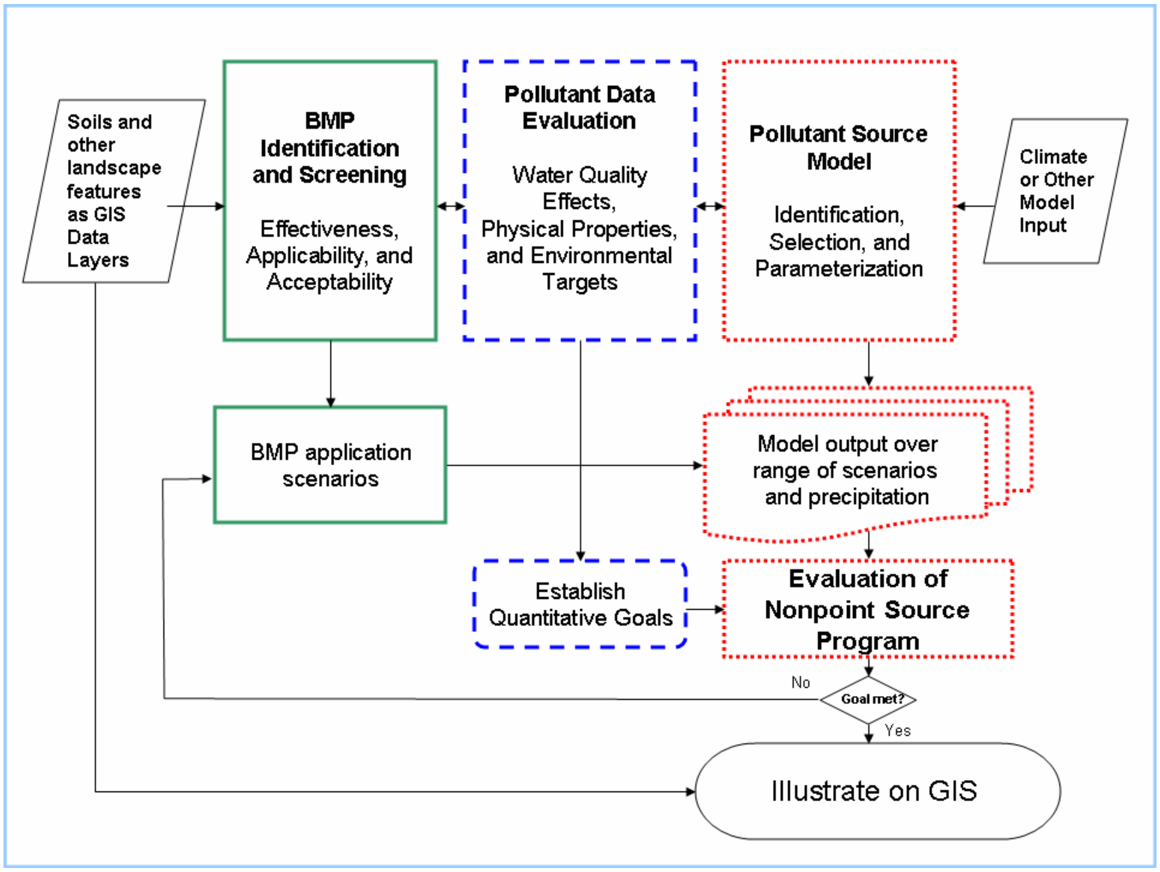

Figure 2 Summary of the Evaluation Steps required to Evaluate Effectiveness of Nonpoint Source Programs.

The methodology though somewhat complex is adaptable to different watershed problems and programs as will be elaborated and illustrated in detail. Generally the activities that support the use of this methodology fall into one of three parallel sets of evaluations integral to measuring or predicting BMP effectiveness. The relationship of these evaluations is shown in Figure 2 The concepts related to evaluation and selection of BMPs themselves are illustrated in solid green outlined boxes. Efforts related to evaluation of the pollutant or pollutants of concern in the watershed are shown in blue dashed boxes. The identification and development of an appropriate model or set of modeling tools is illustrated in the red dotted boxes. Each of these three main themes interacts at various times during a watershed program and each is supported by external data sets that are critical to an effective evaluation (shown in black solid line boxes). A more detailed version of this flow chart is used throughout the report to identify the detailed steps of the evaluation methodology that relate to each phase of the watershed process.

The Upper Big Walnut Creek Watershed in Central Ohio was used as the project's case study. In a separate report titled "Evaluation of Effectiveness of Non-Point Source Pollution Abatement Program in the Upper Big Walnut Creek Watershed" we describe how the “watershed management approach” was applied to address nonpoint source pollution losses from agricultural cropland. Hoover Reservoir, located at the lower end of the Upper Big Walnut Creek Watershed serves as Central Ohio’s largest source of drinking water. The reservoir was observed to have elevated levels of atrazine prior to the promulgation of the atrazine MCL. Throughout the case study discussion we present specific programmatic issues realized during the development of the watershed management plan that formed the basis for this project. Each Chapter of the report discusses the elements of the case study that were used to support the modeling effort and related elements of the methodology. Given that the methodology was being developed concurrently with the implementation of management measures in the watershed, the case study evaluated the measures that were chosen by partnership consensus and Environmental Quality Incentive Program (EQIP) guidelines and compared those to the performance of measures selected through a model optimization process.

Details of the modeling and optimization process are provided in a third report titled “NAPRA Modeling Report to support the Upper Big Walnut Creek Case Study, Application of the Methodology to Evaluate Effectiveness of Watershed-Scale Management Practices”. The NAPRA Modeling Report details the model development and application for the Case study and defines the process that would be used to apply a model such as NAPRA to other watershed projects.

Given the nature of nonpoint source runoff and the mechanisms for reduction of those sources, the traditional tools for monitoring and measuring success are not sufficient. The framework developed in this report provides a link between watershed information, traditional monitoring data and source modeling that can fill that gap.

In a traditional approach the pollutant concentrations and flows of point sources are relatively constant. Traditional modeling and monitoring programs focus on fate and transport processes and are built around receiving stream hydrology and hydraulics since those factors control the resultant downstream pollutant concentrations and estimate water quality attainment reliably.

The proposed methodology provides a mechanism to use quantitative modeling of source loading combined with some level of downstream concentration data to estimate target load reduction and project the effectiveness of site specific BMPs to achieve that goal. Given that the funding for watershed programs is generally somewhat limited, the balance between funding studies versus management practices is critical to success. An approach that allows simplification of the modeling and required monitoring can help organizations balance these funding priorities.

The recommendations of this report are to accomplish the evaluation process in parallel with development of the nonpoint source control program and to assure that evaluative criteria are considered and included in every step of the process. To quote Stephan Covey an evaluation process should “begin with the end in mind” and to do that the process needs to start at the inception of a program and to be integrated into every step of evaluation and implementation.

The methodology used to illustrate both the general case and the progress of our case study provides a relatively simple guideline for where and when to apply the individual steps. Our recommendation and evidence from our case study suggests that the benefits of applying this framework are both measurable and more importantly demonstrable to the stakeholder group. The methodology provides a mechanism to:

- map and track BMP adoption
- quantify progress
- provide site specific optimization of practices
- compare cost effectiveness
- correct the program and support alternative implementation objectives
- demonstrate all of these objectives to stakeholders at all levels

Additionally the methodology can be scaled to both small and large basins, applied to both agricultural and other nonpoint source programs. While our case study measured and controlled a single agricultural pollutant, the framework could be applied to suites of pollutants and even used to define the relative benefit that could be derived by applying BMPs that might have different levels of control for different pollutants. By quantifying effect on resultant loads of different pollutants, a quantitative assessment of relative benefit can be used to determine the balance of overall reduction that could be achieved with an array of management practices directed at the key pollution sources within a watershed.

The results of this project suggest that further case studies should be developed and implemented to test the framework and the ability of watershed groups to independently develop and use the tools necessary to complete this type of evaluation. Our case study illustrates direct benefits to improve implementation of the array of BMPs that had been selected prior to evaluation within the constraints of the EQIP program. Had the pre-evaluation been completed within the guidelines of the methodology the watershed group could have eliminated payments for BMPs that provided little or no reduction of Atrazine runoff and in some cases may have increased the load released from specific farm fields. Our case study also showed that the relative cost of BMP implementation in agricultural watersheds might not be significantly changed but the relative effectiveness can be improved and the basis for implementation can be clearly documented and demonstrated.

From a cost basis the EQIP program cost about $500,000 (over 5 years). The cost of powdered activated carbon saved each year at the treatment plant can not be calculated directly. The plant applies carbon when reservoir concentrations of Atrazine exceed a threshold (below the MCL), if the threshold is not exceeded carbon is not used. The model methodology and empirical relationship with reservoir concentration can be used to estimate how often monthly reservoir concentration would have exceeded that threshold absent BMP application and thus estimate based on water usage how much carbon would have been needed. Based on those estimates at least $500.000 was saved in PAC cost over the 5 year EQIP program. Current projections for PAC cost suggest that prices will double in the near future and thus the saving can potentially double.

The proposed methodology provides guidelines for integration of evaluative tools into a nonpoint source control program. USEPA and USDA should consider implementation of this methodology prior to or during the development of programs to use management measures or BMPs to control nonpoint source pollutants. In particular USDA funded agricultural nonpoint source control programs can benefit from application of this methodology using the tools described in our case study. The methodology will allow those programs to use objective criteria to determine which production lands should receive funding for which arrays of management measures. ORSANCO has plans to apply this methodology to nonpoint source control projects. The USEPA and ORSANCO should discuss a strategy to provide education and training on application of these techniques. Coordination of that education program with USDA and local Soil Conservation agencies would provide the most benefit.

Watershed program managers can apply the principles of this methodology to quantitatively evaluate the effectiveness of current programs. Since the focus of this methodology is to use modeling tools to directly estimate source loads and provide comparison with downstream concentrations the tools provide watershed managers with objective screening tools to develop a sustainable watershed program. The methodology has been described in the report as it relates to the different stages of the generally accepted "watershed approach". That relationship should provide better integration into both proposed and existing nonpoint source control programs.

Methodology to Optimize and Evaluate the Effectiveness of Watershed-Scale Non-Point Source Pollution Abatement Programs

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Chapter 1 INTRODUCTION

Purpose of Document

The purpose of this project as documented in this report is to outline a methodology that can be used to evaluate and optimize the performance of watershed-scale nonpoint source pollution abatement programs. The framework links the cause and effect relationship between landscape feature data and water quality data. This document demonstrates how watershed partnerships can utilize an array of environmental data sets to help identify and define water resources concerns, characterize landscape features, develop solutions, and assess the performance of watershed protection initiatives.

This document provides a methodology that utilizes risk-based analyses to quantify the climatic conditions that cause nonpoint source pollution; select most appropriate management measures commonly called Best Management Practisces (BMPs) at the planning unit-scale, and characterize effectiveness of watershed-scale nonpoint source pollution abatement programs. Lastly, the methodology can readily be utilized by watershed organizations throughout the country for source water assessment and protection (SWAPP), total maximum daily load (TMDL), and stormwater management programs.

Background

The Federal Water Pollution Control Act Amendments of 1972 (U.S. Congress, PL 93-500, 1972), also known as the Clean Water Act (CWA), is the Nation's leading statutory legislation that establishes national water quality goals. The Act defines water quality in terms of designated beneficial uses, which are the desired applications that the water resource should support. Both numerical and narrative criteria define and characterize beneficial uses such as drinking water supply, primary contact recreation, aquatic life and ecological support. The Act authorizes States and Tribes to establish beneficial use standards as long as they comply with federal criteria. The US Environmental Protection Agency (EPA) is the primacy agency responsible for waters quality policies and programs (USDA-ERS, 2003).

The quality of the nation's water resources has significantly improved since passage of the Act. This measurable improvement is especially due to chemical pollutant load reduction (EPA-USDA, 1998; and NRC, 1992). Federal and State regulatory programs, subsidized capitalization loans and grants have been the mechanism to accomplish this achievement (EPA-USDA, 1998). Through these programs, the Congress and EPA have addressed discrete, point source pollution emanating from municipal and industrial wastewater treatment facilities. EPA defines these point sources of pollution as (EPA, 2003a):

> *"Any discernable, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged"*.

These "end-of-pipe" discharges entering into the Nation's waters are subject to enforceable permits, known as National Pollutant Discharge Elimination System (NPDES) permits (EPA, 2003a).

With an estimated more than $541 billion invested by the public and private sectors, the CWA has yielded the following most prominent results (USDA-ERS, 2003; EPA-USDA, 1998; Adler, 1994; and Knopman and Smith, 1993):

- the percentage of the U.S. population served by wastewater collection and treatment systems increased from 42 percent in 1970 to 74 percent by 1998;
- billions of pounds of toxic pollutants discharging into the Nation's waterways have been eliminated; and,
- research and some state monitoring programs suggest that aquatic ecosystems have significantly improved, especially in urban areas.

Although most point sources of pollution have been successfully managed, nearly 40 percent of the nation's assessed waterways remain impaired. Pollution from nonpoint sources, habitat alteration and stream modifications remain the leading cause of water quality impairment in the United States. However, only one-fifth of the nation's water resources remain assessed (EPA, 2002).

According to federal reporting requirements of the Clean Water Act, commonly referred as Section 305(b), the 2000 Water Quality Inventory indicates that 39 percent of the Nation's assessed river miles, 45 percent of assessed freshwater lake acres (except for the Great Lakes), and 51 percent of assessed estuary square miles are impaired (EPA, 2003b; and EPA, 2002).

Nonpoint Source Pollution

Unlike discrete point source discharges, nonpoint source pollution is linked to the natural hydrologic regime to which climatological conditions interact with natural and anthropogenic landscape features (as shown in Figure 1-1). Legally, nonpoint source pollution is loosely defined as everything else that is not statutorily defined as point source.

EPA and USDA define nonpoint source pollution as having the following technical characteristics (EPA, 2003a and USDA, 2002):

- Nonpoint source discharges enter surface and/or ground waters in a diffuse manner at intermittent intervals related mostly to meteorological events;

- Pollutant generation arises over an extensive land area and moves overland before it reaches surface waters or infiltrates into ground waters;

- The extent of NPS pollution is partially related to uncontrollable climatic events and to geographic and geologic conditions, and varies greatly from place to place and from year to year;

- The extent of NPS pollution is often more difficult or expensive to monitor at the point(s) of origin, as compared to monitoring of point sources.

- Abatement of nonpoint sources is focused on land and runoff management practices, rather than on effluent treatment; and,

- Nonpoint source pollutants may be transported and/or deposited as airborne contaminants.

Since nonpoint source pollution is, in part, a function of climatological conditions and various land uses, it is diffuse and widespread in nature and comes from multiple sources. Examples of nonpoint source pollution sources include urban communities, agriculture, silviculture, construction sites, and mining land uses. As rainfall or snowmelt runoff moves across and through the soil interface, the runoff and infiltration intercepts natural and anthropogenic pollutants and discharges them into the receiving water body.

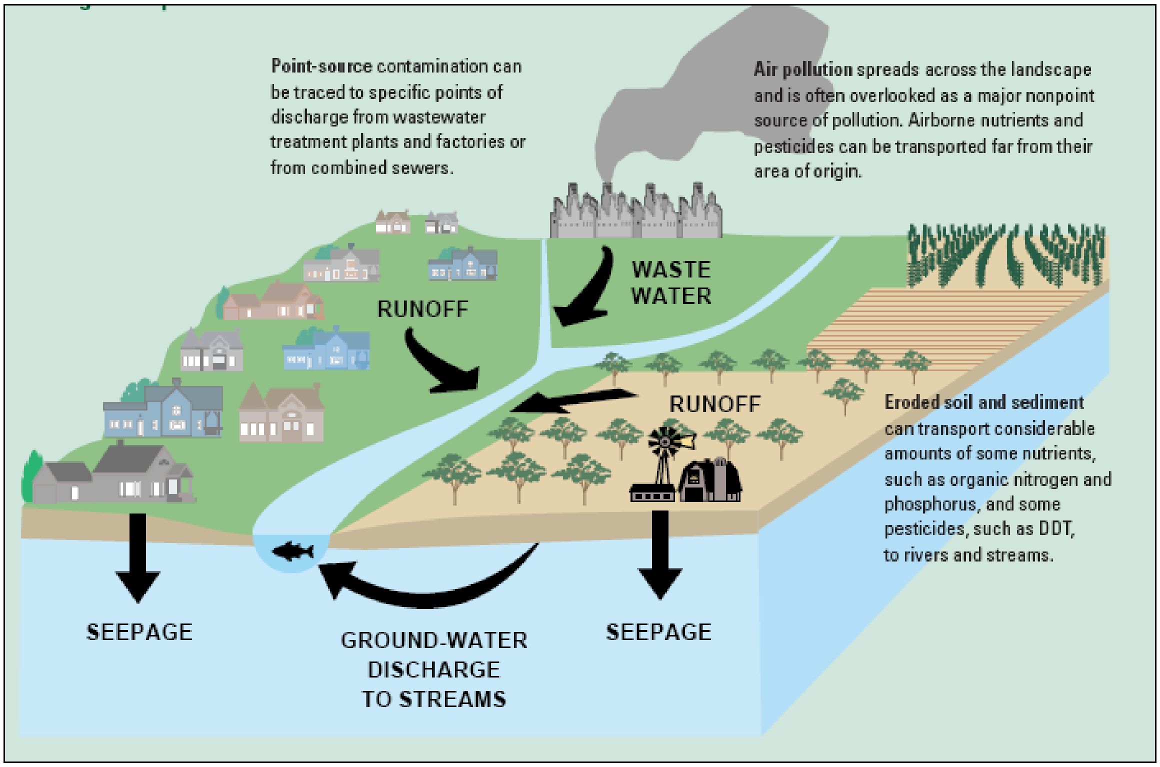

Figure 1-1 The interconnection of natural landscape features, climatic conditions and human activities and their potential to affect water resources (USGS, 1999).

The leading causes of nonpoint source pollution impairing the quality of the nation's water resources include sediments, nutrients, toxic compounds, organic matter, bacteria, oxygen depleting substances, metals, habitat and hydrologic alteration, pesticides, and organic toxic chemicals (EPA 2003a; USDA-ERS 2003; and, ITFM 1998).

Agriculture

Agriculture has been identified as the single largest and most wide-spread source of nonpoint pollution, impacting as much as 60% of our nation's rivers and streams and 30% of lakes. (EPA 2003a; USDA-ERS 2003; ITFM 1998).

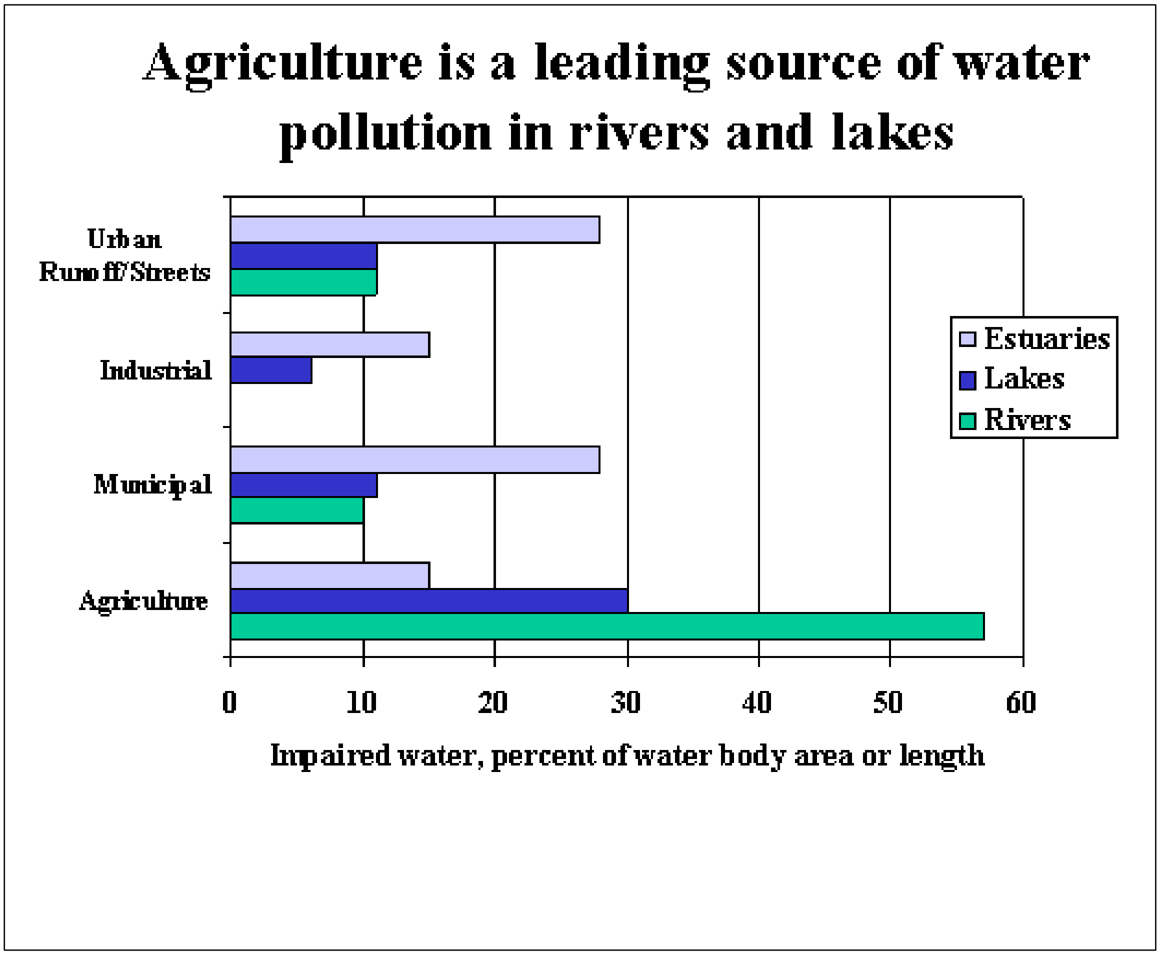

Figure 1-2: Percent of the Nation's water resources impaired by major land use categories (USGS, 1999)

Total land area of the lower 48 contiguous United States is 76.6 billion hectares (1.9 billion acres). The three most predominant land uses are grassland pasture and range land (30.5%), forest land (29.2%), and cropland (24.0%). More than 1.0 billion hectares (260 million acres) of crops are harvested annually and include soybeans (22.2%), corn for grain (21.6%), hay (19.3%), and wheat (16.5%) (USDA-ERS, 2003).

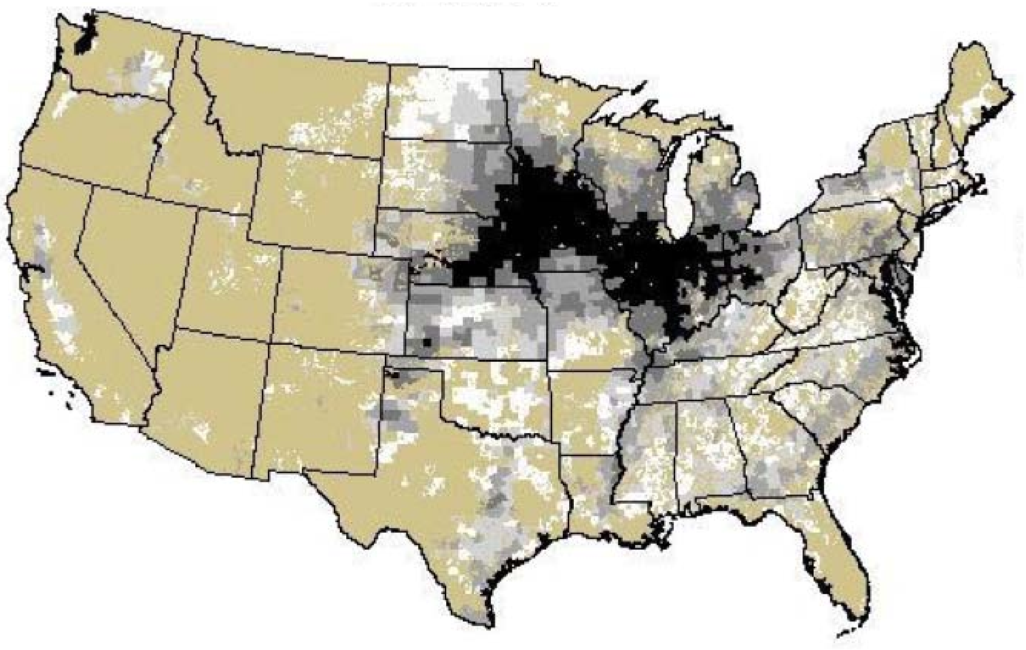

Figure 1-3: The 1997 geographic distribution of corn acres in the coterminous United States (USDA-ERS 2003).

Agricultural row crop production requires tillage, nutrient and pesticide inputs to increase commodity yield. The production of corn has the highest input costs as it requires the most use of nitrogen and pesticide to optimize crop yield. The geographic distribution of corn is commonly produced in the Upper Midwest of the coterminous United States (Figure 1-3).

National water quality research of water resources of agricultural land use areas reveal the wide-spread occurrence of detectable nutrients and pesticides in surface and ground waters. For example, where pesticides are most heavily used is where pesticides in water resources are most frequently detected. Herbicides were the most frequently detected pesticide among both agricultural and urban land uses (Figure 1-4).

Moreover, research findings reveal that exposure to combinations of pesticides to both human health and aquatic life is not clearly understood (USGS 1999).

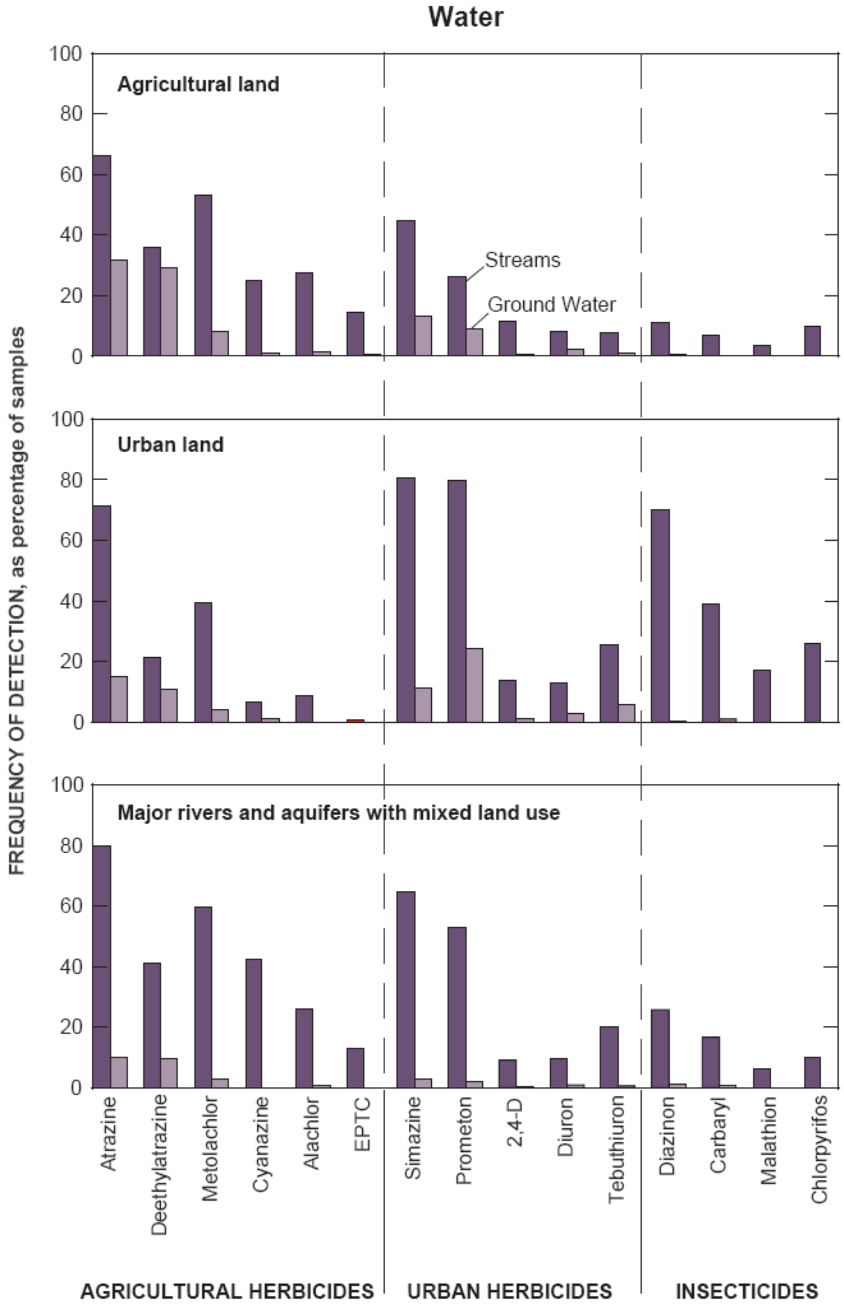

Figure 1-4: Occurrence of herbicide and insecticide detections in surface and ground water resources (USGS 1999).

Nonpoint Source Pollution Control Mechanisms

Definitions of nonpoint source pollution control mechanisms have evolved and vary among agencies, legislation, and states. In general however, terms such as best management practices (BMPs), management practices, management measures, BMP systems, management practice systems, resource management systems (RMS), and total resource management systems refer to actions, structures, planning measures that reduce the amount of a pollutant to move offsite (EPA 2003).

Management Practices

Since the term "best" in best management practice (BMP) can be highly subjective in interpretation, EPA recommends the use of *management practice*.

Management practices are designed to reduce the quantities of pollutants that are generated at and/ or delivered from a source to a receiving waterbody (EPA, 2003). Management measures, or best management practices (BMPs) can help reduce nonpoint source pollutants from entering the Nation's water resources (EPA 2003a, USDA-ERS 2003)

USDA maintains and updates the National Handbook of Conservation Practice which contains NRCS standards for individual management practices. Each state adapts the national standards to meet local conditions.

Management practices reduce nonpoint source pollutants to water resources by (EPA 2003a):

- Minimizing available pollutant (e.g. source reduction);
- Retarding the transport and/ or delivery of pollutants (e.g. conservation tillage); and/ or,
- Remediating or intercepting a pollutant before or after it is delivered to the water resource by chemical or biological transformation (e.g. filter strip).

Management Measures

Management measures contain groups of individual management practices that are integrated into a cohesive system for defined water quality goals (EPA 2003a). Similarly, USDA-NRCS uses management practice systems as analogous to EPA's management measures. For example, coupling the agronomic management practice conservation tillage with structural grassed waterways is a classic management measure or management practice system. Conservation tillage retards the amount of sediment and sediment bound pollutants from leaving the farm field; whereas, the grassed waterway intercepts and has the potential to remediate if sediment bound pollutants leave the farm field.

Surface waters can achieve rapid improvement when management practices that reduce the transport of chemicals are implemented. The response of management practices on ground water resources may require years or decades to yield benefits.

Nonpoint Source Pollution Abatement Programs

Historically, nonpoint source pollution has not been subject to federal Clean Water Act discharge permit requirements (EPA 2003a; and USDA 2002). Except for stormwater from designated municipal urbanized areas, industrial activities and construction projects. For regulatory purposes these stormwater sources of nonpoint pollution are defined as point sources. Beyond the regulated sources, of federal and state nonpoint source control programs have largely been voluntary and incentive-based (USDA 2002).

In response to the growing scientific understanding and public awareness of the increasingly dominated influence of nonpoint sources of pollution, Congress amended the Clean Water Act in 1987 to create a national framework for nonpoint source pollution. In the Act's Section 101 "Declaration of Goals and Policy", Congress added the following principle (EPA 2003a):

> *"It is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution".*

EPA Programs

National Estuary Program

Section 320 of the Clean Water Act requires EPA to administer the National Estuary Program (NEP). This program addresses point and non-point source pollution in high-priority watersheds of estuarine water resources (EPA 2003a).

Coastal Nonpoint Pollution Control Program

The Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 was authorized by Congress to address several resources concerns that included nonpoint source pollution. This Act required EPA, National Oceanic and Atmospheric Administration (NOAA), Fish and Wildlife Service (FWS), and other federal agencies to publish guidance for management measures to control nonpoint source pollution (EPA 2003a). In Section 6217(g)(5) of the CZARA, management measures were defined as (EPA 2003a):

> *"economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint source control practices, technologies, processes, siting criteria, operating methods, or other alternatives"* .

Total Maximum Daily Loads

A TMDL is a process established in the CWA (1972) for implementing State water quality standards when non-attainment is found and is based on the relationship between pollution sources and in-stream water quality conditions. A total maximum daily load is the sum of point source contributions, non-point source contributions and a margin of safety (EPA 1991). Results of the TMDL are used to plan, implement and evaluate activities that cause non-attainment of applicable water quality criteria.

Measurement and assessment of the performance of TMDL programs is currently based primarily on the assessment of point source reduction required to meet goals set and regulated under the NPDES program. Absent effective tools to assess the effectiveness of non point source control measures the performance and load reductions of those measures are largely calculated based on predictions o load reductions. While some of those measures have and can be assessed through watershed wide aggregations of load reductions based on percent implementation of specific control measures there is no set methodology, particularly for agricultural controls, to predict and evaluate the effectiveness of those controls. The methodology proposed in this report can provide a mechanism to more accurately predict and plan for implementation programs to meet TMDL goals.

Pesticide Programs

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) authorize EPA to regulate pesticides that may threaten ground and surface waters. This law requires pesticides to be registered and include enforceable label requirements. Label restrictions may limit maximum application rates, application use practices, and classify the product as a restricted use pesticide. Restricted use pesticides require certified applicators to handle and apply the pesticide.

Source Water Protection Program

The 1996 amendments to the Safe Drinking Water Act require states to develop comprehensive Source Water Assessment Programs (SWAP). The purposes of these programs are to identify areas that supply public drinking water; inventory contaminants and assess water system susceptibility to contamination; inform public of results

USDA Programs

Since the 1930’s, the US Department of Agriculture (USDA) has a long history of protecting the environment by promoting soil erosion control practices and wildlife habitat. However USDA had not emphasized water quality concerns attributed to agricultural production until the late 1980’s.

The USDA oversees diverse national programs and goals that include information dissemination and public awareness, farm income support, increase commodity production and exports, protect the nation’s food supply, manage the nation’s forests, improve nutrition, and promoting land and water conservation programs through non-regulatory mechanisms. Often, these programs have competing objectives and for limited funding. Although USDA had ten programs available specifically for water resources, these programs promoted soil conservation practices to address water quality concerns (GAO 1990).

Goals of USDA conservation programs are to address multiple environmental concerns such as (wind and water borne) soil erosion, water quality, wildlife habitat, air quality and urban sprawl. These are achieved with compensation for private landowners who remove environmentally sensitive land from crop production, and/ or implement conservation practices on actively managed cropland (GAO 2002).

Originally authorized by Congress in the 1885 Food Security Act (Farm Bill), the Conservation Reserve Program (CRP) is the USDA's largest environmental program which temporarily "retires land" that removes whole crop fields from production and planting with native grass species or trees. At a cost of about $19.5 billion, more than 36.4 million acres, 10% of the nation's total cropland, were enrolled in this program by 1992 (GAO 1995).

Critics questioned the program's cost-effectiveness and environmental benefits, and stated that USDA focused on meeting congressionally-established acreage reduction goals and not specific environmental goals such as water quality. Thus, the critics argued, CRP could have provided more environmental benefits if the program goals had been to improve water quality by targeting CRP acres to "buffer zones", Critics recommended "targeting" CRP to only those portions of farm fields adjacent to waterways. GAO estimated that only 6 million cropland acres would need to be enrolled into conservation easement programs to provide environmental and water quality benefits at a fraction (22%) of the costs of $396 million per year (GAO 1995; NRC 1993; and GAO 1992).

USDA responded that whole-field enrollment CRP did fulfill congressional goals that reduced soil erosion, improved wildlife habitat for migratory waterfowl, and served as a cost-effective form of land retirement for commodity price support and farm income support (GAO 1995). Examples of other land retiring programs that provide environmental benefits include:

- Farmland Protection Program
- Forest Land Enhancement Program
- Grazing Land Reserve Program
- Wetlands Reserve Program
- Wildlife Habitat Incentives Program

Improving water quality was not the priority objective of the original 1985 CRP and merely reflects a "potential" environmental benefit to CRP's primary objectives to reduce surplus crop protection and support farm income. This opinion was clearly stated by USDA in response to a GAO review of the CRP program (GAO 1995):

> *"If it is determined that improving surface water quality is the primary objective of a future CRP, then the program should actively target buffers strips and a relatively small program would be warranted"* .

Congress and USDA modified CRP in both 1990 and more substantially in 1996, when officials targeted CRP funding for water quality benefits in the 1990 Farm Bill, and riparian buffer zones with the creation of the Conservation Reserve Enhancement Program (CREP) in the 1996 Farm Bill (GAO 2002; and, GAO 1995).

Since USDA also provides funding to landowners, farmers and ranchers for conservation practices on actively managed lands, other conservation programs are available. Moreover, as the number of CRP acres becomes un-enrolled as contracts expire, or farmers enroll in newer CRP programs that target riparian buffer zones, actively producing cropland will increase. Beginning in 1996, and more significantly in 2002, Congress and USDA shifted focus of the conservation provisions of the Farm Bill to address conservation practices on actively working production (WPP) land.

The Environmental Quality Incentives Program (EQIP), begun in 1996, compiled the ten water quality programs into a single, less confusing, program to specifically address water quality concerns. The program focuses technical, educational, and financial resources to farmers and ranchers and develops conservation management plans on the actively producing cropland. A stated goal of this conservation program is to “optimize the effectiveness of the conservation practices” (Rausch et al 1997).

Problem Statements

In most watershed programs various endpoints define the water quality problems and the control objectives or endpoints of concern to the watershed. Each individual watershed program should focus on identification and prioritization of questions related to the application of BMPs to abate non-point sources of pollutants of concern.

The following problem statements that may be applicable to a watershed program can be addressed by adopting the methodology described in this report:

- What are potential aquatic habitat and human health benefits from watershed non-point source pollution abatement practices (BMPs)?
- Which critical factors control the timing and magnitude of aquatic habitat and human health benefits?
- Which of these factors can be influenced through non-point source pollution abatement practices (BMPs)?
- Among those factors that can be influenced through pollution abatement practices (BMPs), which ones are most important for creating short-term and long-term aquatic habitat and human health benefits?
- Can the aquatic habitat and human health benefits of the pollution abatement practices (BMPs) be quantified? If so, how much and what type of information is necessary to measure the benefit?

- Which of the watershed non-point source pollution abatement practices from other programs (BMPs) can be applied to this watersheds (and vice versa)?

The elements of the framework introduced below and described more fully in Chapter 2 address these and other problems.

Framework for Evaluation of Non Point Source Pollution Abatement Programs.

The framework for the evaluation of non point source pollution abatement that has been developed in this project and illustrated in a case study in the Big Walnut Creek watershed uses a version of the USEPA watershed approach as the organizing tool within which the assessment framework can be executed. In Chapter 2 a general context of how the framework fits within the watershed approach will be described. The framework itself is complex and adaptable to different watershed problems and programs as will be elaborated and illustrated in detail in the body of this report.

Details of the framework will be illustrated in the following chapters of this report and in the case study presented in a separate parallel report “Big Walnut Creek; Case Study to develop a methodology for measuring the effectiveness of nonpoint source pollution abatement programs” the framework was developed to provide detailed and specifically applicable guidance for the implementation of BMPs within a watershed program. While our case study provided the mechanism for developing and testing the integration of the framework into a watershed program often our case study was not able to perform some of the recommended evaluation and modeling steps until after implementation. What we describe in this report is a methodology that can integrate the evaluation and selection of more optimal BMPs earlier into a watershed program in order to more effectively use resources to select and rank BMPs for adoption to achieve targeted results. Chapter 2 will describe the evaluation framework and the remaining chapters of this report will illustrate how the portions of the evaluation framework integrate into each of the stages of a watershed management program.

References

Adler, R.W. 1994. *Reauthorizing the Clean Water Act: Looking to Tangible Values.* Water Resources Bulletin 30(5):799-807.

EPA, 1991. *Guidance for Water Quality-based Decisions: The TMDL Process.* EPA 440/4-91-001. U.S. Environmental Protection Agency, Office of Water (WH-553), Washington, DC.

EPA and USDA, 1998. *Clean Water Action Plan: Restoring and Protecting America’s Waters*. Feb.

EPA, 2002. *National Water Quality Inventory: 2000 Report to Congress*. EPA 841-R-02-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA, 2003a. *National Management Measures for the Control of Nonpoint Pollution from Agriculture*. EPA-841-B-03-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA. 2003b. *Draft Report of the Environment.* EPA 260-R-02-006. US Environmental Protection Agency, Environmental Indicators Initiative. Washington, D.C.

EPA, 2005. *Handbook for Developing Watershed Plans to Restore and Protect Our Waters: DRAFT.* EPA 841-B-05-005. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

GAO. 1990. *AGRICULTURE: USDA Needs to Better Focus Its Water Quality Responsibilities.* GAO/RCED-90-162. US General Accounting Office. Resources, Community, and Economic Development Division. Washington, D.C.

GAO. 1995. *Conservation Reserve Program: Alternatives Are Available for Managing Environmentally Sensitive Cropland.* GAO/RCED-95-42. US General Accounting Office. Resources, Community, and Economic Development Division. Washington, D.C.

GAO. 2002. AGRICULTURAL CONSERVATION*: State Advisory Committees' Views on How USDA Programs Could Better Address Environmental Concerns.* GAO/RCED-02-295. US General Accounting Office. Resources, Community, and Economic Development Division. Washington, D.C.

ITFM. 1995. *The Strategy for Improving Water-Quality Monitoring in the United States. Technical Appendices.* Final report of the Intergovernmental task Force on Monitoring Water Quality, Intergovernmental Task Force on Monitoring Water Quality, Washington, D.C. February.

Knopman, D.S., and R.A. Smith. 1993. *Twenty Years of the Clean Water Act*. Environment 35:17-34.

National Research Council. 1993. *Soil and Water Quality: An Agenda for Agriculture.* National Academy Press, Washington, D.C.

National Research Council, 1999. *New Strategies for America's Watersheds*. Committee on Watershed Management. National Academy Press, Washington, DC.

Rausch, J., Sohngen, B., Norland, E. 1997. The Environmental Quality Incentive Program: EQIP. AE-2-9. The Ohio State University Extension, Columbus, OH.

USDA-ERS. 2003. *Agricultural Resources and Environmental Indicators*. Agricultural Handbook AH722. US Department of Agriculture, Economic Research Service, Washington, DC.

USDA-ERS. 2006. *Agricultural Resources and Environmental Indicators, 2006 Edition*. EIB-16 US Department of Agriculture, Economic Research Service, Washington, DC.

USGS, 1999. *The Quality of Our Nation's Waters: Nutrients and Pesticides.* US Geological Survey Circular 1225. U.S. Department of Interior, U.S. Geological Survey. Reston, VA.

USDA. 2002. *Water Quality and Agriculture: Status, Conditions, and Trends*. US Department of Agriculture, Natural Resources Conservation Service. Working Paper #16.

USGS, 2006. *The Quality of Our Nation's Waters: Nutrients and Pesticides.* US Geological Survey Circular 1291. U.S. Department of Interior, U.S. Geological Survey. Reston, VA.

Chapter 2 FRAMEWORK

Introduction

The framework that this project used to evaluate and optimize the effectiveness of non-point source pollution abatement programs was developed to support the USEPA watershed management approach. The watershed management approach is an adaptive water resources planning and management process that fosters integrated partnerships to address water resource issues (EPA 1991; EPA 1996; EPA 2005a; EPA2005b; NRC 1999).

A watershed is a geographic area where surface waters converge to a common downstream point. Watersheds vary in size and range from a few hectares to thousands of hectares such as the Ohio River Basin.

The watershed management framework is not new, but complements existing regulatory and voluntary-based environmental programs. The watershed management approach is intended to provide flexibility to organizations of various sizes and geographic areas and adapt to their specific situations (EPA, 1991). The watershed management approach entices organizations to advance beyond fulfilling programmatic requirements to solving complex water resources issues (EPA, 2005a).

The watershed management approach framework has been used by the National Estuary Program (NEP), Source Water Assessment and Protection Program (SWAPP), Total Maximum Daily Load (TMDL) program, Conservation Reserve Enhancement Program (CREP), among others.

Phases of the Watershed management approach

EPA recommends watershed groups adopt the following fundamental principles (EPA, 2005a and EPA, 2005b):

Partnerships: Identify those people affected by management decisions and engage them throughout the key decision making process through an established governance structure.

Geographic Watershed Focus: Activities are directed within specific geographic areas, typically the areas that drain to surface water bodies or that recharge or overlay groundwaters or a combination of both.

Sound Management Techniques based on Strong Science and Data: Collectively, watershed stakeholders link sound scientific data, tools, and techniques in an iterative decision making process.

Public Participation: Engaging the community increases the public's understanding and appreciation providing the greatest potential to modify behaviors, voluntarily, that results in attainment of water quality goals.

For this project, we define our framework and its ability to operate within seven key phases of the watershed management approach: identify problem; form partnership; characterize watershed; define problems; develop solutions and establish goals; create action plan; and, implement and evaluate (EPA, 1991; Ohio EPA, 1997, EPA, 2005a)

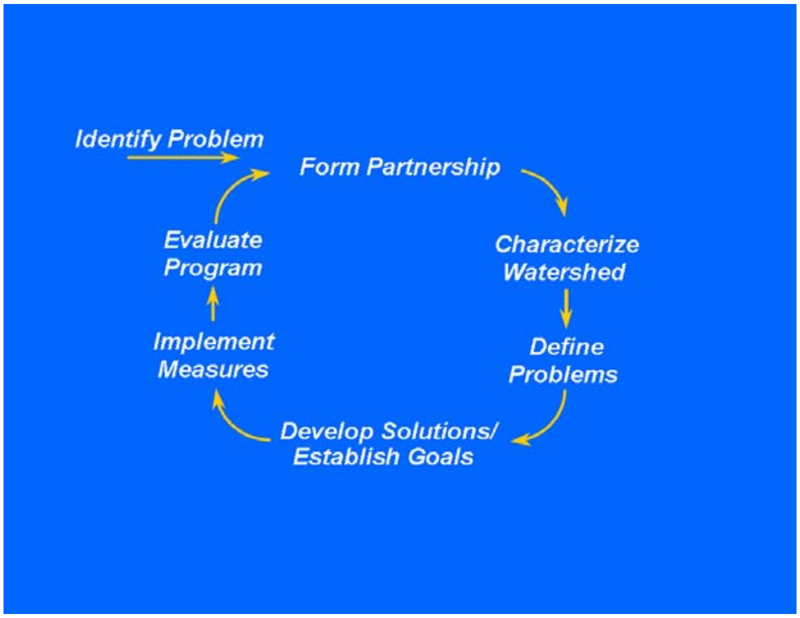

Figure 2-1 Diagram of the watershed planning process.

Potential benefits of this process include (EPA, 1996; OEPA, 1997):

- Engages the public as a community to resolve problems;
- Fosters locally-led participation and solution development;
- Integrates existing technical resources to develop effective solutions;
- Reduces duplicative and conflicting actions;
- Streamlines implementation and reporting of restoration programs;
- Provides accountability through measurable environmental performance; and,
- Strengthens teamwork and forms an *Esprit de Corp* among the public and private sectors at all levels.

Our methodology has been developed to illustrate a flexible and interactive framework designed to operate within an adaptive watershed management process. Figure 2-2 shows the generic view of how the framework fits within a watershed management approach and Figure 2-3 shows a more detailed flow chart of the framework itself. The steps of the flow chart have been divided into three main groups to simplify understanding of the relationship between the framework and the activities that a watershed group might accomplish to evaluate BMPs.

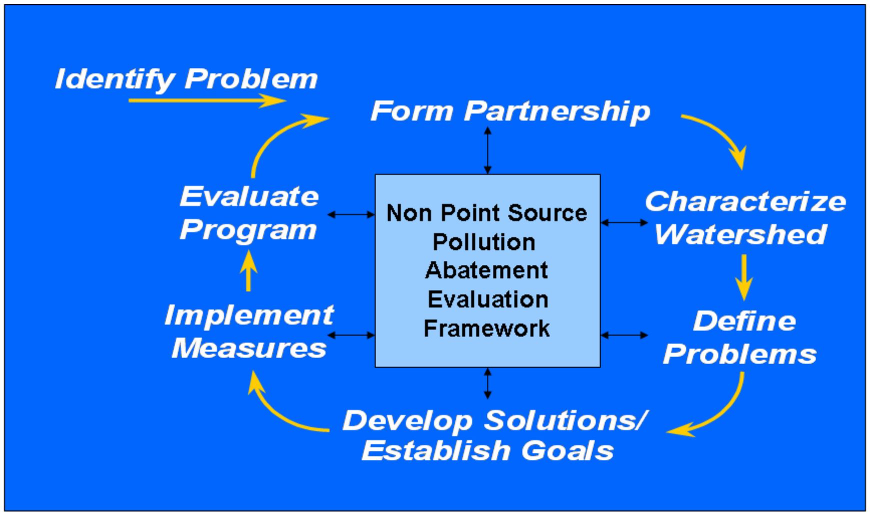

Figure 2-2 Relationship of evaluation framework to watershed management

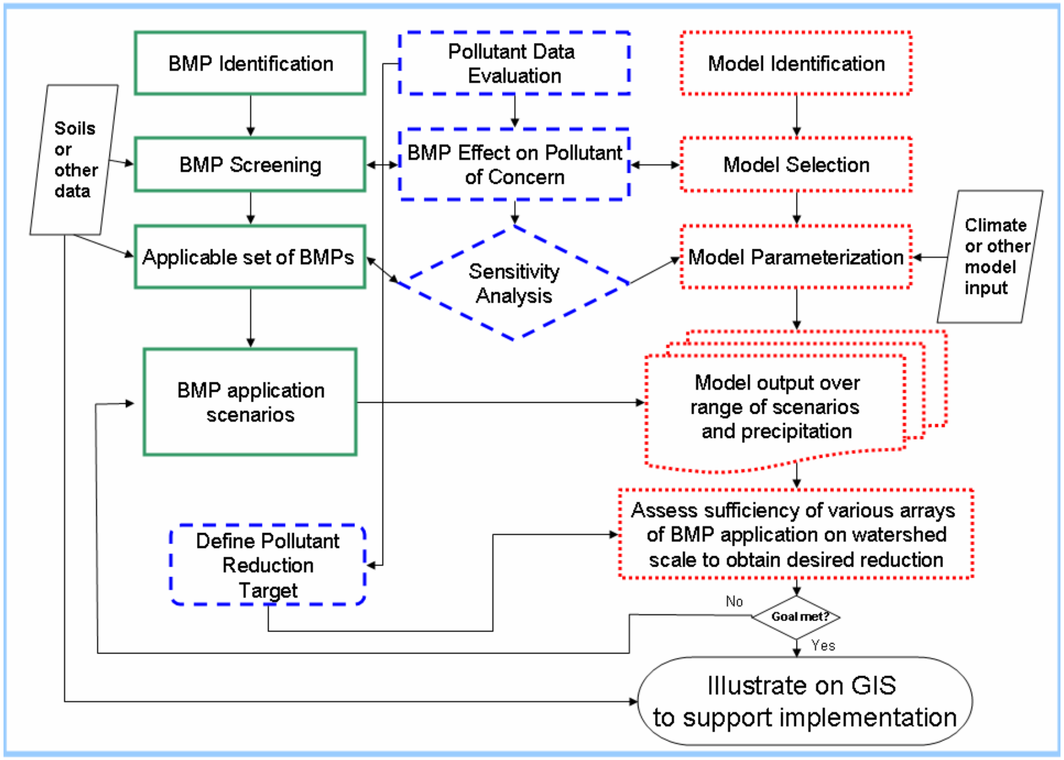

Figure 2-3 Methodology to evaluate non-point source control BMPs Dashed blue boxes Pollutant Evaluation, Solid green boxes BMP Evaluation, Dotted red boxes modeling.

The remainder of this chapter briefly summarizes the three parallel sets of evaluations of the non-point source methodology to support implementation of BMP evaluation within a watershed program.

Figure 2-3 above illustrates the three parallel sets of evaluations that are integral to measuring or predicting effectiveness of BMPS: Evaluation and selection of BMPs themselves, evaluation of the pollutant or pollutants of concern in the watershed, and identification and development of an appropriate model or set of modeling tools. Each of these three main themes interacts at various times during a watershed program and each is supported by external data sets that are critical to an effective evaluation.

Pollutant Evaluation

While pollutant evaluation is illustrated in the center of the flow chart in Figure 2-3 it is typically the starting point for developing a program of BMPs and for defining the needs and objectives of those BMPs. Watershed programs are typically developed to target locally important conditions or pollutants. Identifying and defining the pollutant (or pollutants) of concern drives the selection of BMPs and helps to provide criteria for selection of appropriate modeling tools.

The pollutant of concern can be identified in many ways. Typically a pollutant will be attributed to non-attainment of a downstream designated use. Some pollutants may be defined specifically by non-attainment of numeric criteria specific to a certain chemical.

That criteria can be a water quality standard, a drinking water standard or other criteria set to protect human health or the environment. In some instances the pollutant at the source may create a downstream effect that changes due to fate and transport properties of the source material. In other instances the pollutant may be more conservative and resultant downstream concentrations may be a more simple function of upstream loads.

The sets of information that need to be reviewed for a pollutant are the general properties of the pollutant, and the specific occurrence of that pollutant in the watershed. Those properties are critical to defining and developing an appropriate evaluation framework as well as to supporting the selection of appropriate BMPs to control that pollutant in the watershed.

The properties of a pollutant can generally be identified from review of the related literature. Literature values for physical and chemical properties of various important agricultural or other anthropogenic chemicals in the environment are generally accessible within the available literature. The success of both BMP implementation and defining an effective evaluation program for BMP implementation will be dependent on a clear understanding of the properties of the pollutants that are being controlled by those BMPs.

The pollutant concentration data available within a watershed are often far more limiting to effective evaluation than the literature values. Often a limited set of downstream concentrations may be available. The sampling frequency can often be intermittent and locations may or may not have been chosen with any clear management objectives. Source data may be available in terms of application rates and frequencies but often is not available in a truly quantitative form. At the early stages of a BMP evaluation project, gathering readily available pollutant source and fate information may be sufficient, but as an evaluation project develops some additional monitoring or other form of data collection can be required to support the parameterization of the model selected to support this evaluation.

Whatever the status of available pollutant data in a watershed; sufficient information must be gathered to support the selection and definition of BMPs to control that pollutant. However, the modeling approach used in our case study and many potential modeling frameworks do not always require detailed calibration of a fate and transport model to effectively evaluate the application of BMPs.

BMP Evaluation

During the initial problem identification and throughout a watershed program BMPs should be identified and screened for their ability to reduce pollutants of concern in that basin. Our methodology defines several discrete stages of BMP evaluation that can integrate with the development and evaluation of an implementation program.

An initial set of applicable management practices is either generally known or can be obtained by land managers within a watershed. Early in a watershed management program an effort should be made to identify other BMPs that control the pollutant of concern that might be applicable to the local problem. Our methodology then relies on an important external dataset to help screen and select applicable BMPs. Detailed soil information is typically a critical piece of information to determine the constraints on application and effectiveness of BMPs. Fortunately, soils data sets are available in most watersheds in some form and detailed digital soil maps are becoming increasingly available in agricultural watersheds. Using that soils data and input from discussions with watershed stakeholders that screens the potential BMPs to define those applicable to the local soils.

As a set of applicable BMPs are defined, they can then be researched and literature values for effectiveness can be collected to support the evaluation. One significant point of caution here is that literature values are often provided as averages or % effectiveness and might not always represent the effectiveness of a BMP for the subject conditions. For example, some pollutants are significantly more mobile during extreme rainfall events and the effectiveness of a BMP on average may not represent the effectiveness during those extreme conditions. The literature search therefore should not only identify effectiveness but should clearly define the conditions (climate weather soil types slopes etc.) under which the effectiveness was observed. Selection and parameterization of appropriate modeling tools will rely heavily on detailed knowledge of BMP effectiveness.

Once an applicable set of BMPs are identified the range of soils, slopes, and crop or land use conditions can be used to define scenarios of use for those BMPs to support simulating of a range of possible conditions. The scenarios should also include as much cost information as available in order to help illustrate any cost-effectiveness comparisons required to support future decision-making.

Modeling

Many modeling programs rely on the fate and transport approach used to evaluate point source loads, and contaminant migration from hazardous waste sites. Given the diffuse nature of non-point source loading detailed fate and transport modeling is not always possible nor is that level of effort always needed to develop solutions. While fate and transport properties of some chemicals may be well known often the numerous environmental factors present at the watershed scale require an extensive data set to provide sufficient calibration.

In our case study we selected a model to define the field scale source loading and define a downstream endpoint to evaluate the performance of the entire watershed. This approach does not ignore fate and transport so much as it is viewed as a black box. Within the fate and transport box, losses or transformations occur that may change the magnitude of the load received downstream from the combined sources. Those losses or transformations in many instances can be assumed to be constant or proportional, but are not essential to understanding the relative effectiveness of upstream BMPs.

To define and compare the effectiveness of BMPs the non-point source evaluation methodology used for this project relies on selecting accurate source modeling and using monitoring data combined with a risk based approach to evaluate downstream concentrations.

References

EPA, 1991. *The Watershed Protection Approach: An Overview*. EPA/503/9-92/002. US Environmental Protection Agency, Office of Water (WH-556F), Washington, DC.

EPA, 1996. *Why Watersheds?* EPA 800-F-96-001. U.S. Environmental Protection Agency. US Environmental Protection Agency, Office of Water, Washington, DC.

EPA, 2005a. *Community-based Watershed Management: Lessons From The National Estuary Program*. EPA-842-B-05-003. US Environmental Protection Agency, Coastal Management Branch, Washington, DC.

EPA, 2005b. *Watershed Approach Framework.* http://www.epa.gov/owow/watershed/framework.html US Environmental Protection Agency, Office of Water (WH-556F), Washington, DC.

National Research Council, 1999. *New Strategies for America's Watersheds*. Committee on Watershed Management. National Academy Press, Washington, DC.

Ohio EPA, 1997. *A Guide to Developing Local Watershed Action Plans in Ohio*. Ohio Environmental Protection Agency, Division of Surface Water, Columbus, OH.

Chapter 3 PROBLEM IDENTIFICATION

Overview

This chapter illustrates the process of how existing environmental information can be used to identify and prioritize watershed-based water quality concerns in a manner that will support effective evaluation of watershed BMPs. By developing a better understanding of specific water resource issues of concern, watershed stakeholders make informed decisions of restoring and protecting water resources (EPA 2003a; Yoder 1997). Without this environmental information, it is difficult, if not impossible for federal state and local entities to prioritize problems and evaluate the effectiveness of programs designed to achieve water quality goals (EPA 2003b).

Identifying water quality problems is a process of acquiring and examining environmental information. This information will be used to begin to formulate a causal relationship between water quality problems and upstream watershed land use and land management practices. Thus, the water quality issue of concern can be used to engage the appropriate watershed stakeholders who can influence land management changes on the landscape. Generally stakeholders include anyone with a vested interest in the watershed, for the purpose of forming an effective partnership to implement nonpoint source controls a stakeholder group must include individuals who control land use and can implement different land management practices. For example, certain water quality parameters are characteristic of rural agricultural landscapes. Therefore, the water quality data can be used to engage the agricultural community to take actions that reduce the occurrence of the contaminant of concern.

An established watershed partnership can identify water resource concerns and proceed through the watershed management framework and programmatic evaluation methodology presented herein. Alternatively, individual stakeholders can identify water resource concerns that can be used to provide the incentive to formulate a partnership. In either case, the methodology presented in this document is valid. We use problem identification as the initial phase in this report to demonstrate how individual stakeholders can use environmental data sets to effectively engage appropriate stakeholders, and provide the technical basis for evaluating effectiveness of stakeholder actions.

When a water quality problem has been identified, the subsequent watershed management actions commonly support a watershed restoration goal. If water quality problems are unknown, or documented as not occurring, then the watershed management process supports a water quality protection goal. Both goals can co-exist within a watershed and should be prioritized by the partnership and documented in the watershed management plan. Generally the framework provided in this report supports evaluation of restoration goals because restoration is more focused on reducing pollutants, however BMP evaluation tools can look at changes in land use and potentially identify thresholds causing adverse effects. The process would be very similar to the one described here for pollutant reduction but would instead look at losses of land with optimal management practices and define when those changes would result in inappropriate loadings of pollutants.

An objective of this project is to provide a methodology to document and evaluate a watershed-based cause-and-effect relationship between changes in land management and corresponding water quality. Watershed specific environmental data sets are needed to examine these relationships. Three initial steps in the BMP evaluation framework that was discussed in Chapter 2 should be accomplished during the problem identification stage of a watershed planning program to support effective selection and evaluation of potential management practices (Figure 3-1). The readily available information about the pollutant or pollutants should be collected. Current and potential BMPs designed to control the pollutant should be identified. An initial discussion or thought process should occur to define what modeling approach (not necessarily which model) would best be used, with existing data and would provide a cause and effect or input and output evaluation of changes related to watershed land use.

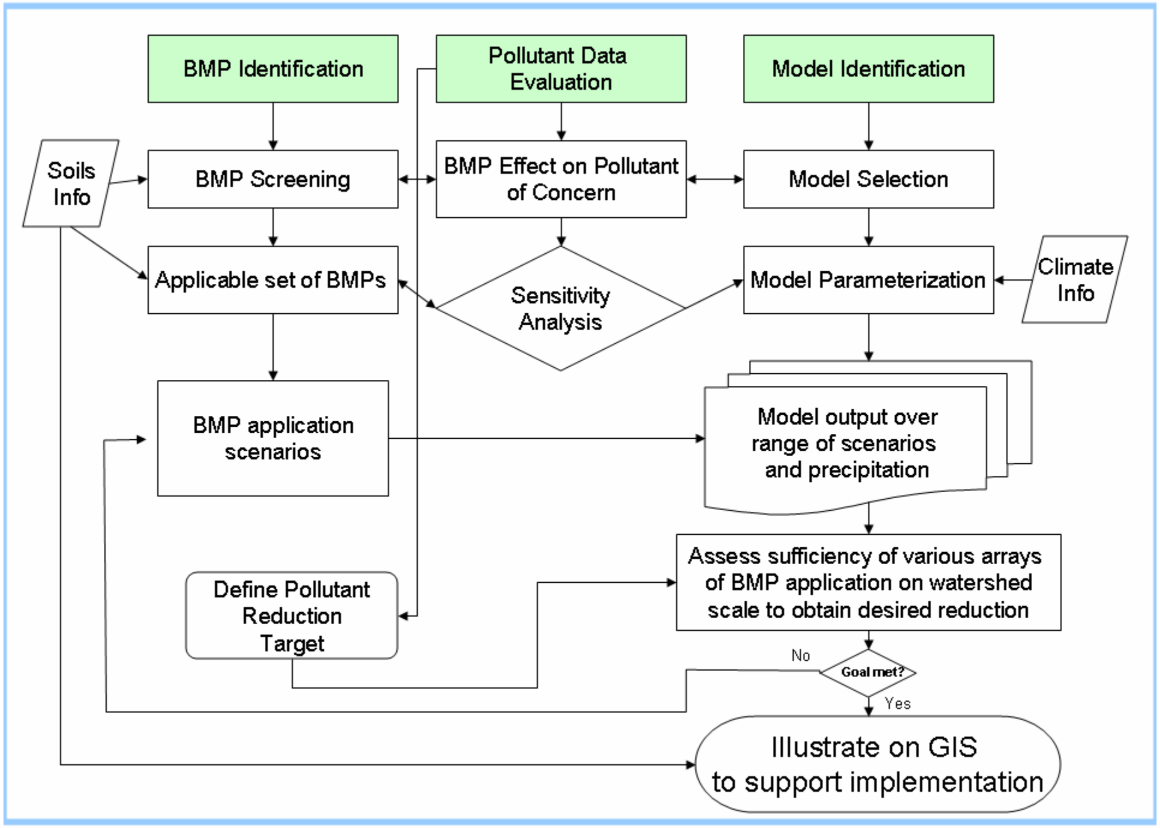

Figure 3-1 Initial Steps in Problem Identification needed to support evaluation of nonpoint source controls

Regardless of the approach selected, a literature review of existing information about the selected watershed should be conducted. Benefits of a literature review during this phase will more quickly advance a watershed group's general understanding of water resources; identify water quality issues; define applicable BMPs and, identify data and knowledge gaps.

Water Quality Information

Water quality monitoring information is the best approach to evaluate and validate if desired water quality changes have occurred due to changes in land management. Therefore, acquiring local watershed water quality data is critical to identify specific concerns, establish baseline conditions and basis for evaluation (EPA 1997; Yoder, 1997; and, Coffey, et al. 1995).

Existing water quality monitoring programs are excellent references to identify water resource issues. Nationwide, water quality monitoring programs have been established to achieve various objectives and goals. Monitoring data collected from these programs can be used by local watershed partnerships to identify specific water quality problems and thus where to focus their energies. Examples of commonly available water quality information include:

- State Water Resources Inventories, commonly known as 305(b) reports;
- Total Maximum Daily Load (TMDL) reports;
- Source Water Assessment Plans (SWAP);
- Academic research studies;
- Agency special studies from US Geological Survey (USGS), US Department of Agriculture (USDA) among others;
- Regulated water utilities and industry that extract or discharge water from the watershed; and,
- Voluntary monitoring programs.

A preliminary assessment of the documents and information collected during this period should be summarized. The reports will also help the watershed group to differentiate between point and nonpoint sources of pollution. Critical information to consider during the initial summary assessments may include:

- Types of studies conducted;
- Water quality parameters identified as problematic;
- Models and statistical tools used to assess the water resources;
- Key findings of the studies;
- Any efforts to implement or evaluate BMPs in the watershed

- Summary conclusions and recommendations.
- Contact information.

BMP Identification

When water quality data are limited or not available, another approach to identifying potential water quality problems can be achieved by modeling the watershed's landscape. For example, if land use changes are planned within a watershed, or new products are available for use in a watershed, it may be more prudent to examine the potential effects of changes in land management on water resources using environmental models prior to extensive water quality monitoring data collection. This approach can be used as a planning tool to examine potential outcomes. This approach will require a process that is documented in subsequent chapters of this report.

A critical outcome of either the water quality-based or landscape-based problem identification approach should reveal which watershed stakeholders should be engaged to address the identified water quality problem. Those stakeholders will ultimately be responsible for BMP implementation and initial contacts prior to forming a stakeholder group should be used to define the universe of potential management practices applicable to the pollutant of concern in the watershed.

Engagement of the stakeholder group early in the process can help frame the universe of potential management practices. While further evaluation of BMP applicability will certainly involve stakeholder input, initial engagement of stakeholders including academic, agency and others will define a list of management measures that can be refined by the processes in subsequent steps of the methodology. At this stage it is important to include a comprehensive list of management measures so that they can be evaluated both subjectively (generally by stakeholders) and more objectively (by direct measurement, literature review, or model output).

Model Identification

In this early stage of BMP evaluation a watershed program should make some initial evaluations about the modeling approach that will provide the most useful tool for evaluation of BMPs. In data rich watersheds, detailed fate and transport modeling might be available to assess both the current source concentrations and the level of control required to meet a downstream goal. In most watersheds, fate and transport modeling would be limited both in accuracy and affordability because of the data required to support a calibrated hydraulic and hydrologic water quality model. In these watersheds some of the transport processes can be treated empirically in a modeling approach and the changes in source concentration can be assumed to be proportional or related in some readily verifiable way to the downstream concentration. We refer to this as a cause and effect relationship where tools are used to estimate changes in the source (cause) and simple mathematical relationships are used to equate that change to a change in the downstream concentration (effect). In these cases source models can provide sufficient information to evaluate the potential effectiveness of BMPs to control a pollutant.

Because of the cost and effort implications the definition of modeling alternatives and levels of detail required to support different goals should be defined early in the process. The methodology in this report has been developed to support a cause and effect approach which is consistent with the level of effort suited to many watershed programs. Our case study was helpful in defining this approach.

References

Coffey, S.W.; J. Spooner, and M.D. Smolen. 1995. *The Nonpoint Source Manager's Guide to Water Quality and Land Treatment Monitoring.* North Carolina State University, Water Quality Group, Department of Biological and Agricultural Engineering, Raleigh, NC.

EPA. 1997. *Monitoring Guidance for Determining the Effectiveness of Nonpoint Source Controls*. EPA-841-B-96-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA, 2003a. *Draft Report on the Environment: Technical Document*. EPA-600-R-03-050. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

EPA. 2003b. *Elements of a State Water Monitoring and Assessment Program*. EPA 841-B-03-003. U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds, Washington, DC.

Yoder, C.O. 1997. *Important Concepts and Elements of an Adequate State Watershed Monitoring and Assessment Program.* ASIWPCA Standards and Monitoring Task Force. Prepared for U.S. EPA Office of Water Cooperative Agreement CX825484-01-0. Washington, DC.

Chapter 4 PARTNERSHIP FORMATION

Overview

Water Quality in the United States has improved in recent decades through programs that regulate pollutant discharges from point sources. Yet, more than forty percent (40%) of the nation's waters remain impaired, primarily from nonpoint source pollution runoff. Sources of this runoff are widespread and complex from a variety of land uses that range from urban, agricultural, mining, forestry, and others. The focus of restoration must move beyond the water resource itself, but address how the land is used and managed. Thus, solving the cumulative effect of land use sources of pollution requires a comprehensive and integrated approach that fosters collaboration among diverse groups of watershed stakeholders (EPA 1991; EPA 2001; EPA 2003; EPA 2005).

Stakeholders are those individuals and organizations that have a vested interest in the achieving the defined water quality goals. Stakeholders can include, but are not limited to, a broad range of local citizens, landowners, conservation organizations, private enterprise, and community water utilities, local, state and federal governmental agencies (EPA 1991; EPA 2003; and, EPA 2005a). Interaction with a stakeholder group is essential to the watershed approach and it is critical in supporting a methodology for evaluation of pollution control programs implemented in a watershed.

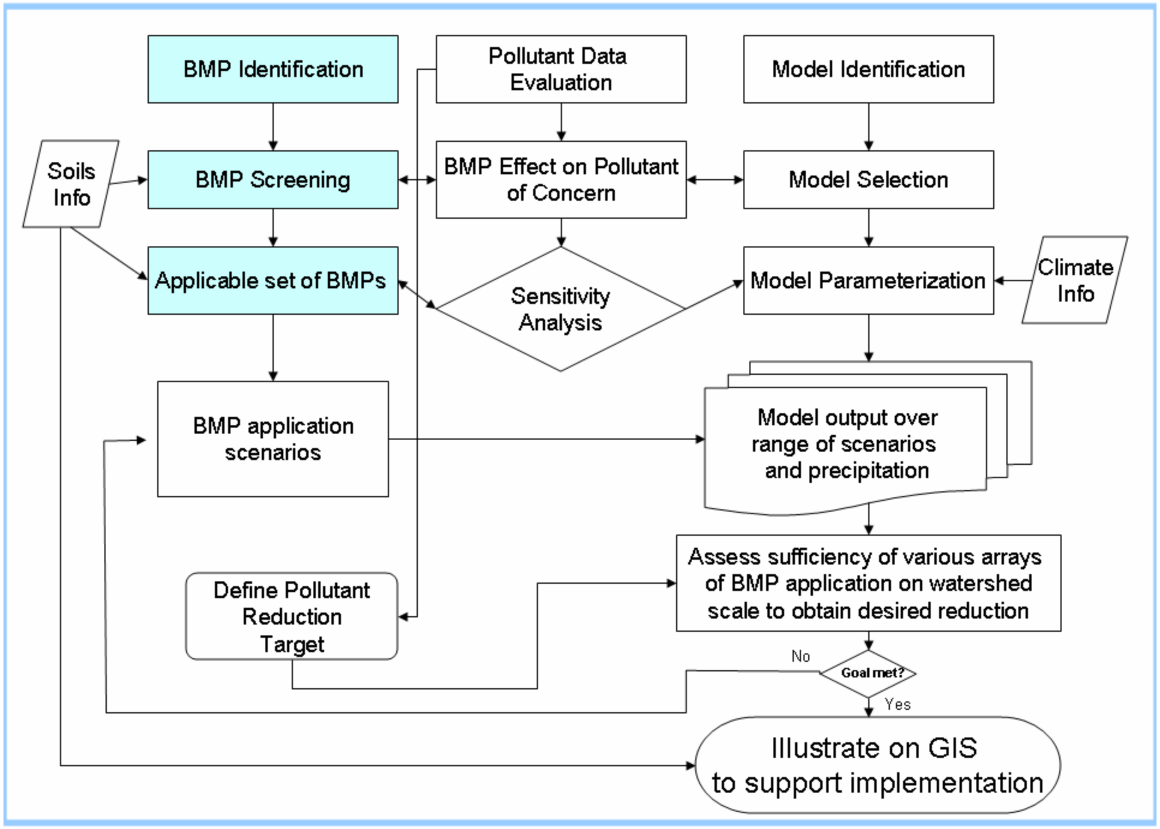

Figure 4-1 The role of the watershed partnership supports BMP screening and evaluation.

Figure 4-1 highlights the BMP evaluation processes where input from watershed stakeholders is critical. Though the stakeholder partnership can assist with numerous steps in the BMP evaluation methodology, their most critical role is in the identification and selection of applicable best management practices. As the pollutant of concern will have been identified in the earlier stages of the watershed approach the critical stakeholders who control land uses related to that pollutant should be engaged. Those stakeholders may have some knowledge of existing or alternative land use management practices related to that pollutant. Other important partners might be agencies or organizations who interact with or provide advice to the land use managers. In our case study those stakeholders included Soil and Waters Conservation Agencies and Agricultural chemical manufacturers.

The activities of the watershed partnership are critical to an effective program of BMP evaluation since a set of pollution control practices not only has to be effective but has to be adoptable by the land owners or managers in the watershed. This role should be stated to the stakeholder group early in the process to focus their efforts on screening and selection of applicable management practices. Stakeholders should be asked to define which management measures are feasible to implement and also asked to define both subjective and objective measures of the relative feasibility of different measures. If a management practice is not acceptable or adoptable there is little point in defining or modeling its effectiveness at controlling nonpoint source pollution. In agricultural watersheds management practices can effect crop yield, planting and harvesting logistics and other factors economically important to farmers. In non-agricultural watershed other land use partners should be sought out to provide input. Turf grass management in suburban settings or golf courses may be an important source of pollutants such as nutrients that can be altered by adoption of different fertilizer application procedures. Both private landowners and commercial turf grass managers could provide important input on the applicability and viability o different practices.

Though much of the information received from the partnership will be both valuable and valid an effective evaluation process will need to question the assumptions of the stakeholders so that BMP screening is as objective as possible. Working with the stakeholder group to define real verifiable costs and benefits will help to support selection of BMPs that can provide the most benefit for the least cost.

In addition to BMP evaluation the partnership should be involved in other steps of the evaluation process on an as-needed basis to validate assumptions about BMP effectiveness, model parameter selection and other issues tied to land use management. The partnership will also have a major role in helping to support the actual implementation by facilitating the adoption of BMPs by an appropriate proportion of stakeholders as defined by the optimization methodology that will be defined in Chapter 6 and 7.

The case study presented below demonstrates how water quality data was used to drive the formation of a partnership to address an identified water quality concern.

References

EPA 1991. The Watershed Protection Approach. EPA/503/9-92/002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA 2001. *Protecting and Restoring America's Watersheds.* EPA-840-R-00-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA 2003. *Getting in Step: Engaging and Involving Stakeholders in Your Watershed*. EPA. Environmental Protection Agency, Office of Water, Washington, DC.

EPA 2005. *Handbook for Developing Watershed Plans to Restore and Protect Our Waters: DRAFT.* EPA 841-B-05-005. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

Chapter 5 Watershed Characterization

Overview

The ability to evaluate the effectiveness of a watershed-wide pollution abatement program is predicated on obtaining sufficient information to establish a causal relationship between a watershed's landscape and the quality of its water resources. Figure 5-1 illustrates the evaluation framework and how the environmental data collected during this phase will be used throughout various stages of this methodology. Information acquired during this process will be used to verify the initial motivating factor that was established in Problem Identification; characterize physical features of the watershed; characterize existing land management practices; identify potential best management practices (BMPs); examine appropriate models; and, establish a technical foundation for program evaluation.

The process of watershed characterization can be separated into the following three categories:

- Conduct literature review of the pollutant of concern;
- Conduct data inventory of landscape features and water resources; and,
- Establish technology and information management protocols.

Today's desktop technology and information management software enable an efficient integration of the data collected into this evaluation framework. Acquiring sufficient information to characterize the watershed can be more efficiently achieved when stakeholders collaborate to identify, share and validate sources of information

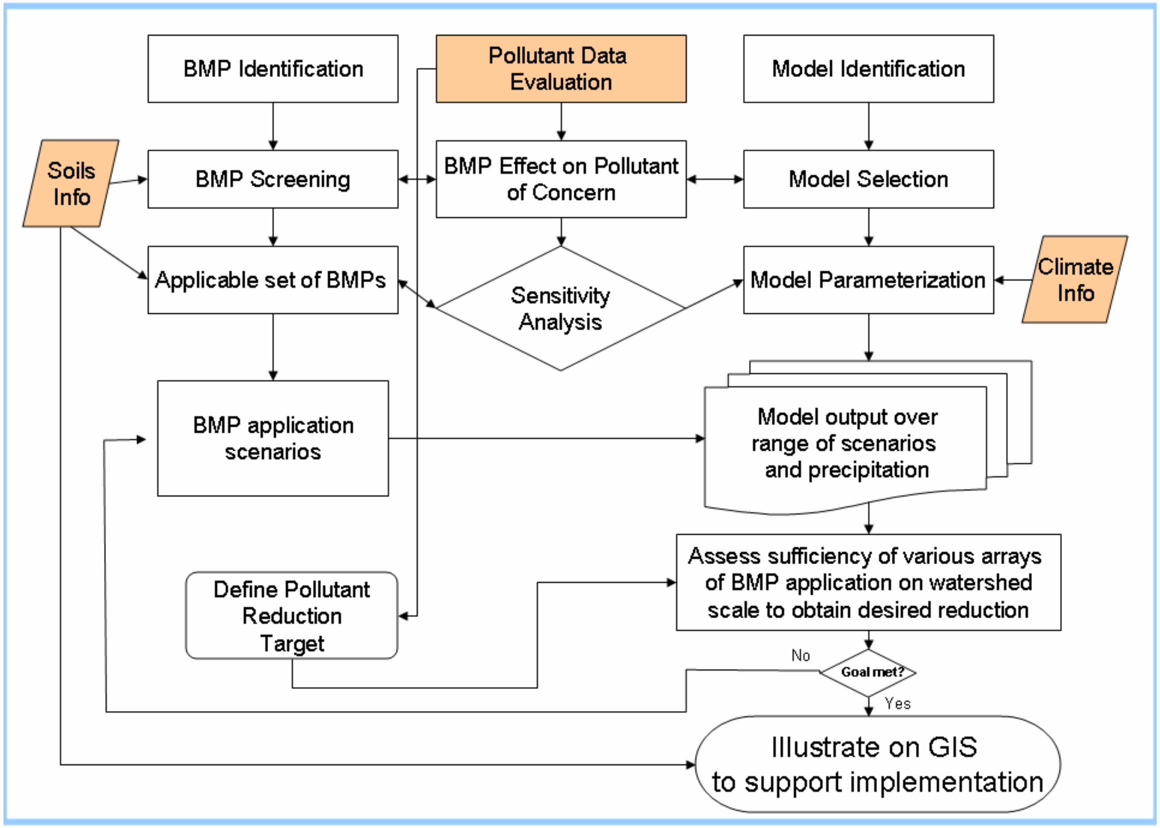

Figure 5-1: Watershed Characterization elements of nonpoint source pollution abatement evaluation framework.

Literature Review

A more detailed review of existing published literature about the pollutants(s) of concern should be conducted during this phase. Specifically, information should be acquired that characterizes how the identified pollutant of concern is used or managed on the landscape, and its occurrence in the environment. The resultant compilation of information will enhance watershed stakeholders understanding of the pollutant to compare with the project watershed data. For example, certain pollutants (such as Atrazine as described in our Case Study) exhibit characteristics that they occur seasonally at higher concentrations in surface water systems. Data collected during the data inventory of the project watershed should be assessed to determine if the identified pollutant of concern exhibits similar characteristics as reported in published articles. Lastly, the literature review will help watershed planners begin to identify which types of environmental data are needed to be integrated into the nonpoint source pollution evaluation framework.

The Internet has become an excellent tool to access a vast array of publicly available environmental information to conduct a pollutant literature review and acquire environmental data to characterize a watershed.

Data Inventory

The basis of the evaluation framework presented in Figure 5-1 is built upon acquiring existing and readily accessible environmental data sets. Conducting a watershed data inventory and potential sources of that data has been well documented elsewhere (EPA 1995; NAS 2003). Also, states that have published guides for developing watershed management plans often provide regional and local references for environmental data (Ohio EPA 1997; IDEM, 2003).

Data types to consider to characterizing a watershed should consist of water resources and landscape based information. Environmental data used to characterize the watershed should not be limited to simply summarizing physical attributes of the watershed, but integrated into the Evaluation Framework presented in Figure 5-1. For example, geospatial soil data and field-scale management practices can be integrated into a model to assess the most effective best management practices (BMPs). Pollutant data (water quality monitoring data), if available, will be used to identify the problem, help define pollutant reduction goals, and validate effectiveness of program implementation. Climate data such as precipitation will be used for modeling the landscape and water quality data. For example, climatological data can be used to assess effects of variable precipitation on the fate and transport of a pollutant based on soils and land management practices. Conversely, climate data can also be integrated with water quality data to create general causal relationships between rainfall and occurrence of a pollutant in a water body.

Much of this data is readily available via the internet and in geospatial data format. There are several federal and state agency managed environmental data clearinghouses that provide up to date local data suitable for the watershed characterization process. An example is the recently developed data portal managed by the US Department of Agriculture known as Geospatial Data Gateway, http://datagateway.nrcs.usda.gov.

Although significant amounts of useful environmental data have become widely available across the nation, certain types of critical data can only be accessed at the local level. For example, field-scale geospatial and attribute land management data may only be obtained only by surveying individual land owners, or through collaborative partnerships with the US Department of Agriculture (USDA) county level service offices. Thus, engaging watershed stakeholders in the data collection process will yield site specific information necessary to model the watershed.

For all data acquired for the watershed characterization process, a quality assurance project plan (QAPP) should be developed and documented in accordance with EPA data quality guidelines (EPA 2002).

Information Management Technologies

Within the previous 10-years, technology has advanced to the degree that watershed managers no longer require expensive sampling and statistical analysis techniques, e.g. window surveys and probabilistic sampling, to evaluate and report on the implementation of nonpoint source management measures as described in EPA (1997). Today, watershed managers have access to substantial amounts of information for planning, modeling, tracking and evaluating program effectiveness because or recent technological advances in data acquisition through remote sensing, data utilization through geographic information systems (GIS) and data sharing through the Internet (Miller, et al., 2004).

Geographic information management systems (GIS) has become one of the most advanced software technologies suited for watershed characterization. This technology has rapidly developed in recent years that is reasonably cost efficient and requires a nominal amount of training to be sufficiently used in the nonpoint source pollution abatement evaluation framework.

Although GIS and other data management software technologies are readily available, watershed organizations must develop or rely upon a standardized data management protocol. Many of the federal and state agencies have developed data management protocols for geospatial data; some are listed in the references (EPA 2003 and USDA 2003). Watershed stakeholders should evaluate and select an appropriate data management protocol that best suites the community's interests. This approach will enable more efficient data and technology transfer among partners and data sharing outside of the project watershed.

References

EPA, 1995. *Watershed Protection: A Project Focus*. EPA-841-R-95-003. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA, 1997. *Techniques for Tracking, Evaluating, and Reporting the Implementation of Nonpoint Source Control Measures: Agriculture.* EPA-841-B-97-010. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA, 2002. Guidance for Quality Assurance Project Plans. EPA QA/G-5. EPA/240/R-02/009. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

EPA, 2003a. *Guidance for Geospatial Data Qualtiy Assurance Project Plans. EPA QA/G-5G.* EPA/240/R-03/003. Office of Environmental Information, Washington, DC.

IDEM, 2003. Indiana Watershed Planning Guide. Indiana Department of Environmental Management, Office of Water Quality, Watershed Management Section, Indianapolis, IN.

Miller, R.C; D.P. Guertin, and P. Heilman, 2004. *Information Technology in Watershed Management Decision Making.* Journal of American Water Resources Association (JAWRA) 40(2):347-357.

NAS, 2003. *New Strategies for America's Watersheds*. National Academy of Sciences, Committee on Watershed Management, Washington, DC.

Ohio EPA, 1997. *A Guide to Developing Local Watershed Action Plans in Ohio*. Ohio Environmental Protection Agency, Division of Surface Water, Columbus, OH.

USDA, 2003. *Manual for Managing Geospatial Datasets in Service Centers, Version 4.0.* AFY00.60000-00.UAO-SCM. U.S. Department of Agriculture, Service Center Modernization Initiative (SCMI)

Chapter 6 PROBLEM DEFINITION

Introduction

This chapter defines the process for supporting model selection and parameterization while collecting information to better define watershed problems. Problem definition is a key element in supporting the effective evaluation of nonpoint source BMP implementation. Diagnosing the nature and extent of the identified pollutant of concern accurately supports selection and development of appropriate modeling tools to estimate the effects of selecting and implementing BMPs. A clearly defined watershed problem is one where the identified pollutant and sources are known and the impact is quantified. Estimating the current pollutant loading will provide a foundation to develop and parameterize a model to determine how much pollutant reduction will be achieved by implementing BMPs in order to meet a water quality based goal.

Figure 6-1 illustrates the activities that should be completed to support evaluation of BMPs to control nonpoint source pollution. During the formation and development of the watershed partnership, a planning group should already have developed an initial list of potential best management practices to address a pollutant of concern. The group should also understand the fundamental fate and transport mechanisms of that pollutant. That information should have been used to create a set of criteria for developing a modeling approach. During this phase the group should explore all of the assumptions and data used to derive the initial conclusions and begin to definitively select a model capable of providing appropriate estimates of loading and or fate and transport as is applicable to the watershed cause and effect relationship defined to address the water quality concern. Watershed stakeholders should participate in the problem definition process. Specifically, they can validate, or more closely identify model parameter assumptions when site specific data are not readily discernable from the literature review.

A more detailed literature review of the fate and transport processes for the identified pollutant(s) of concern should be conducted during this phase. Specifically, the literature review should reveal pathways of how the pollutant moves through the environment, and factors that affect the movement of the pollutant throughout the environment. Information collected will be used to help evaluate and select appropriate pollutant transport models, data recommendations to parameterize the model, and identify modeling data gaps not obtained during the watershed characterization process. The literature review can also reveal the efficacy of potential best management practices (BMPs) that are applicable to the land use and define models or tools to estimate the effect of implementation of those BMPs. Our case study illustrates an example of how a black box model can be used effectively to evaluate BMP effectiveness on a watershed scale, but in some instances fate and transport modeling might be required if the resultant downstream concentrations are not clearly related to upstream loads but are heavily modified or influenced by instream process.

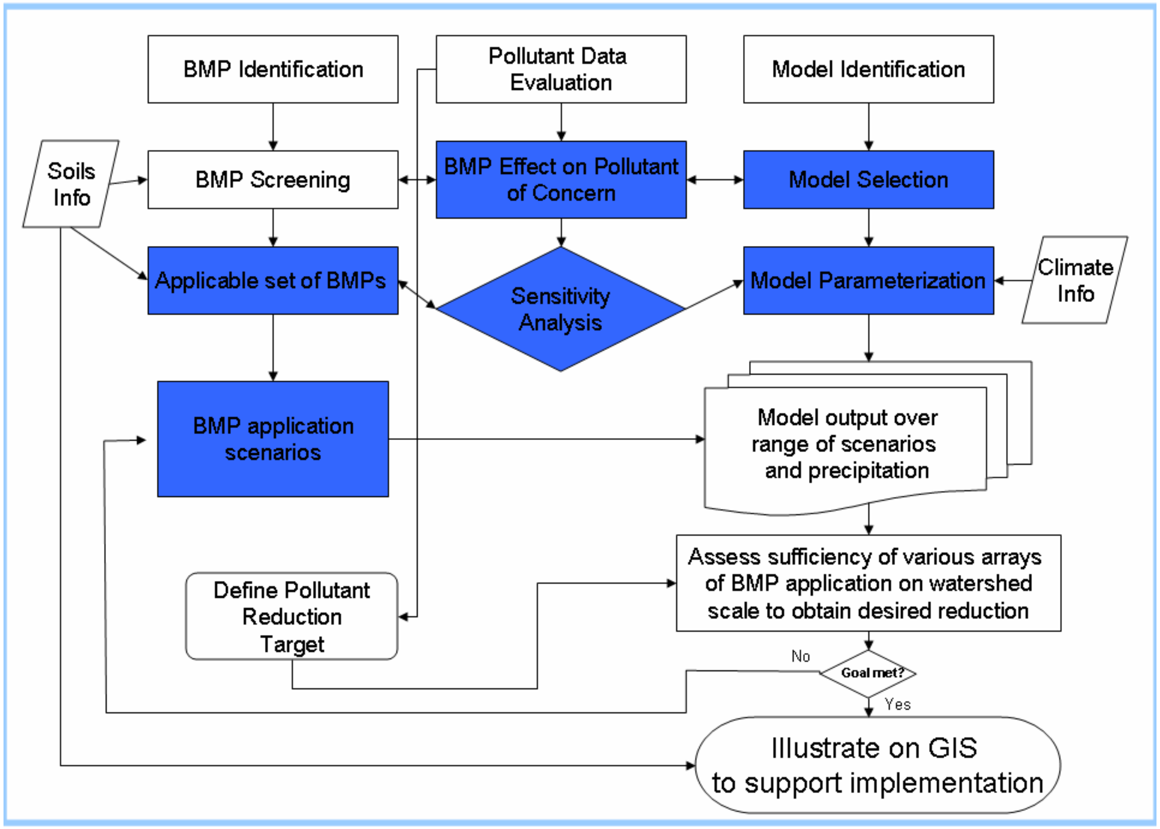

Figure 6-1 Problem definition activities required to support evaluation of non-point source pollution controls

Pollutant Data (Water Quality Data)

When pollutant data or water quality monitoring data are available, the data can be analyzed to estimate pollutant loads or other quantitative methods as a means of supporting model selection. If the practices for introducing or releasing a pollutant relative to a land use are understood, those should be the best indication of what type of best management practices are applicable to control that pollutant. If the mechanism of release or loss of a pollutant to a receiving stream is understood then selection criteria for specific modeling tools can be defined. It is at this point that sufficient data should be available to support the decision that a loading model as used in the case study for the project is sufficient to evaluate BMP effectiveness. In some cases where BMPs are available that target the detailed fate and transport mechanisms for specific pollutants it might require more detailed fate and transport modeling. However, our case study suggests that in most cases where BMPs are designed to address source control, fate and transport modeling may refine estimates of downstream concentrations but is not essential in evaluation of the effectiveness of BMPs.

Applicable Set of Practices

Results of the watershed characterization process should have revealed land management practices common to the project watershed. These management scenarios can be populated in a model to estimate baseline pollutant loading conditions. It is important to note that the scale of the evaluation of management practices is critical. Site specific analysis may require validation of land management practices whereas larger watershed-scale analysis may need only general descriptions of land management practices common to the study area.

Defining the problem should not be limited only to water quality data analysis. The user should establish an understanding how a pollutant of concern is used, managed and resultant fate and transport within the watershed landscape.

Once the applicable BMPs are defined a set of application scenarios or ranges of implementation percentage should be developed. These application scenarios will be used in conjunction with the modeling tools to develop an estimate of the portion of the applicable land use that will be needed in order to achieve the water quality goal. The development of the modeling tool specific to a project should be used to help test and refine a set of applicable BMPs

Model Selection

Models offer watershed planners an approach to estimate nonpoint source pollutant watershed-based loads, site specific loads, and ability to evaluate various alternative management scenarios. There are many models that exist today that can be readily adapted to a watershed pollutant of concern. Caution must be observed when using a model to assess pollutant transport and loading in a watershed. Several factors, but not a complete list to consider when selecting a pollutant loading model include:

- Objectives of analysis
- Scale of area modeled
- Relevance of the model to the watershed conditions
- Model credibility, i.e. has the model code been peer-reviewed and validated?
- Defining specific detailed questions the model will address

Whether a source model or fate and transport model is selected that model will need to be calibrated or have appropriate values of parameters set so that it provides estimates appropriate to the local watershed context. Often model documentation and known constants for pollutant properties are sufficient to select appropriate parameters for a baseline model. However in instances where the available data are insufficient to select appropriate values for a model input parameter, sensitivity analysis can be an important tool to help support setting that input.

Chapter 7 Establish Goals & Develop Solutions

Overview

This chapter will define how the framework for evaluating nonpoint source pollution controls can be used by watershed groups to establish goals and develop solutions to pollutant problems. It is in this phase that properly developed modeling tools provide a way to pre-evaluate the outcome of BMP application and determine the potential for those BMPs to meet targets. In many watershed programs (including the case study presented to support this report) BMPs are defined based on sound principals but the potential for an array of BMPs to meet a watershed wide goal is not tested or measured. Our framework suggests a method where different scenarios can be simulated to estimate the net effect of arrays of BMPs optimized for specific soil types, land uses or other site specific characteristics on the entire watershed. That estimate can provide powerful negotiating tools to use to work towards the implementation of an effective array of management practices.

Figure 7-1 illustrates the evaluation framework and how the pollutant data (water quality monitoring data) can be used to establish the watershed-wide goals. The pollutant data can be used to develop target load reduction goals. An array of BMPs selected to optimize pollutant reduction for each soil type or other appropriate site specific property are modeled. The model can be run in a randomized or monte carlo simulation mode to examine the potential reduction that can be gained by different proportions of land use managers adopting the appropriate BMPs for different source conditions or changes in land use. In an agricultural setting such as our case study the model can randomize which crop is chosen for each particular field for a given year to estimate effects of crop rotation as a change in land use.

Pollutant data

The pollutant data collected and review in earlier phase of the project can be used at this phase to estimate the change in load required across the entire watershed to meet the water quality criteria applicable to the pollutant of concern in the target area. In the case of a cause and effect model the load reduction may not be totally traceable to the downstream concentration. The source load reduction may be calculated, as it is in the case study, as a percent reduction of downstream concentration required translated back to a relative percent decrease in initial load released from the upstream land uses. If a more data intensive fate and transport approach is required the relationship of upstream load to downstream concentration may be more precisely quantified. However, our case study supports the assertion that fate and transport modeling is neither necessary nor more accurate for estimating BMP effects on downstream pollutants. A fate and transport approach has greater precision but introduces additional sources of error and is significantly more data intensive to accomplish on a watershed scale for even modestly sized watershed projects.

When water quality data is available, it can often be used directly to establish goals. Water quality standards, for human health or ecological end points, should be used to define the minimum water quality goals. The problem definition phase revealed the occurrence and magnitude of the water quality concerns. The difference between the observed pollutant occurrence and the water quality standards provides the basis to establish water quality goals.

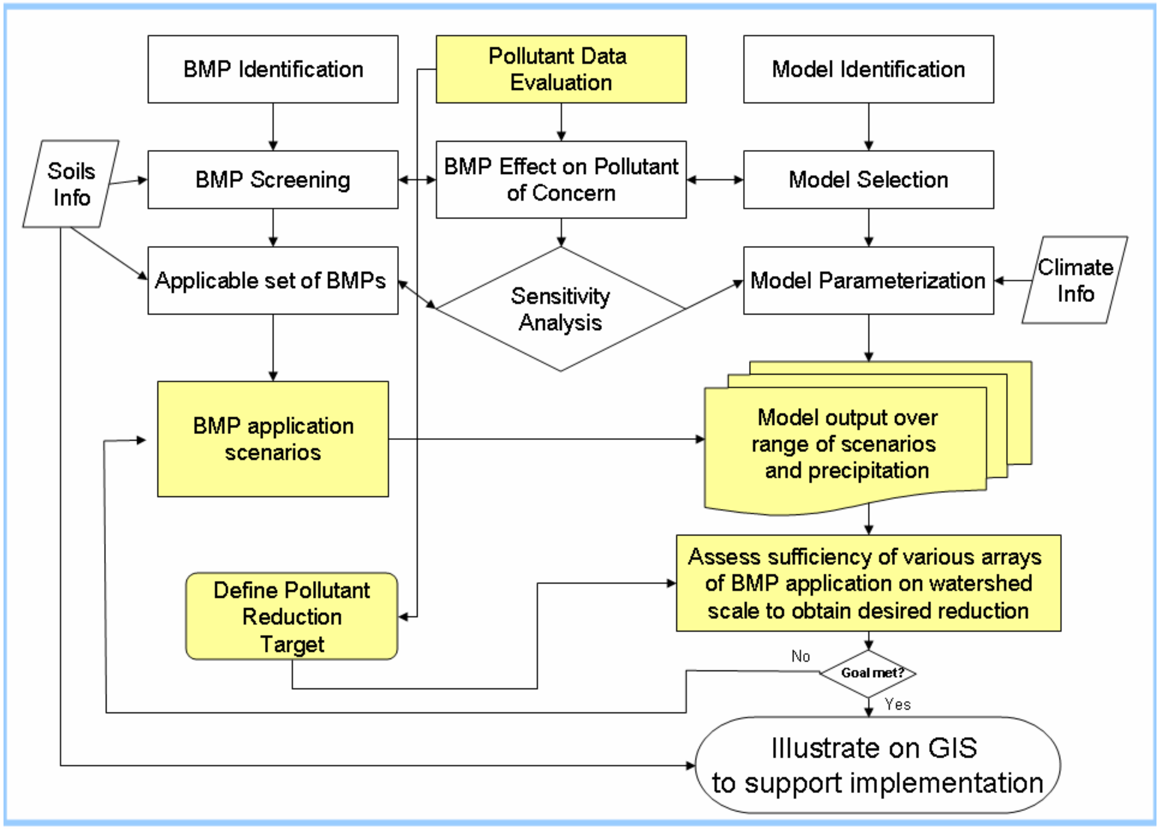

Figure 7-1 Framework elements needed to establish goals and identify potential solutions.

BMP Application Scenarios

Regardless of whether sufficient water quality data is available to calculate historic loading rates, assessing BMP application scenarios can be conducted through pollutant modeling. This approach can be very helpful when new products become available and little information about the occurrence of the pollutant in the environment is readily available. This approach enables “pre-planning” or development of “what-if” scenarios to estimate the potential affect on water resources before changes in land use and land management occur in a watershed.

Evaluating the array of management scenarios will reveal the potential solutions to attain water quality goals. The interaction of stakeholders and the evaluation program should by this point have defined individual management practices acceptable to stakeholders and applicable to controlling the pollutant of concern.

Modeling

The modeling tool can then be used to select optimal or best performing BMPs for each possible combination of applicable land use and soil type. The array of BMPs to model for estimating watershed performance would then be percent participation by land managers in implementing an optimal BMP for each applicable land use and soil. The modeler can then apply monte carlo simulation techniques to gauge the performance of different levels of participation over the entire range of available climate data. The model output can then be expressed as a probability of load reduction for any given weather year that can be compared to the target load reduction goal to evaluate whether the program is sufficient to meet the defined watershed need.

Chapter 8 Implementation

Overview

Based on recommendations developed according to the preliminary modeling described in Chapter 7, the watershed planners should have a good estimate of which management practices on each land use and soil type will provide the most effective reduction for the pollutant of concern. The model can then generate an estimate of the percent participation required to meet watershed wide pollution reduction targets. These optimal BMPs can then be mapped and used to illustrate the BMPs to convey the suggested possible arrays of BMPs to the land owners and managers. The modeling and mapping can also be used to illustrate areas where BMPs will provide little or no benefit or in some instances might even worsen nonpoint source control performance.

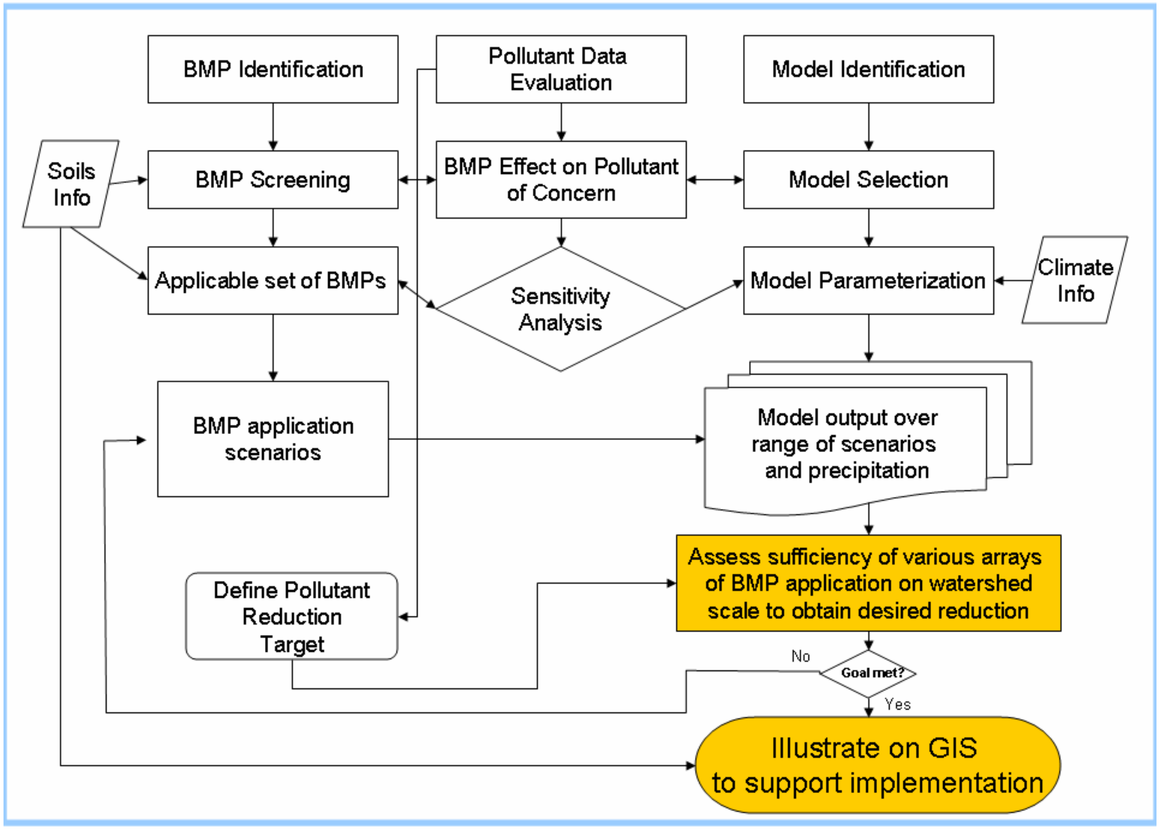

Figure 8-1 The output from the model estimates the potential effectiveness of BMP implementation and can be used to illustrate in which areas those BMPs should be applied.

The model can be used in two ways to guide implementation. The simplest form is to use the model output as a simple ranking tool to illustrate which BMP is the best performing on each land use. By selecting the highest ranked (and most implementable) management practice each land manager will inherently "optimize" their portion of load reduction. If the model has been fully developed and the different land use and soil categories are ranked and prioritized, the model output then provides a tool to determine the relative importance of applying management practices in one geographic area or soil type versus another. At that level of application the evaluation framework can be used to prioritize the efforts to enroll land managers into nonpoint source pollution control programs. The information management tools that can be populated with model output provide a valuable tool to illustrate those priorities to the stakeholder groups.

Information Management Technology

Today, watershed managers have access to substantial amounts of information for planning, modeling, tracking and evaluating program effectiveness because or recent technological advances in data acquisition through remote sensing, data utilization through geographic information systems (GIS), and data sharing through the Internet (Miller, et al., 2004). Information management technology can play a critical role in providing a low cost effective and efficient system that can track performance of BMP adoption and implementation. GIS software technology can enable watershed practitioners the ability to track where conservation funding and corresponding management measures have been implemented. This information provides a mechanism to assess the distribution of funding; which practices are being accepted, conversely which ones are not accepted. It is important to note that tracking this information alone is not sufficient information to determine if the watershed-wide conservation program is effectively achieving water quality or other environmental goals. The interaction of the model output and the GIS information system provides a critical link that estimates effectiveness of pollution control practices and illustrates where those practices need to be applied.

Using GIS technology provides a valuable resource to map the distribution of conservation measures that help illustrate where conservation has been adopted and where conservation efforts need to focus. GIS maps also provide helpful information for watershed stakeholders and public education and outreach. As an example, Figure 8-2 illustrates a section of the watershed in our case study and is thematically coded to indicate which management practices were employed on each field.

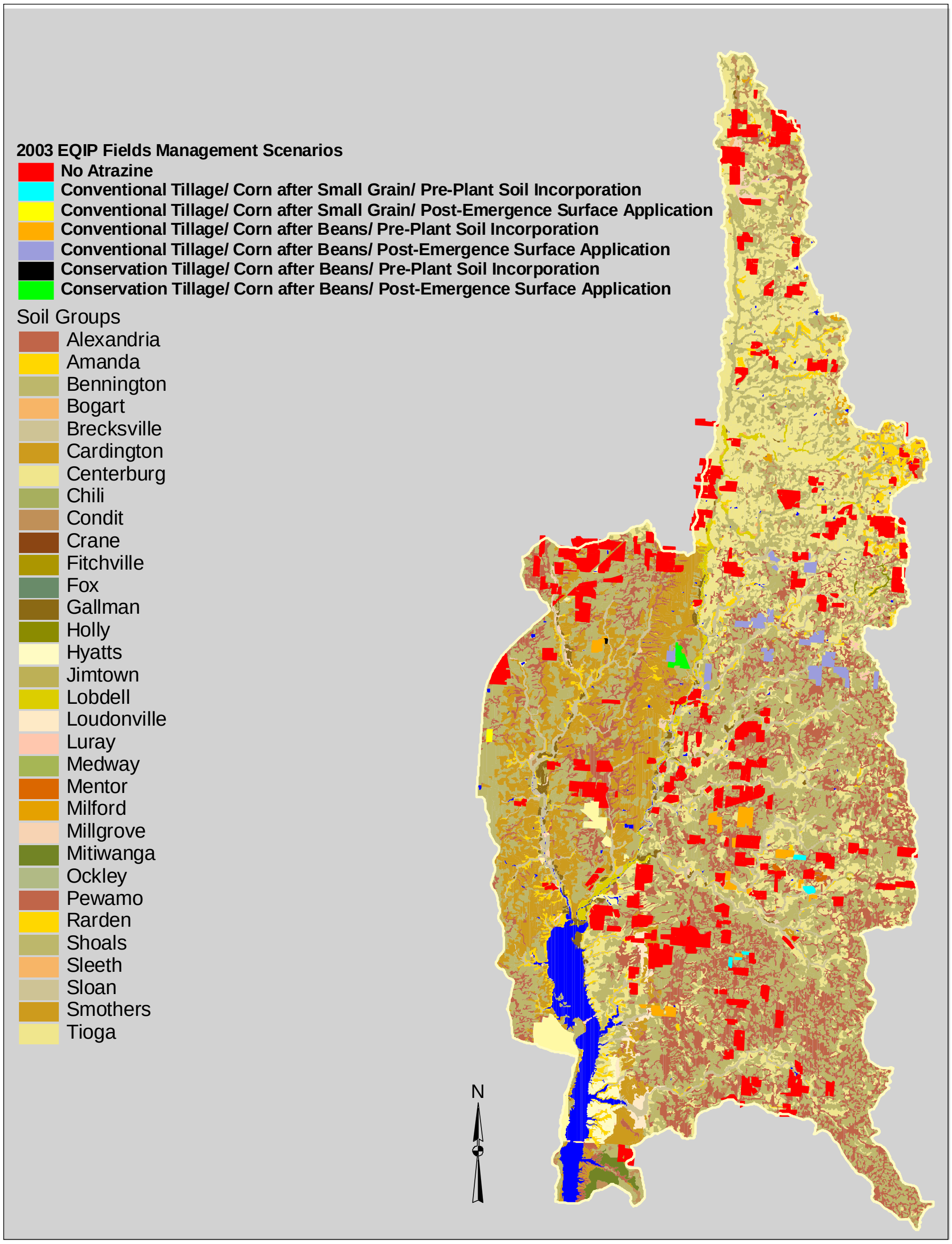

Figure 8-2 **Distribution of best management practice (BMP) scenarios among crop fields enrolled in the USDA EQIP program for the year 2003**

References

Miller, R.C; D.P. Guertin, and P. Heilman, 2004. *Information Technology in Watershed Management Decision Making.* Journal of American Water Resources Association (JAWRA) 40(2):347-357.

Chapter 9 Evaluation

Overview

In Chapter 7 the use of the modeling framework was discussed in the context of pre-evaluation of nonpoint source pollution control programs. In Chapter 8 the modeling framework provided a method to rank the relative success of an implementation program. In the context of the traditional evaluation phase of the watershed approach modeling or monitoring studies might be used post implementation to directly measure the success of a nonpoint source control project. In the context of the framework discussed in this report the evaluation that would occur at this point in a watershed approach might be termed a re-evaluation as the actual results of implementation would be compared to the model predictions.

Many traditional watershed programs have been developed based on generalized loading models, concentration based hydraulic fate and transport models or TMDL based calculation of area wide load. The framework suggested in this report involves modeling or calculating a specific source based load and generalizing the comparison with downstream results. One advantage to this approach is that instead of predicting and evaluating a required percentage load reduction from diffuse sources the source model allows optimization and selection of the best nonpoint source reduction method for each land use at whatever scale is appropriate to the pollutant within that watershed. By optimizing the sources and comparing to downstream targets the quantification of the required amount of pollution control management is more straightforward. Therefore the model output can be used to both predict the degree of overall control expected and evaluate if the goal was met when the controls are implemented.

Figure 9-1 illustrates the portions of the evaluation framework which will be evaluated or re-evaluated in the event that the target reduction goals are not met following implementation of a set of management practices. A similar evaluation or review could be conducted at key milestones (25% implementation, 50% etc.) to determine if the proportion of pollutant reduction observed is consistent with the prediction. In the event that the management practices can be shown by monitoring or other data collection efforts to not meet performance goals the array of management practices can be revisited. At this point further literature review or monitoring of specific projects might be required to attempt to identify any assumptions about BMP performance that might have been inaccurate.

The modelers might also revisit the sensitivity analysis assumptions and review the model input parameters to see if any of those selected might selected could have skewed the output in a direction that overestimated actual performance. In the event that elements of the model input are changed new implementation mapping can result. If

BMP based levels of control are re-evaluated new model runs might reveal a new proportion of implementation required to meet goals and objectives.

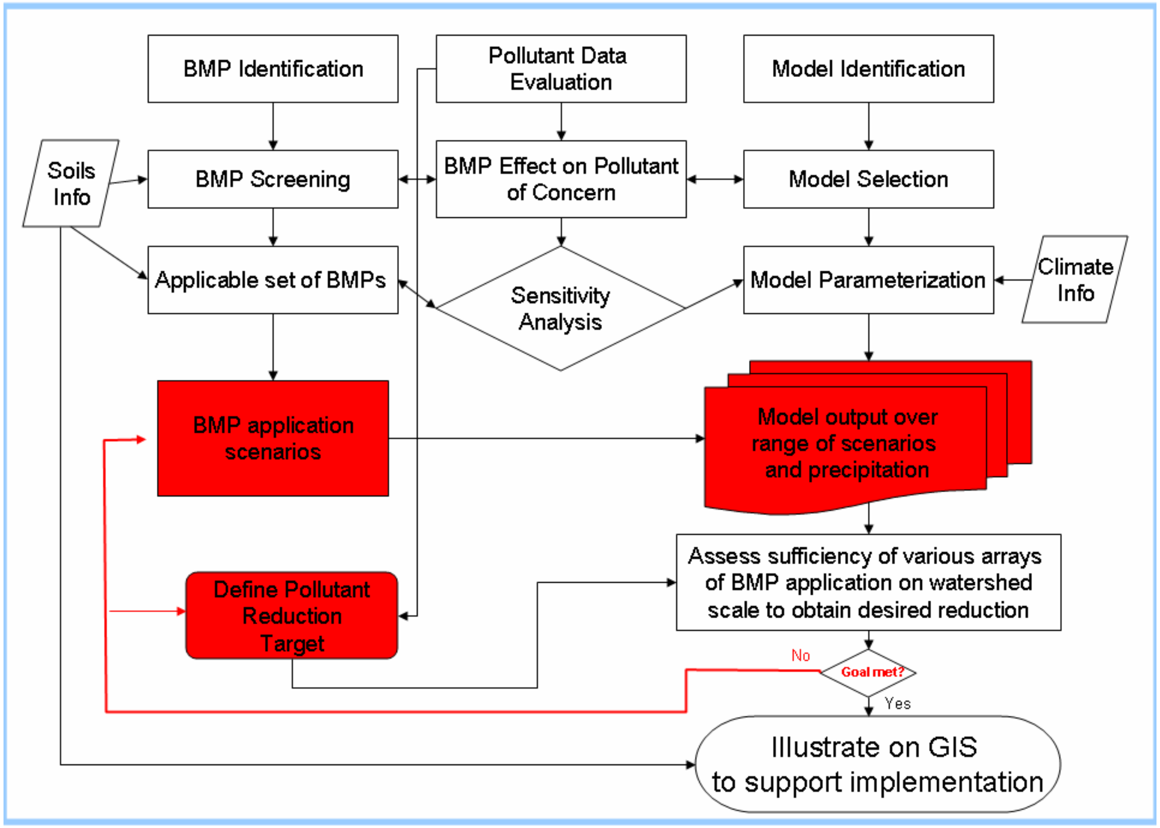

Figure 9-1 Modeling framework provides a mechanism to re-evaluate the implementation of nonpoint source pollution controls.

Chapter 10 Recommendations

Evaluating the success of nonpoint source pollution control programs is becoming an increasingly critical component to demonstrate progress towards achieving the water quality goals of the Clean Water Act. The focus of most State and Federal monitoring and modeling efforts has been measuring the gains achieved by control of point sources. Given the nature of nonpoint source runoff and the mechanisms for reduction of those sources, the traditional tools for monitoring and measuring success are not sufficient. The framework developed in this report provides a link between watershed information, traditional monitoring data and source modeling that can fill that gap.

In a traditional approach the pollutant concentrations and flows of point sources are relatively constant. Traditional modeling and monitoring programs focus on fate and transport processes and are built around receiving stream hydrology and hydraulics since those factors control the resultant downstream pollutant concentrations and estimate water quality attainment reliably. Numerous watershed programs have attempted to use those modeling approaches to measure the success of controls for nonpoint source pollution. Generally the success of those programs is limited by the availability of sufficient data to effectively calibrate and verify a model to estimate flows and concentrations downstream during the range of climate conditions where nonpoint source runoff occurs. Even combined sewer overflow and other wet weather urban stormwater programs have been limited in the ability to effectively and unequivocally quantify pollutant loads and water quality effects through the use of hydraulic and hydrology based modeling methods.

The framework provides a mechanism to use quantitative modeling of source loading combined with some level of downstream concentration data to estimate target load reduction and project the effectiveness of site specific BMPs to achieve that goal. While many traditional modelers have expressed reservations about treating fate and transport systems as a black box, those same modelers will also readily recognize the data required to dynamically model a broad range of wet weather events. Given that the funding for watershed programs is generally somewhat limited, the balance between funding studies versus management practices is critical to success. An approach that allows simplification of the modeling and required monitoring can help organizations balance these funding priorities and focus spending to get results.

Our case study provides an agricultural example where an agricultural source model was used to estimate field specific loading on an annual basis. The same framework could be developed for other sources. While the NAPRA model is one choice to model detailed source loading on a site scale, it is primarily designed for agricultural applications. In some cases the model could be adapted to define loading from other forms of land use there are also other mechanisms to calculate field scale loads and then upscale them to the watershed level. In each project a model evaluation should be conducted as was described in the Phase I model evaluation for this report to define the needs for a source model and either adopt or develop an appropriate source estimating tool. Some tools will provide very precise estimates of the relative change derived from BMPs similar to what NAPRA provides, however in some cases less precise estimates or ranges of probability of reduction might be sufficient to answer planning level goals.

The recommendations of this report are to begin the evaluation process in parallel with development of the nonpoint source control program and to assure that evaluative criteria are considered and included in every step of the process. To quote Stephan Covey an evaluation process should “begin with the end in mind” and to do that the process needs to start at the inception of a program and to be integrated into every step of evaluation and implementation as has been discussed in the preceding chapters of this report.

To do this successfully the following key points should be understood:

- the available water quantity and quality data.
- the ability of management practices to control the pollutant.
- the relationship between upstream sources and downstream effects (with fate and transport process if necessary)
- the ability of a selected modeling tool to estimate changes in load caused by changes in management practice
- the acceptability of best management to the stakeholders who will be responsible for implementing them.
- the cost of BMPs
- the availability of digital topographic, soil, climate and other relevant physical properties of the watershed

The framework which has been used to illustrate both the general case and the progress of our case study provides a relatively simple guideline for where and when to apply the individual steps. In Chapter 9 the term re-evaluation was used to describe the performance evaluation for an implementation program. That term is important because if this methodology is implemented from the beginning of a program a watershed program should have good evidence to indicate what level of success they might expect to achieve when an array of management practices is completed in the watershed.

Our recommendation and evidence from the case study suggests that the benefits of applying this framework are both measurable and more importantly demonstrable to the stakeholder group. The framework provides a mechanism to:

- map and track adoption of BMPs
- quantify progress
- provide site specific optimization of practices

- compare cost effectiveness
- correct the program and support alternative implementation objectives
- demonstrate all of these objectives to stakeholders at all levels

Additionally the framework can be scaled to both small and large basins, applied to both agricultural and other nonpoint source programs. While our case study measured and controlled a single agricultural pollutant, the framework could be applied to suites of pollutants and even used to define the relative benefit that could be derived by applying BMPs that might have different levels of control for different pollutant. By quantifying effect on resultant loads of different pollutants a quantitative assessment of relative benefit can be used to determine the balance of overall reduction that could be achieved with an array of management practices directed at the key pollution sources within a watershed.

Finally, the results of this project suggest that further case studies should be developed and implemented to test the framework and the ability of watershed groups to independently develop and use the tools necessary to complete this type of evaluation. Our case study illustrates direct benefits to improve implementation of the array of BMPs that had been selected prior to evaluation within the constraints of the EQIP program. Had the pre-evaluation been completed within the guidelines of the evaluation framework the watershed group could have eliminated payments for BMPs that provided little or no reduction of Atrazine runoff and in some cases may have increased the load released from specific farm fields. Our case study also showed that the relative cost of BMP implementation in agricultural watersheds might not be significantly changed but the relative effectiveness can be improved and the basis for implementation can be clearly documented and demonstrated.

Evaluation of Effectiveness of Non-Point Source Pollution Abatement Program in the Upper Big Walnut Creek Watershed

8/17/2007

Internal and Client Review Only
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Chapter 1 INTRODUCTION

OBJECTIVES

The Upper Big Walnut Creek Watershed in Central Ohio case study was used to accomplish the following objectives to support the development of the methodology to evaluate the effectiveness of nonpoint source pollution control measures as described in the parallel report completed for this project.:

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- Organize and utilize existing NRCS and SWCD field office technology and necessary data for use in the selected project watershed model (e.g. NAPRA).
- Evaluate and select appropriate contaminant loss and water resources contaminant statistical loading models.
- Simulate potential atrazine loss at field-scale and watershed-scale from agricultural cropland in the Upper Big Walnut Creek watershed under Pre-EQIP conditions.
- Calculate risk for atrazine losses at field-scale and watershed-scale from cropland in the Upper Big Walnut Creek watershed under Pre-EQIP conditions.
- Evaluate the Pre-EQIP relationship between rainfall and monthly change of atrazine concentration and load (lbs.) in Hoover Reservoir.
- Simulate reduction in atrazine loss at field-scale and watershed-scale on the basis of actual best management practices applied under EQIP conditions.
- Calculate risk for atrazine losses at field-scale and watershed-scale from cropland in the Upper Big Walnut Creek watershed under EQIP conditions.
- Develop relationships between changes (post- minus pre-EQIP) in risk for atrazine losses and measured changes in atrazine concentrations in Hoover Reservoir.
- Use the pre- and post-EQIP results to develop appropriate watershed target load reductions for Atrazine.
- Simulate reduction in atrazine losses at the field scale and watershed-scale for a set of optimal BMPs specific to each soil type.
- Using Monte Carlo simulation techniques define the proportion of crop fields that would need to adopt optimal BMPs in order to achieve the target watershed load reduction.

- Evaluate cost performance of a set of optimal BMPs to meet the target load relative to cost performance of EQIP program.

- Document the process and provide recommendations.

The case study report is organized into chapters that parallel the chapters in the methodology report to demonstrate how our project accomplished each of these watershed specific objectives.

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Watershed Description

The Upper Big Walnut Creek Watershed in Central Ohio was used as the project's case study. We present how the "watershed management approach" and the methodology for evaluation of non-point source pollution controls was applied to address herbicide losses from agricultural cropland. Hoover Reservoir serves as Central Ohio's largest source of drinking water where occurrences of elevated levels of atrazine were detected prior to the promulgation of the atrazine MCL. Throughout the case study discussions we present specific programmatic issues realized during the development of the watershed management plan that formed the basis for this project.

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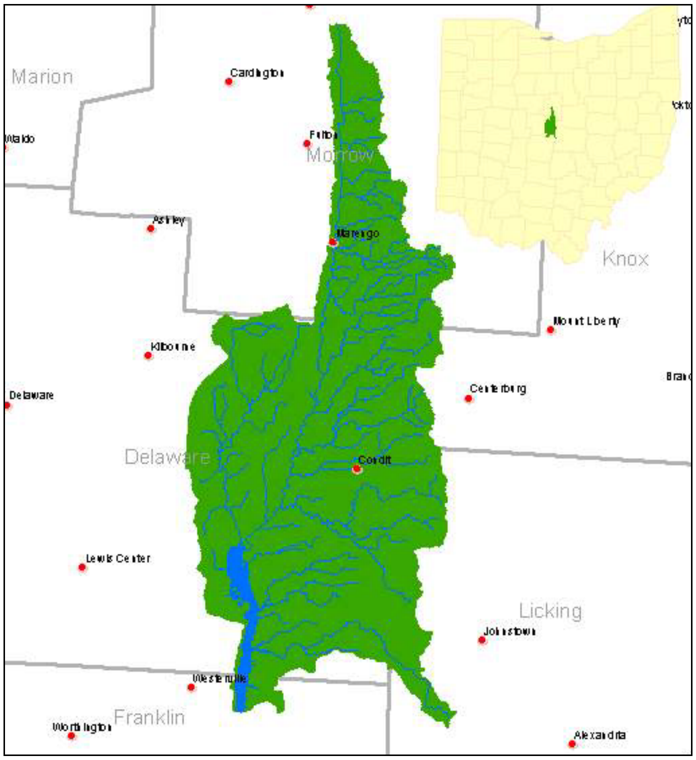

Figure 1-1: Location of the Upper Big Walnut Creek Watershed (Delaware SWCD, 2004).

Water Supply Description

The City of Columbus, Ohio provides drinking water for more than 1 million people in Central Ohio. The City's Division of Water is responsible for the collection, treatment, distribution, maintenance and compliance with state and federal water quality standards.

The Division's sources of drinking water are from two surface and one ground water supply systems. The newest addition to the Division's water supply is the groundwater well field south of Columbus which provides 20 million gallons per day (MGD). Griggs and O'Shaughnessy Reservoirs are the city's oldest sources of water with a combined storage capacity of 6.2 billion gallons of water. The reservoirs are located west of the city and within areas of substantial development. Situated northeast of downtown Columbus and completed in 1955, Hoover Dam provides more than 20.8 billion gallons of storage capacity in Hoover Reservoir and is the Division's largest source of drinking water. The three reservoirs provide 85% of the 130 million gallons used daily. The remaining fifteen percent is withdrawn from the large collector wells in southern Franklin County (Columbus, 2005).

Figure 1- 2: Aerial photo of the Hap Cremean Drinking Water Treatment Plant with the Hoover Reservoir and Upper Big Walnut Creek Watershed in the background.

Framework Application

The City of Columbus has monitored Atrazine concentrations in Hoover Reservoir since 1985. Those measurements provide the baseline downstream or resultant load received from the Upper Big Walnut Creek watershed. The City of Columbus facilitated the formation of a watershed partnership to investigate and address the Atrazine issue in the watershed. The partnership included members of the agricultural, university and government stakeholder groups and is described in greater detail in Chapter 4. As a result of the partnership agricultural BMPs were implemented with funding from USDA in the form of EQIP program funding. Each component of our framework was integrated into the case study watershed and detailed in the following chapters. The evaluation methodology proposed in this report was used to define alternative arrays of BMPs and compare the effectiveness of those arrays to the results achieved from the application of EQIP programs.

While this case study focuses on a problem resulting from agricultural land use, it is important to note that the methodology applied here can be used to evaluate other pollutant sources. Though available pollutant data, specific BMPs and modeling tools might be different the principles of the evaluation framework and the steps and sequencing of the application of the framework can be applied to a broad range of watershed problems. Urban or suburban land uses, mixed uses or areas where development pressure is causing a change of land use could all apply this evaluation framework. The framework can also be applied to a broad range of pollutants. Further the process can be scaled to evaluate BMPs applied to a small sub-catchments or major river basin.

REFERENCES

City of Columbus, 1992. *Operations Report.* Division of Water, Department of Public Utilities, Columbus, OH.

City of Columbus, 2005. *Water Sources.* http://utilities.columbus.gov/Water/WaterSources%20.htm. Division of Water, Department of Public Utilities, Columbus, OH.

Chapter 2 PROBLEM IDENTIFICATION

INTRODUCTION

A literature review of water quality reports of Hoover Reservoir and Upper Big Walnut Creek watershed was compiled. References are presented at the end of this chapter and cited throughout this report (Ohio EPA, 2000; Ohio EPA, 2003; Ohio EPA 2005; and, Williams and Miller, 1991). Several watershed-wide water quality monitoring efforts have been completed to achieve various programmatic requirements. For example, Ohio Environmental Protection Agency (Ohio EPA) has sampled for a biological and water quality study, or "biosurvey" that is used as a basis for regulatory actions by the agency. Such actions can be instituted through discharge permits, Director's Orders, the Ohio Water Quality Standards, Water Quality Permit Support Documents, State Water Quality Management Plans, the Ohio Nonpoint Source Assessment, and the Ohio Waters Resource Inventory (305[b]) report (Ohio EPA, 2000). Data collected during the recent "biosurvey" were also used as the basis to compile a Total Maximum Daily Load (TMDL) report (Ohio EPA, 2005). It is interesting to note that although the herbicide atrazine has been identified as a contaminant of concern to a public drinking water supply atrazine was not sampled or integrated into the Big Walnut Creek Watershed TMDL report.

In 2003, Ohio EPA completed a Source Water Assessment and Protection Plan for the Upper Big Walnut Creek Watershed. This report does cite atrazine as having "caused water quality concerns in the watershed", but the water quality monitoring data range is limited to a few years and only reports the range of atrazine concentrations detected (Ohio EPA, 2003).

Although these reports have achieved programmatic reporting requirements, they provide limited value to establish a baseline or framework to evaluate effectiveness of nonpoint source pollution abatement programs. This is especially true for the needs of a public drinking water supply that is regulated by concentration-based compliance standards. The case study in this project demonstrates how an individual stakeholder, the City of Columbus who routinely monitors water quality, can help identify and prioritize water resource concerns, and provide critical information to subsequently define the problem, establish goals, select appropriate management measures, and lastly evaluate program effectiveness. The case study was used to identify, develop and test the methodology for evaluation of BMPs so in that process the actions that occurred would not always be the first choice if a watershed group "began with the end in mind" and built the BMP implementation process following the methodology defined by this report.

Figure 2-1 The City of Columbus' long-term water quality sampling site is located in the reservoir adjacent the Hoover Dam structure (City of Columbus, 1992)

Problem Identification

The City of Columbus, Ohio Division of Water's Water Quality Assurance Laboratory (WQAL) has maintained a comprehensive watershed water quality monitoring program. The program routinely monitors the streams, rivers, reservoirs, and ground water wells in Central Ohio. Samples are collected monthly for analysis of physical, nutrients, pesticides, biological and microbial water quality parameters. The WQAL has coordinated with US Geological Survey, The Ohio State University, Ohio EPA, and among other research organizations.

The City's staff has collected monthly grab samples of Hoover Reservoir near the dam (Figure 2-1) using appropriate pesticide sampling procedures. Water quality monitoring includes nutrients such as nitrate-N and phosphorus, and common agricultural pesticides such as acetochlor, alochlor, atrazine, cyanazine, metolachlor, metribuzin, and simazine. Data from the reservoir's long-term water quality sampling program have revealed that only the herbicide atrazine has been detected at levels of concern. The water quality monitoring data depict the occurrence, variability and magnitude of atrazine in Hoover Reservoir (Figure 2-2).

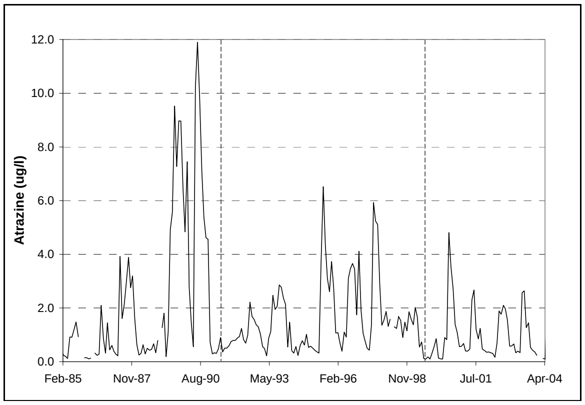

Figure 2-2 Monthly Atrazine Concentrations in Hoover Reservoir (1985 - 2004).

The occurrence of atrazine concentrations in the reservoir between 1985 and 2004 have ranged from less than 0.10 µg/l on four separate sampling events to the highest detected level of 11.89 µg/l in July, 1990. Figure 2-2 graphically displays the high degree of monthly, seasonal and annual variability. This pattern of occurrence is consistent with US EPA and USDA characterization of nonpoint source pollution runoff (EPA, 2003).

ANNUAL PATTERNS

Average annual concentrations reveal that only 1989 and 1990 exceeded the drinking water atrazine standard of 3 ppb. The average annual atrazine concentration in Hoover Reservoir has varied from a low of 0.55 µg/l in 1991 to a high of 5.90 µg/l in 1990. These data are presented in Figure 3-4.

These data suggest Hoover Reservoir is susceptible to atrazine runoff to levels that necessitate corrective measures that include atrazine removal treatment at the downstream drinking water treatment facility and collaborating with the agricultural community to implement BMPs. The development of that collaboration clearly identified a need for a methodology to evaluate the effectiveness of any agricultural BMPS that were implemented in order to be able to define the costs and benefit to all stakeholders.

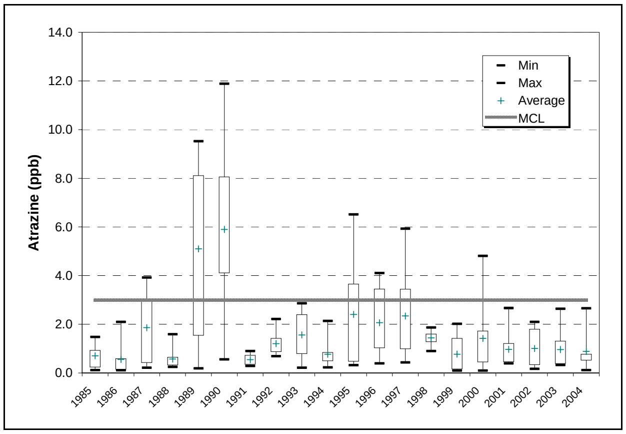

Figure 2-3 Variability of annual atrazine concentration in Hoover Reservoir in relationship to the drinking water maximum contaminant level (MCL) (1985 – 2004).

Response

The occurrence of atrazine is an indicator of land use actions without control practices in the Upper Big Walnut Creek Watershed where the herbicide is used to control weeds for agricultural row crop production of corn.

In response to the City's long-term water quality data observations, the City began development of a proactive multiple barrier approach to attain compliance with the drinking water standard for atrazine's maximum contaminant level (MCL). The City initiated engineering and construction of a Powdered Activated Carbon (PAC) treatment facility for the Hap Cremean Drinking Water Plant (HCWP). By 1997, and at a cost of $4.5 million, the PAC treatment facility was completed to treat taste and odor, pesticides, and a range of organic contaminants should they be detected in the water supply.

Concurrent to a treatment process operations solution, the City referred to its long-term water quality data and initiated communication with the Ohio Farm Bureau Federation (OFBF) and atrazine's primary registrant, Syngenta (formerly Ciba-Geigy). The purpose was to initiate dialogue with the herbicide manufacture and agricultural producers who use the product. Outcomes of these partnerships are presented in Chapter 4.

REFERENCES

EPA, 2003. National Management Measures for the Control of Nonpoint Pollution from Agriculture. EPA-841-B-03-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

Ohio EPA, 2000. *Biological and Water Quality Study of the Big Walnut Creek Basin*. Ohio Environmental Protection Agency, Division of Surface Water, Ecological Assessment, Columbus, Ohio.

Ohio EPA, 2003. Drinking Water Source Assessment for the City of Columbus. Oho Environmental Protection Agency, Divisions of Surface Water, Ground and Drinking Waters, Central District Office and Central Office. Columbus, Ohio.

Ohio EPA, 2005. Total Maximum Daily Loads for the Big Walnut Creek Watershed. Ohio Environmental Protection Agency, Division of Surface Water, Columbus, Ohio.

Williams, W.M. and Miller, D. 1991. *Investigation of Atrazine in Hoover Reservoir. Columbus, Ohio*. Blasland & Bouck Engineers, P.C. Leesburg, VA.

Chapter 3 PARTNERSHIP FORMATION

INTRODUCTION

Results of the Upper Big Walnut Creek Watershed long-term water quality monitoring program were introduced in Chapter 3 and indicate the occurrence of the agricultural herbicide atrazine in Hoover Reservoir. Representatives of the City met with the Ohio Farm Bureau Federation (OFBF) to discuss the water quality concerns of elevated levels of atrazine in the public water supply.

The Ohio Farm Bureau recommended that Syngenta (then Ciba-Geigy), the leading herbicide manufacturer, be involved in the dialogue. Syngenta sponsored a special investigation of the Upper Big Walnut Creek Watershed to better understand the sources and causes of the atrazine in Hoover Reservoir; and identify potential solutions to mitigate the occurrence of atrazine in the reservoir. The study's findings were (Williams and Miller, 1991):

- Climate conditions in 1989 and 1990 were the most probable causes for the high levels of atrazine in the reservoir;
- The "critical season" of April through July was identified when atrazine runoff is most probable;
- Agronomic trends in atrazine uses and practices were considered less significant sources because total volume of atrazine use and acres treated have decreased in the watershed since 1986;
- Major point sources [Agribusiness chemical dealerships] were not identified as probable factors; and,
- Residues in the reservoir for extended durations of many months was more a function of the reservoir's six-month hydrologic residence time but residues are unlikely to persist from one year to the next.

The study recommended the implementation of nonpoint source pollution abatement best management practices (BMPs) that include (Williams and Miller, 1991):

- increase use of no-till and conservation tillage;
- maintain buffer strips of perennial vegetation or riprap between the edge treated fields and surface waters;
- exercise caution to avoid spills during pesticide mixing and application; and,
- avoid over application by careful measurement of pesticide; and, properly calibrate and maintained application equipment.

Based on these recommendations, the Ohio Farm Bureau engaged the Ohio Departments of Agriculture and Natural Resources, and US Department of Agriculture Natural Resources Conservation Service (USDA-NRCS). Results of these early discussions resulted in recommendations for the local USDA-NRCS agents to apply for a USDA program known as the Environmental Quality Incentives Program (EQIP). This program will provide incentives to agricultural producers to implement best management practices (BMPs) that reduce atrazine runoff. A local Work Group comprised of producers, conservation experts, program managers recommended specific BMPs that were eligible for federal incentive funding.

By 1997, the City of Columbus, agricultural community, and federal and state conservation agencies were formally organized as the Upper Big Walnut Creek Water Quality Partnership. Members of the partnership include both public and private partners and include:

- City of Columbus
- Ohio Environmental Protection Agency
- Ohio Department of Agriculture
- Ohio Department of Natural Resources, Division of Soil and Water Conservation
- Ohio State University Extension
- Ohio Farm Bureau Federation
- Ohio Professional Applicators for Responsible Regulation
- Soil and Water Conservation Districts
    - Delaware County
    - Knox County
    - Licking County
    - Morrow County
- Syngenta (formerly Ciba-Geigy)
- USDA: Farm Services Agency
- USDA: Forest Service
- USDA: Natural Resources Conservation Service
- US Geological Survey

With assistance from the Ohio Farm Bureau Federation, State Representative Joan Lawrence sponsored funding provisions from the State of Ohio Legislature to help form the Upper Big Walnut Water Quality Partnership. The legislature allocated $100,000 to the partnership with the purpose of coordinating farmers to develop a water quality management plan, raise awareness and implement best management practices.

To achieve this goal, the partnership adopted the “watershed approach”. The partnership formed a farmer-led Executive Committee that oversaw the development of the watershed management plan (Malcolm Pirnie, 1999). That group defined a set of BMPs for control of atrazine runoff and set costs per acre that would be subsidized through the EQIP program to implement those BMPs. The BMP screening and adoption in the EQIP program did not focus on methods to evaluate success but was driven solely by the financial objectives of the farmers. The methodology proposed in this report advocates a different approach to BMP screening but nonetheless our case study provides an example that can (and will) be used for comparison to BMPs selected for both performance and cost effectiveness.

REFERENCES

Malcolm Pirnie, 1999. *Upper Big Walnut Creek Water Quality Management Plan*. Delaware Soil and Water Conservation District, Delaware, OH.

Williams, W.M. and Miller, D. 1991. *Investigation of Atrazine in Hoover Reservoir. Columbus, Ohio*. Blasland & Bouck Engineers, P.C. Leesburg, VA.

Chapter 4 Watershed Characterization

INTRODUCTION

In Chapter 3, we presented evidence that the agricultural herbicide, atrazine, was detected at levels in Hoover Reservoir that has the potential to exceed drinking water standards.

Literature Review

Atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-trainzine) is a synthetic systemic herbicide used for the selective control of annual broadleaf and certain annual grass weeds. Atrazine is in the triazine family which includes cyanazine, metribuzin, propiazine, simazine, among others. Triazines have common toxicity and mode of action that inhibit photosynthesis in plants. Triazines essentially block the process where plants convert sunlight into chemical energy used for plant growth (Loux, et al., 2005).

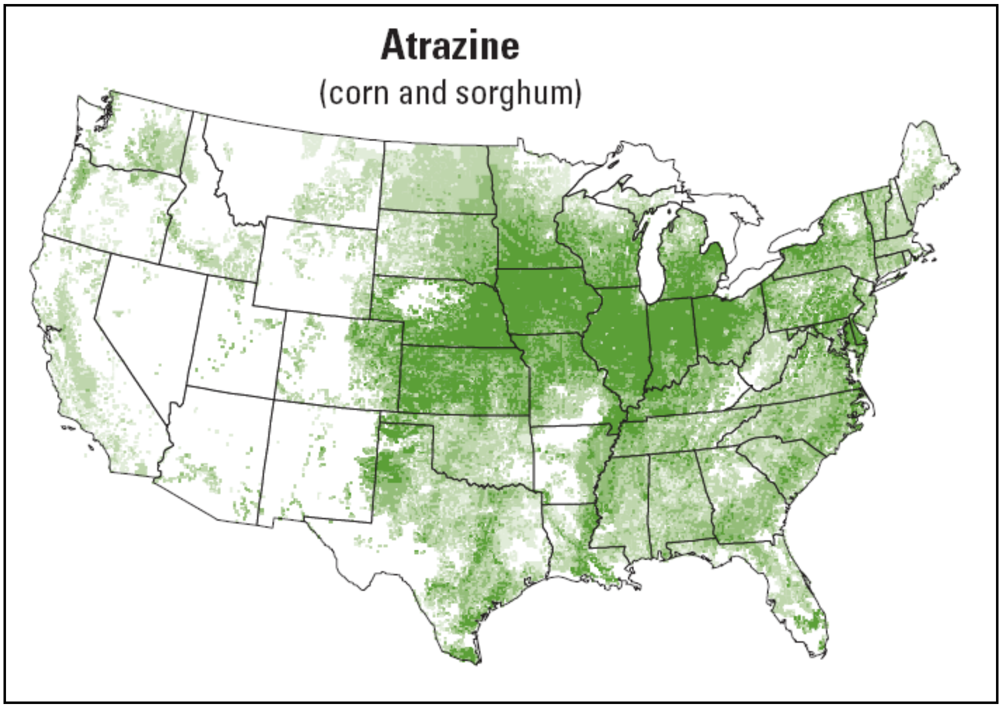

Figure 4-1: Distribution of atrazine use in the United States (USGS, 2006).

Atrazine is one of the most widely used agricultural herbicides in the United States where an estimated 34.5 thousand kilograms (76 million pounds) of active ingredient are applied annually. More than 98% of atrazine is applied to agricultural cropland and used primarily on field corn (86%), sorghum (10%) and sugarcane (3%). The remaining application of atrazine is used in forestry, turf and other non-agricultural uses (EPA, 2003). Since 1992, atrazine is used only in corn production in the Upper Big Walnut Creek Watershed (Loux personal communications).

Regulatory History

A review of atrazine's regulatory history proved to be a significant factor in the analysis of water quality monitoring data from Hoover Reservoir. Significant regulatory changes occurred during the water quality monitoring period which includes restrictions to atrazine application uses, rates, and to licensed applicators. The following summarizing these product restrictions. A summary of atrazine's regulatory history is:

- Atrazine was registered as a systemic triazine herbicide by Syngenta (then Ciba-Geigy) in 1958;
- In 1992, Ciba-Geigy, the primary registrant for atrazine, voluntarily instituted risk reduction measures that further reduced total annual application rates for corn and sorghum from 3.0 lb ai/acre to 2.5 lb ai/acre (1.5 lb ai/acre for pre-plant and emergence, and 1.0 lb ai/acre post emergence programs);
- Prohibited all uses for total vegetation control on non-cropland (effectively reducing atrazine application rate from 10 lb ai/acre to 0 lb ai/acre);
- Atrazine-containing products were classified as Restricted Use Pesticides (RUPs) except for lawn care, turf, and conifer uses. (Restricted Use Pesticides require all product applicators to be licensed and maintain records for at least two years on when are where the product was applied);
- Maximum seasonal application rate for corn was reduced from 4.5 kg/ha (4 lb ai/acre) to 3.36 kg ai/ha (3 lb ai/acre);
- Maximum application rate on non-cropland and total vegetation was reduced from 44.8 kg ai/ha (40 lb ai/ acre) to 11.2 kg ai/ ha (10 lb ai/acre); and,
- Prohibited all uses for total vegetation control on non-cropland (effectively reducing atrazine application rate from 10 lb ai/acre to 0 lb ai/acre).

Occurrence in the Environment

In the United States, comprehensive studies of the occurrence of common pollutants of concern such as sediments, nutrients and pesticides are readily available. The USGS has compiled a compendium of studies for these pollutants. USGS has established sufficient relationships between land use and anticipated pollutants of concern. These relationships are helpful to watershed partnerships when long-term water quality monitoring data are not locally available. Conversely, when adequate local monitoring data are available, USGS studies can provide general guidance of expected occurrence relationships of the pollutant of concern.

Commonly known as the National Water-Quality Assessment Program (NAWQA), the U.S. Geological Survey (USGS) has developed a national water quality monitoring program that can be used to help characterize the occurrence of nonpoint source derived pollutants in the environment (USGS, 2006). The NWQAP program assesses a wide range of pollutants and the have reported monitoring summaries for sediments, pathogens, volatile organic compounds, trace elements, nutrients, and pesticides. USGS water quality monitoring reports are freely available on the Internet at www. usgs.gov/nawqa.

The USGS national water quality monitoring provides insightful information about the occurrence of atrazine in water resources. Figure 5-3 illustrates the occurrence of elevated levels of atrazine in surface waters is more prevalent throughout the Midwest where atrazine use is high; especially for corn production. Conversely, atrazine detections in shallow ground waters in the Midwest are relatively low. This relationship has been purported to be a result of the significant amount of systematic subsurface drainage used in agricultural commodity production to enhance crop yield (USGS, 2006). Research in Northwest Ohio had proposed this relationship and the USGS national monitoring program supports this conclusion (Baker et al., 1985; and, Richards and Baker, 1993). This general relationship is important in the Upper Big Walnut Creek Watershed project area because sub-surface drainage is also used in the watershed.

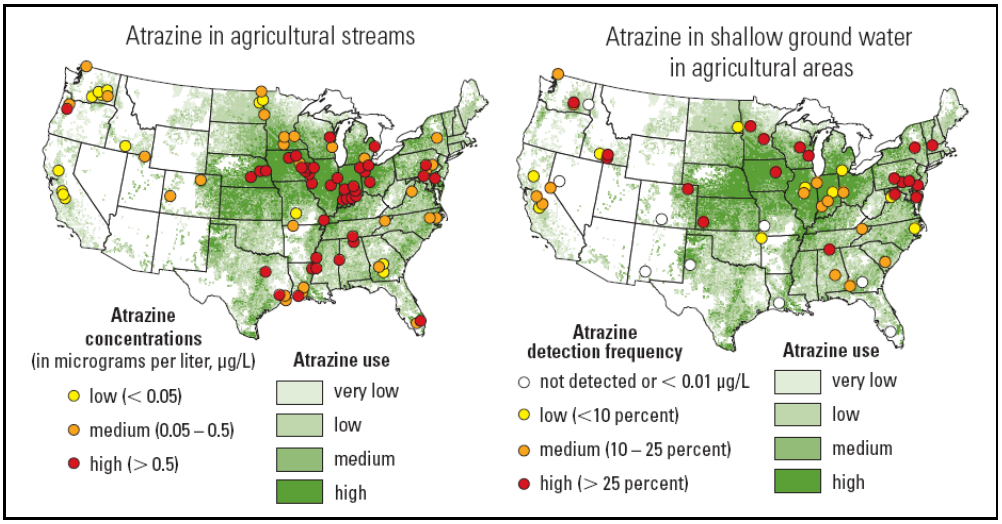

Figure 4-2: The use of agricultural sub-surface drainage appears to increase the frequency of higher levels of atrazine in surface waters than in ground waters (USGS, 2006).

Understanding the temporal patterns and seasonal occurrence of a nonpoint source pollutant is an important factor to establish so that it can be related to land use and management activities in the watershed. Long-term water quality data of the White River in Indiana were presented in the USGS pesticide study and clearly depict seasonal spikes during the spring season. This occurrence is widely known the "Effect of Spring Flush" (Thurman, et al., 1991, and Richards and Baker, 1993). A water quality monitoring survey of thirty-three drinking water utility's surface water supplies throughout the Midwest confirms this seasonal pattern where the highest concentrations were detected in the months of April through June (Graziano, et al., 2006).

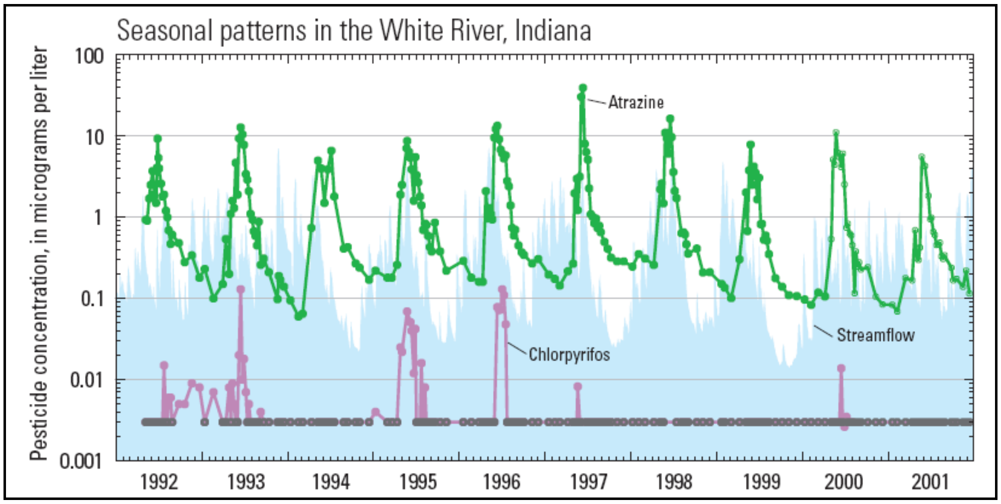

Figure 4-3: The occurrence of atrazine in surface waters of an agricultural landscape reveal a "spring flush" effect that can be related to the timing of when the herbicide is applied (USGS, 2006).

Data Inventory

An inventory of relevant watershed data was conducted. Data are grouped into water resources or landscape feature data, and discussed below. The types of data collected for this project are classified as "secondary" by US EPA and defined as (EPA, 2002):

> "A secondary data research project involves the gather and/or use of existing environmental data for purposes other than those for which they were originally collected."

Examples of water resources related feature data include the atrazine concentration data of Hoover Reservoir, average daily flow data (reservoir discharge) below Hoover Dam, and average weekly reservoir water volume data. These data collected to characterize the occurrence of atrazine in Hoover Reservoir establish the baseline pollutant loading conditions.

Locally measured climate data that include average daily precipitation, average daily air temperature, and mean monthly maximum and minimum temperature were obtained for use in the NAPRA landscape models and development of occurrence of atrazine in Hoover Reservoir.

Landscape feature data for the Upper Big Walnut Creek Watershed consists of geospatially-referenced data that include the hydrologic unit area (watershed boundaries), aerial orthophotography imagery data, SSURGO soils data, and agricultural crop field boundary data. Attribute data that characterize the crop fields enrolled in the US Department of Agriculture

Geospatial data include hydrologic unit area data, orthophoto image data, SSURGO soils data, crop field boundary data, EQIP field attribute data, Crop type data, tillage practice data, atrazine management data,

Additional secondary data were collected and used in the GLEAMS/ NAPRA model and are reported in “NAPRA Modeling Report to support the Upper Big Walnut Creek Case Study, Application of the Methodology to Evaluate Effectiveness of Watershed-Scale Management Practices” (henceforth “NAPRA Modeling Report”) the companion report to this case study.

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Data used for this project are documented in an approved US EPA Quality Assurance Project Plan (QAPP) (Malcolm Pirnie, 2003).

Results

Results of the watershed characterization analysis are briefly summarized here.

The Upper Big Walnut Creek Watershed encompasses 190 square miles in Central Ohio. Agriculture row crop production exceeds 60% of the watershed land use. This is attributed to the relatively level landscape and highly productive soil types when drained (USDA, 1969). Agricultural animal production is not a significant feature of the watershed’s land use.

The herbicide atrazine is commonly used for corn production and applied during the spring planting period during the months of mid-April to as late as early June.

Average annual rainfall is 989.0 mm (38.9 in.) and has varied from a low of 621.3 mm (24.5 in.) in 1966 to a high of 1464.3 mm (57.6 in.) in1990.

Product Regulatory Changes

Results of the regulatory history of atrazine have been used to establish more appropriate baseline conditions of the water quality data from Hoover Reservoir. Three discrete monitoring periods were established for data analysis and are graphically presented in Figure 5-6 below.

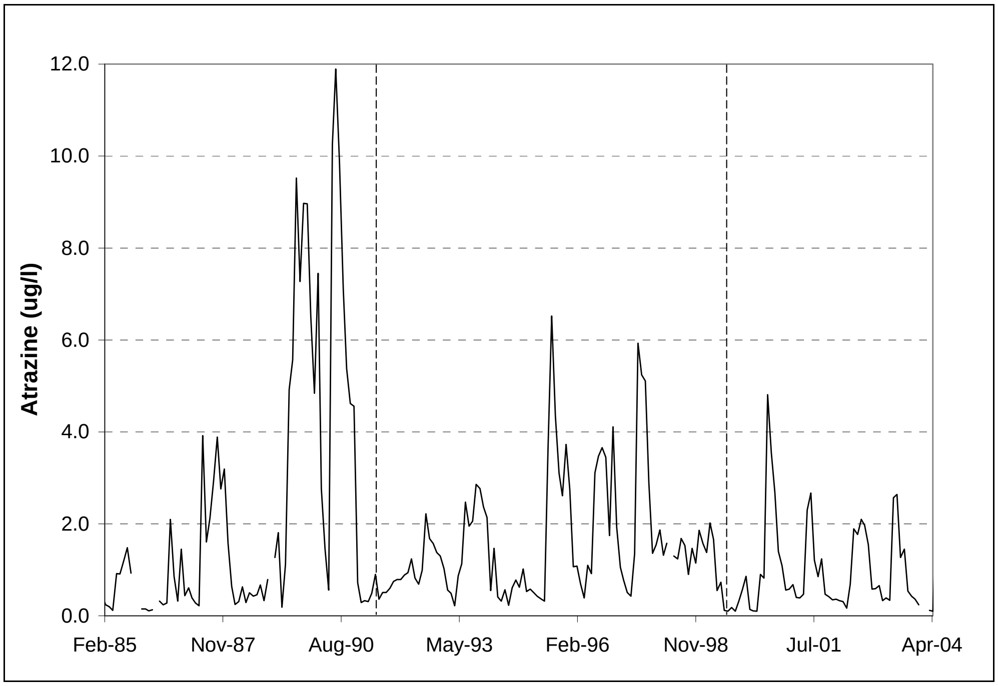

Figure 4-4: Monthly atrazine concentrations in Hoover Reservoir (1985 - 2004).

Occurrence Trends

Average monthly concentration data of Hoover Reservoir reflects the hydrological features of the reservoir where average atrazine concentrations tend to increase during the spring runoff season and then steadily decease during the following six months. This corresponds with the reservoir's hydrologic residence time of an average of 180 days. Therefore, reservoir discharge appears to be the primary mechanism of decreasing atrazine levels in the reservoir. Residual annual carryover does not appear to be significant.

Percent corn planted serves as a proxy indicator of when atrazine and other herbicide products are applied in the watershed. Atrazine is typically applied to cropland in the watershed during the months April through mid June. This data reflects similar state and regional research (USGS, 2006; Thurman, et al., 1993; and, Baker, et al., 1985).

Total precipitation for the months of April through July was characterized as the "critical season" (Williams and Miller, 1991). This is when atrazine is typically applied to agricultural cropland throughout the Midwestern US corn-belt region and the Upper Big Walnut Creek watershed, which has the highest potential for runoff (Thurman, 1991; Baker, 1991; and, Wauchope, 1978).

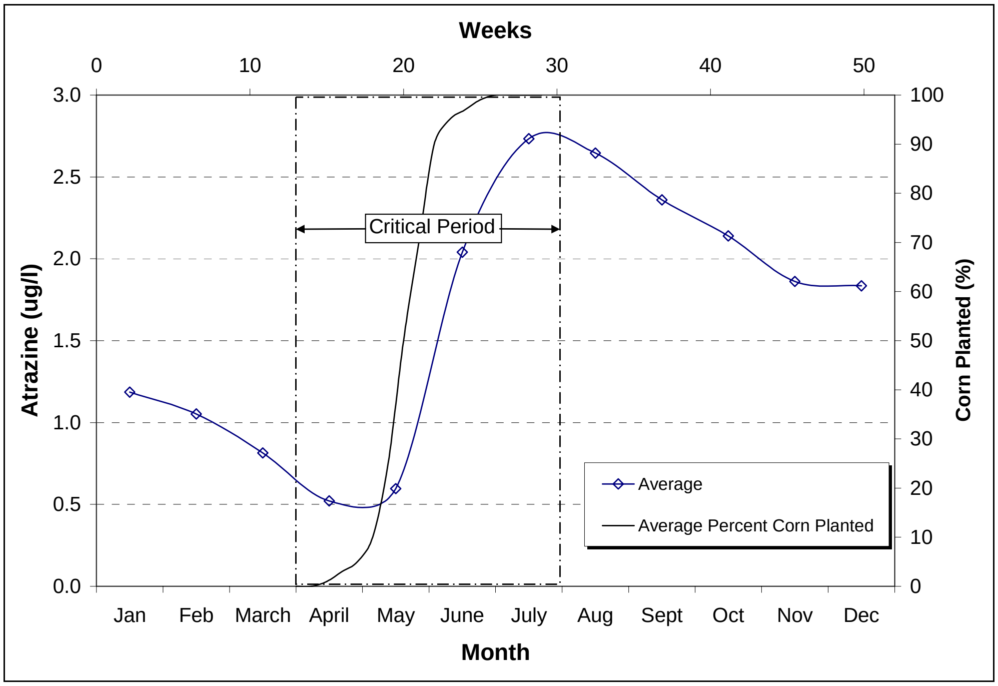

Figure 4-5: Relationship between percent corn planted and occurrence of atrazine in Hoover Reservoir.

Average monthly atrazine concentration data prior to label use restrictions and implementation of the EQIP program shows considerable concentration increases between the months of May and June are noticeable. Maximum average maximum atrazine concentrations in water are 3.8 µg/l and occur in August. Moreover, protracted elevated concentrations are apparent even until the month of December before concentrations tend lower until May of the following year.

The pattern of increasing atrazine concentrations from May to June and into July continue in subsequent monitoring periods. However, maximum average monthly concentrations increase to 2.7 µg/l in July. Because of the fall application label use restriction, the reservoir's six-month hydrologic residence time is more apparent as concentrations continue to decrease from the month of July until the following May. A slight increase observed in monitoring period 2 might be attributed to 1995 when an unusually cool wet spring may have delayed the seasonal epilimnion and hypolimnion turnover in Hoover Reservoir. Elevated atrazine from early spring runoff events may have been trapped in the lower levels of the reservoir until fall turnover that was detected in the December sampling event.

REFERENCES

Baker, D.B., K.A. Krieger, R.P. Richards, and J.W. Kramer. *Effects of Intensive Agricultural Land Use on Regional Water Quality in Northwestern Ohio.* In Perspectives on Nonpoint Source Pollution 1985, pp. 201-207.

EPA, 2002. Guidance for Quality Assurance Project Plans. EPA QA/G-5. EPA/240/R-02/009. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

EPA, 2003. Interim Reregistration Eligibility Decision for Atrazine: Case No. 0062. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Washington, DC.

Graziano, N., M McGuire, C. Adams, A. Roberson, H. Jiang, and N. Blute, 2006. *Using the ELISA method to track atrazine occurrence in a national monitoring program*. Journal of American Water Works Association 98:10 111-123 (October 2006).

Loux, M.M.; J.M. Stachler; W.G. Johnson; G.R.W.Nice; and T.T. Bauman, 2005. *Weed Control Guide for Ohio and Indiana*. Ohio State University Extension and Purdue University Cooperative Extension Service.

Malcolm Pirnie, 2003. *Quality Assurance Project Plan (QAPP).* Malcolm Pirnie, Inc. Columbus, OH.

Richards, R.P., and D.B. Baker. *Pesticide Concentration Patterns in Agricultural Drainage Networks in the Lake Erie Basin.* Environmental Toxicology and Chemistry, Vol. 12, pp. 13-26, 1993.

Thurman, E.M., D.A. Goolsby, M.T. Meyer, and D.W. Kolpin. *Herbicides in Surface Waters of the Midwestern United State: The Effect of Spring Flush.* Environmental Science & Technology, October 1991, pp. 1794-1796.

USDA, 2003. *Manual for Managing Geospatial Datasets in Service Centers, Version 4.0.* AFY00.60000-00.UAO-SCM. U.S. Department of Agriculture, Service Center Modernization Initiative (SCMI)

USGS, 2006. *The Quality of Our Nation's Waters: Pesticides in the Nation's Streams and Ground Water, 1992-2001*. Circular 1291. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.

Williams, W.M. and Miller, D. 1991. *Investigation of Atrazine in Hoover Reservoir. Columbus, Ohio*. Blasland & Bouck Engineers, P.C. Leesburg, VA.

Chapter 5 PROBLEM DEFINITION

INTRODUCTION

In the Big Walnut Creek watershed an extensive effort was focused on problem definition in order to support BMP implementation and development of the framework described in this report. Part of that effort was focused on defining the effectiveness of source control modeling versus fate and transport modeling and the remainder of that effort was designed to support parameter selection for the source control model that was acceptable to the technical advisory group assembled for this project. The discussions within the various technical advisory committee (TAC) meetings are summarized in the TAC minutes which are appended to this report in Appendix D.

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The analysis supported the selection of a source model to estimate effectiveness of source control BMPs for atrazine. A brief model evaluation and selection report has been compiled and is presented in Appendix A.

Modeling the landscape and land management features of the Upper Big Walnut Creek watershed helped define the baseline conditions. Sensitivity analysis was used to verify the parameters chosen or suggested through the TAC process. Summary information of the selection of appropriate parameters for the model relative to the properties of Atrazine on farm fields is described in this chapter. Supporting details of the modeling process are presented in the “NAPRA Modeling Report”.

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The occurrence of atrazine in Hoover Reservoir is a result of the herbicide application, soil management, and subsequent climate conditions that cause surface runoff. The analysis of the atrazine data prior to the implementation of management measures in the watershed provided support for the concept of a source model to estimate loads from corn fields in the watershed.

LITERATURE REVIEW

A literature review on fate and transport of atrazine in the environment and those factors affecting the occurrence of atrazine in water resources was conducted. The following summarizes these findings.

Factors Affecting Occurrence

Factors affecting the occurrence of atrazine in surface water resources have been well documented. Atrazine readily dissolves in water and is transported from the land to streams primarily by surface runoff or leaching through the soil from rainfall or irrigation. Offsite transport into adjacent water bodies is mostly a function of the timing of rainfall, or irrigation, after atrazine is applied to the landscape (USGS, 2006).

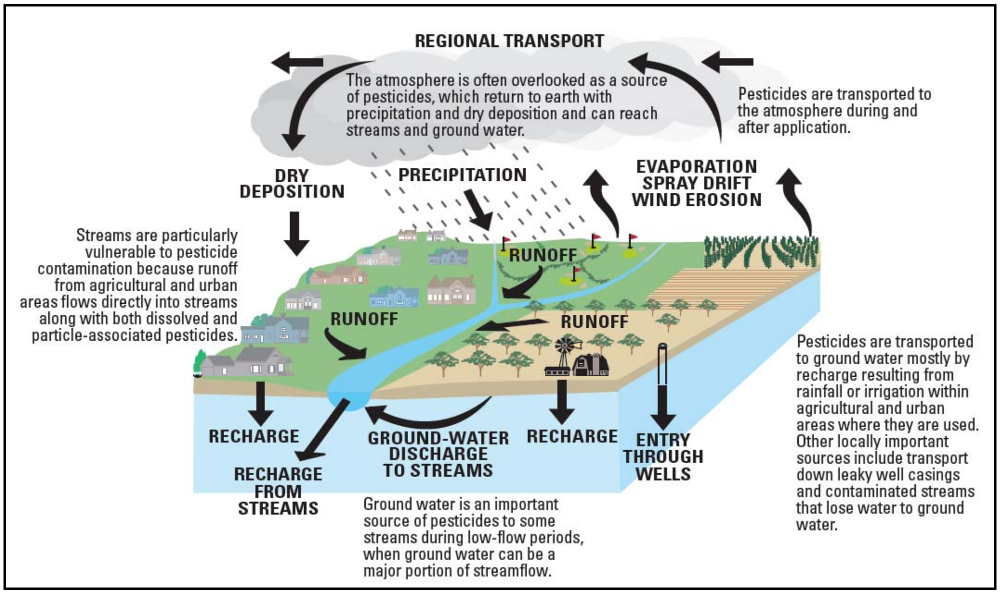


Figure 5-1 Atrazine movement in the environment (USGS, 2006).

The factors that strongly influence the occurrence and transport of atrazine into surface water include: herbicide application rate, method and use patterns, duration and intensity of rainfall event, recent rainfall history (antecedent soil moisture content), time since application, soil type, soil management practices, surface conditions, crop condition, water and soil temperature, pesticide use history, and chemical characteristics of the pesticide (Richards and Baker, 1993; EPA, 2003a and b; Battaglin and Goolsby, 1999; and, USGS, 2006).

An estimated 1 to 5% of applied atrazine is lost from crop fields to nearby water resources via overland flow and subsurface drainage (Wauchope, 1978; and, Battaglin et al., 2003). The amount of atrazine loss to water resources is usually highest during the one to two week time period following application (EPA, 2003a).

Fate and Transport

Atrazine is applied directly to soil during pre-plant and pre-emergence applications and indirectly to soil from incomplete foliar interception when applied during post-emergence applications. Atrazine, like most herbicides, is readily adsorbed by the intended target plants or transformed (metabolized) in the soil (Battaglin et al., 2003).

Drift during spray application can leave intended application sites and contaminant nearby non-target plants, soil and surface waters. As much as 30% of applied pesticide can be lost to volatilization and windblown drift during application (EPA, 2003a). Factors affecting atmospheric loss of atrazine depend on weather such as temperature and wind, atrazine formulation with other additives that affect droplet size, and application equipment (EPA, 2003a).

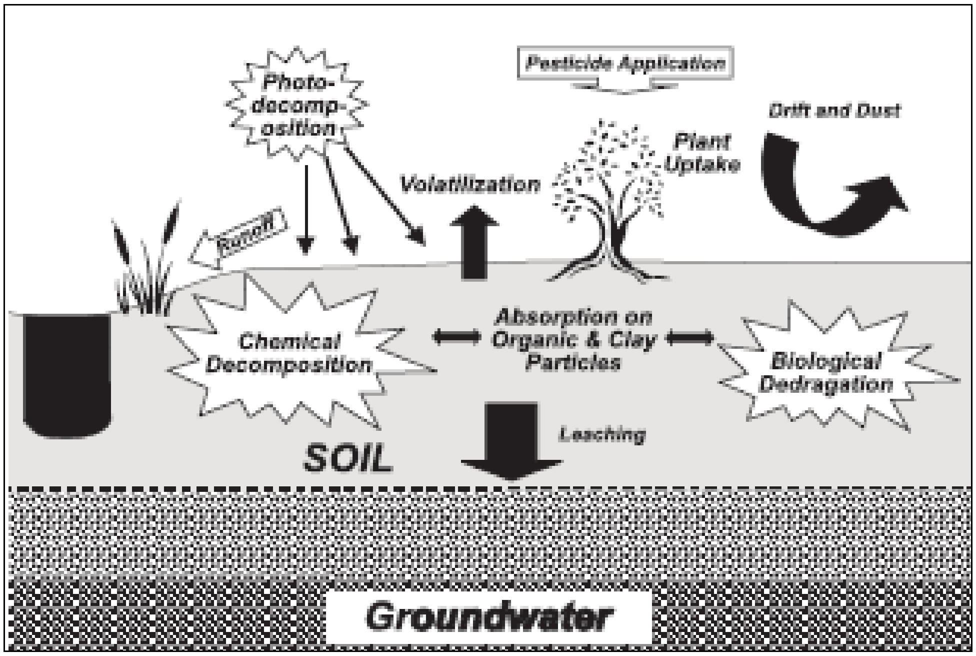
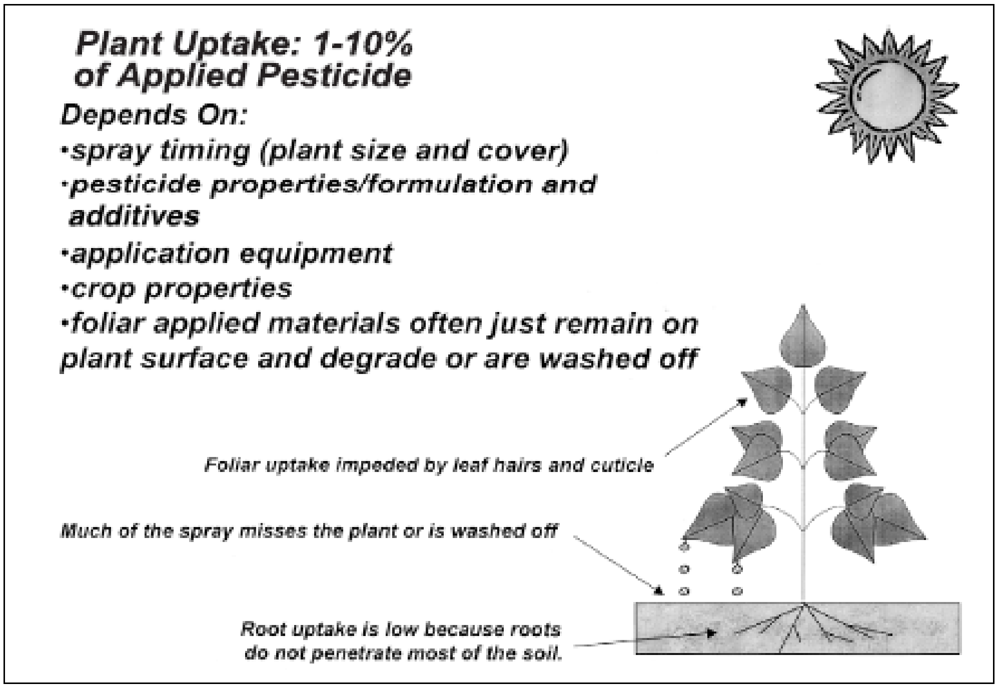


Figure 5-2 **Pesticide fate - major pathways (EPA, 2003a)**

Atrazine, like most pesticides, is readily adsorbed by the intended target plants or transformed (metabolized) in the soil (Battaglin et al., 2003).



Plant Uptake: 1-10% of Applied Pesticide

Depends On:

- spray timing (plant size and cover)
- pesticide properties/formulation and additives
- application equipment
- crop properties
- foliar applied materials often just remain on plant surface and degrade or are washed off

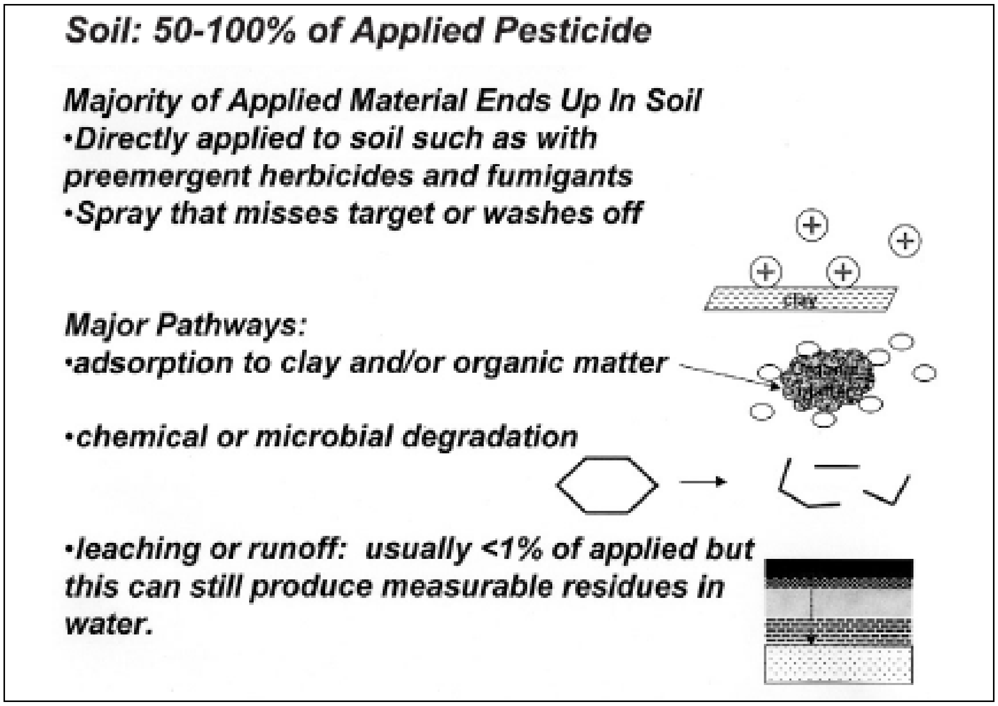
Foliar uptake impeded by leaf hairs and cuticle

Much of the spray misses the plant or is washed off

Root uptake is low because roots do not penetrate most of the soil.

Figure 5-3 **Pesticide fate: plant uptake (EPA, 2003a)**

While in contact with soil, atrazine is metabolized into four hydroxyl and three chlorinated atrazine compounds. Primary atrazine degradate metabolites include hydroxyl-atrazine (HA), deethyl-atrazine (DEA), deisopropyl-atrazine (DIA), and the terminal degradate diaminochloro-atrazine (DACT). The relative order of metabolite concentrations in soils is generally DEA>DIA>DACT~HA.



Soil: 50-100% of Applied Pesticide

Majority of Applied Material Ends Up In Soil

- *Directly applied to soil such as with preemergent herbicides and fumigants*
- *Spray that misses target or washes off*

Major Pathways:

- *adsorption to clay and/or organic matter*
- *chemical or microbial degradation*
- *leaching or runoff: usually <1% of applied but this can still produce measurable residues in water.*

Figure 5-4 **Pesticide fate: soil (EPA, 2003)**

Atrazine’s degradation rate in soils under anaerobic conditions can range from three to four months. However, atrazine degradation in aquatic environments can range much longer with half lives with the overall, water, and sediment half-lives of 608, 578, and 330 day, respectively (EPA, 2001).

Chlorinated metabolites are formed in animal tissues, soils and water and are considered to be equal in toxicity to the parent compound atrazine (EPA, 2003b).

The fate and transport properties of atrazine that affect its occurrence in water resources is a function of the herbicide’s chemical properties, how it is applied, soil characteristics, soil management practices and climate. Clearly, of the array of complex factors influencing atrazine’s fate and transport in the environment, factors that can be managed include how the herbicide is applied and soil management practices. Understanding how the other factors such as soil type affecting atrazine runoff were critical to targeting appropriate management measures at the field-scale.

These factors and the resultant model parameters applicable to measuring atrazine runoff have been documented as part of the watershed modeling effort and presented in Chapter 3 of the “NAPRA Modeling Report”

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POLLUTANT DATA (WATER QUALITY DATA)

The water quality data of Hoover Reservoir for Hoover reservoir was used in the case study to define both the "real" occurrence of atrazine during the monitored years and the modeled probability or risk of occurrence of atrazine based on 50 years of climate data. Risk is defined as "a characteristic of a situation of action wherein two or more outcomes are possible, the particular outcome that will occur is unknown, and at least one of the possibilities is undesired" (Covello and Merkhofer, 1993). In our methodology for evaluation of nonpoint source pollution controls we use our modeling estimates to calculate a risk of releasing a pollutant load sufficient to exceed water quality criteria set to protect human health or the environment. The following briefly presents how water quality data can be used to define the criteria applicable to atrazine in the Big Walnut Creek Watershed and provides an estimate of the risk of exceeding those criteria prior to the implementation of best management practices (BMPs). A detailed water quality analysis report is presented in Appendix C.

HUMAN HEALTH

Atrazine concentration monitoring data of Hoover Reservoir were used to define the pollutant of concern relative to the drinking water standard. The maximum contaminant level (MCL) for atrazine in drinking water is 3.0 µg/l based on an average of four quarterly samples. Based on previous Hoover Reservoir studies, regression analyses were developed by correlating critical season precipitation and average annual atrazine concentrations in the reservoir (Williams and Miller, 1992). These relationships were established to estimate the risk of atrazine exceeding water quality standards in Hoover Reservoir. However, the previous linear regression results were questionable because at low rainfall, average annual atrazine levels were projected to be less than zero. Current regression equations were derived from "best-fit" correlations using MS Excel software. The "best-fit" regression equations were used to estimate the average annual atrazine concentrations for the 50 year period 1953 through 2004.

Based on the regulatory literature review compiled in the Watershed Characterization phase, regressions were plotted for the two monitoring periods: May 1985 through April 1993; and, May 1993 through April 1999.

Regression analysis for the monitoring period 1993 through 1999 reveal that although average annual atrazine levels in the reservoir are relatively similar to the monitoring period prior to 1993, a separation from the monitoring period one regression equation begins to occur at about 500 mm (19.7 in.) total critical season rainfall. The departure becomes more evident at higher critical season total precipitation.

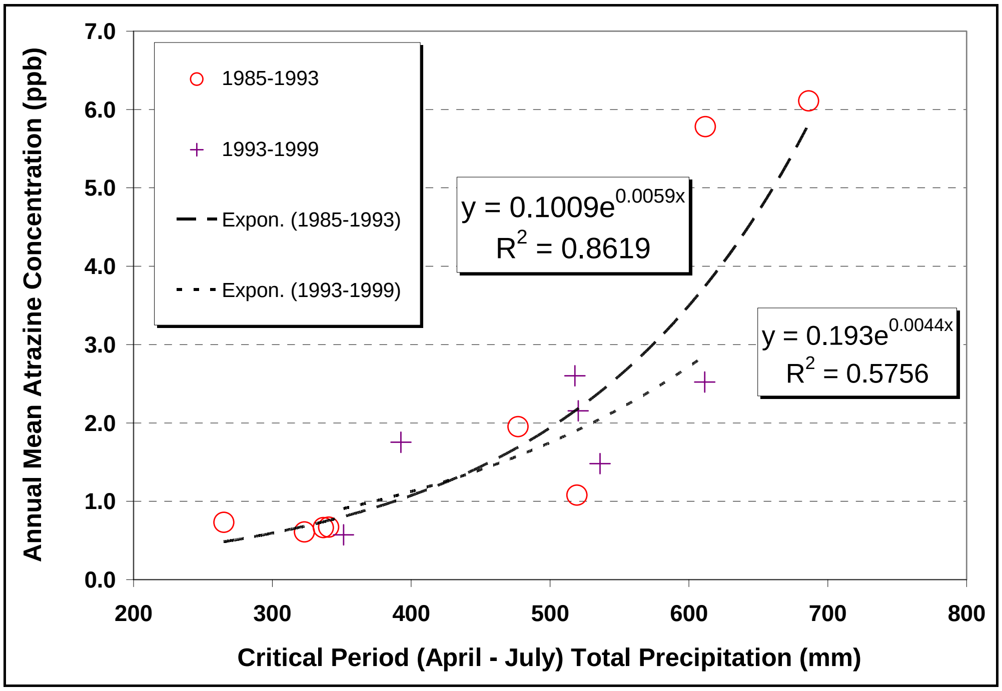

Figure 5-5 Best-fit regression analysis reveals relationship between precipitation and average annual atrazine concentration is not likely linear.

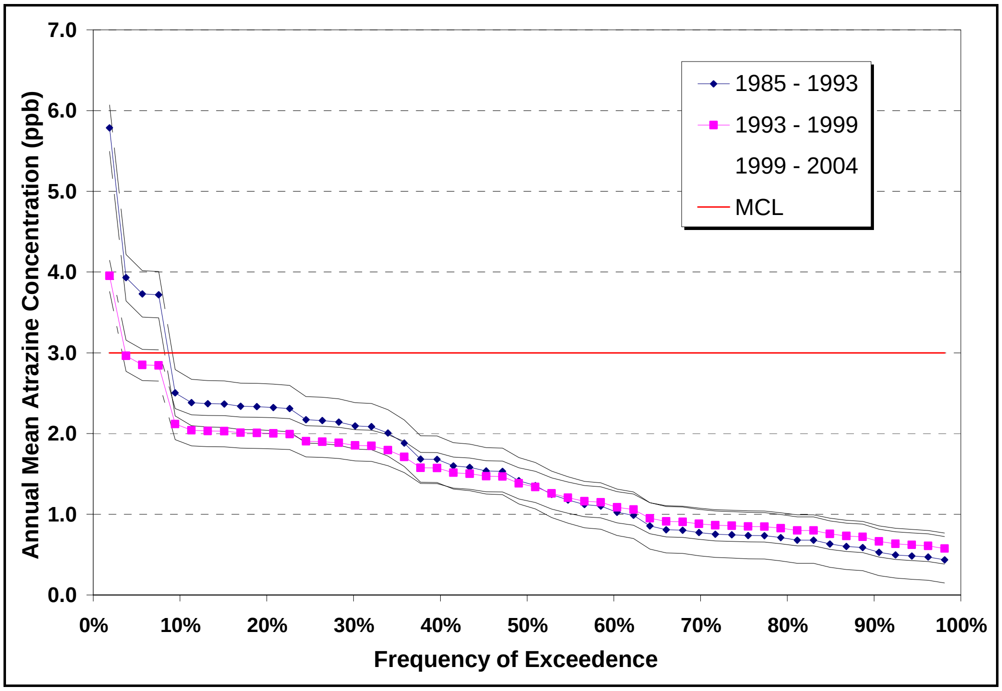

Figure 5-6 Frequency of exceeding annual mean atrazine concentrations in Hoover Reservoir for sampling periods 1 and 2, prior to implementation of the watershed pollution abatement program.

The probability of exceeding the atrazine MCL in Hoover Reservoir prior to 1993 when Syngenta (then Ciba-Geigy) instituted several label use restrictions was 8%. Applying the best-fit regression equation indicates that only four of the previous fifty years would the annual mean atrazine concentration in the reservoir have exceeded 3.0 ppb. The years include 1957, 1972, 1989 and 1990; the later two had actual water quality monitoring data.

Since instituting label use restriction in 1993, the best-fit regression model indicates that the risk of atrazine exceeding the atrazine MCL in Hoover Reservoir was reduced to about 2%. Also, monitoring period 2 (1993 to 1999) indicate higher rainfall during the critical season does not result in average annual atrazine concentrations that exceed the MCL. Thus, using human health drinking water standards provides a low-cost technique to define the risk of pollutant occurrence in water resources. Subsequent water quality data analysis can be plotted against this baseline condition to validate the effectiveness of nonpoint source pollution abatement programs.

ECOLOGICAL

Effects of ecological exposure to atrazine have provided varying conclusions. A comprehensive literature review indicated that exposure to high concentrations at low frequency intervals common to ephemeral headwater streams was not significant to varying species (Baker, et al, 1993).

Recent ecological assessments indicate that similar exposure patterns do have an indirect on fish assemblages. Short duration high atrazine concentrations impact low order plant species that die from atrazine exposure. As a result, atrazine affects the aquatic community.

Monthly atrazine concentration data were plotted on a frequency of occurrence graph Concentration data were separated in the sampling periods 1 and 2 to reflect the label use restrictions instituted in 1993.

Based on twenty-years of water quality monitoring and regression modeling, Hoover Reservoir has low to no risk of exceeding the aquatic habitat level of concern at 10 to 20 µg/l (EPA, 2003b). However, the refined ecological risk assessment proposed by EPA in 2002 does suggest Hoover Reservoir is at risk to exceed ecological levels of concern for aquatic species, especially the non-vascular phytoplankton plants.

Cumulative exceedence curves for monthly atrazine concentration data were plotted for each of the two water quality monitoring periods.

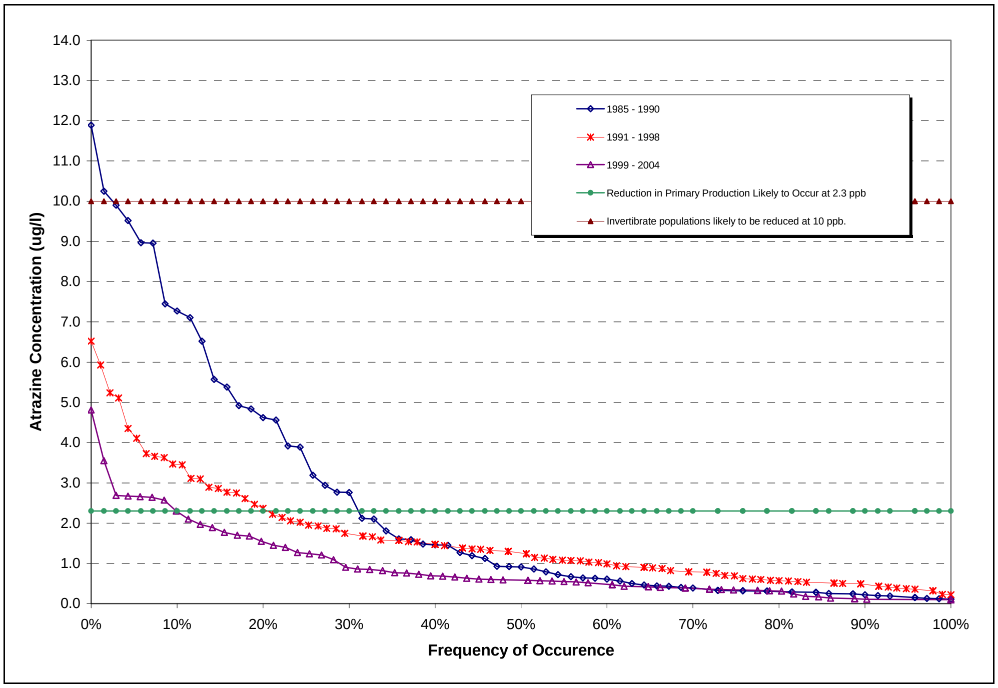

Figure 5-7 **Frequency of occurrence of exceeding monthly atrazine ecological indices in Hoover Reservoir for the three discrete sampling periods.**

For the water quality sampling period 1, 1985 through 1993, prior to implementation of label-use restrictions, monthly atrazine concentrations exceeded the level of concern for aquatic invertebrates where populations were “likely” to be reduced 1.5% of the time. Non-vascular plants such as phytoplankton however, were more often exposed to levels where reductions in primary production were estimated to occur 30% of the time with concentrations exceeding 2.62 µg/l.

Between 1993 and 1999, the highest concentration in Hoover Reservoir was 6.52. During this period, aquatic invertebrates were not exposed to levels to cause population reductions. Non-vascular plants were exposed to levels of concern 20% of time.

REFERENCES

Battaglin, W.A., E.M. Thurman, S.J. Kalkhoff, and S.D. Porter, 2003. Herbicides and Transformation Products in Surface Waters of the Midwestern United States. J. of the American Water Resources Association (JAWRA) 39(4):743-756.

Covello, V.T., and M.W. Merkhofer. 1993. Risk Assessment Methods: Approaches for Assessing Health and Environmental Risks. Plenum Press, New York

EPA. 2001. Drinking Water Exposure Assessment for Atrazine and Various Chloro-triazine and Hydroxy-triazine degredates. US Environmental Protection Agency, Office of Pesticide Programs, Environmental Fate and Effects Division (EFED). Washington, D.C.

EPA, 2003a. National Management Measures for the Control of Nonpoint Pollution from Agriculture. EPA-841-B-03-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA, 2003b. Interim Re-registration Eligibility Decision (IRED) for Atrazine. Case No. 0062. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Washington, D.C.

Richard, R.P. and D. B. Baker. 1993. Pesticide Concentration Patterns in Agricultural Drainage Networks in the Lake Erie Basin. Environ. Toxicol. and Chem. 12: 13-26.

USGS, 2006. The Quality of Our Nation's Waters: Nutrients and Pesticides. US Geological Survey Circular 1291. U.S. Department of Interior, U.S. Geological Survey. Reston, VA.

Wauchope, R.D. 1978. The Pesticide Content of Surface Water Draining from Agricultural Fields – A Review. J. of Envrion. Quality. &(4): 459-472.

Williams, W.M., and D. Miller. 1992. Investigation of Atrazine in Hoover Reservoir, Columbus, Ohio: Vol. I. Blackland and Bouck Engineers, Leesburg, VA.

Chapter 6 Establish Goals & Develop Solutions

INTRODUCTION

To comply with drinking water quality standards, the City of Columbus has adopted a management policy at the Hap Cremean Water Treatment Plant (HCWP) to maintain atrazine concentrations below 2 ppb. When atrazine in Big Walnut Creek exceed this level, the City uses powdered activated carbon (PAC) treatment technology to chemically remove atrazine from the City's drinking water. Atrazine levels in Hoover Reservoir serve as a proxy to treatment thresholds at HCWP, and thus provide a concentration based water quality goal for the Upper Big Walnut Creek Watershed.

TARGET LOAD DEVELOPMENT

To maintain atrazine levels below 2 ppb in Hoover Reservoir, an atrazine target load goal for the reservoir was calculated. The frequency of reservoir concentrations exceeding the treatment threshold was evaluated to estimate atrazine load reduction goals for the reservoir. Once watershed load reduction goals were established, the soils-based BMP performance data from the NAPRA model were integrated into a GIS to derive field-scale solutions to meet the Hoover Reservoir atrazine target load. A description of how the field-scale solution sets were developed is presented in Section 5.0 of the project in the "NAPRA Modeling Report".

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SUMMARY OF BMP ARRAY

There are forty-one soil groups in the project watershed used for agricultural commodity production. Our extensive evaluation of these soils has revealed a critical finding that the performance of management practices varies widely among soils. Thus, the optimal best management practice (BMP) also varies by soil. Details of the BMP performance by soil group is presented in the "NAPRA Modeling Report".

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There are four soil groups in the Upper Big Walnut Creek Watershed that represent nearly 93% of all agricultural cropland, and include Bennington (42.4%), Pewamo (22.3%), Centerburg (21.2%), and Cardington (7.4%).

Bennington and Pewamo are the most prevalent soils in the project watershed, which are characterized with high clay and organic matter content. Because of these physical features, these soils are prone to retaining water in the soil profile. To enable producers to plant crops during this period, these soils have sub-surface drainage to quickly convey water out of these soils. Producers typically cultivate (chisel plow) these soils prior to planting, which help warm and dry these soils, and apply atrazine as a pre-emergent surface application in a corn and soybean crop rotation. Results of the NAPRA model suggests that the soil management practice of no-till is among the optimal BMP for these soils. No-tillage soil management offers the Bennington and Pewamo soils a potential atrazine reduction of 31 and 70 g/ha, respectively. This finding is consistent with a previous model analysis of the Upper Big Walnut Creek Watershed (Williams and Williams, 1992). However, producers are unlikely to adopt no-tillage on these soils, and are evident in the low enrollment rates for this practice in the federally subsidized Environmental Quality Incentives Program (EQIP).

Although not necessarily optimal, the use of conservation tillage on these soils enable producers to lightly incorporate the atrazine during application, which when these management scenarios are combined on these soils, offer similar, if not better, atrazine reduction potential. Results of the NAPRA model suggest that the management scenario of conservation tillage with soil incorporation on Bennington soils yields as much as 26 g/ha for atrazine reduction. Although not optimal, this practice is more likely to be adopted by producers managing fields with Bennington soils.

The Pewamo soils offer an interesting finding in that, the use of conservation tillage with soil incorporation offers the optimal management scenario. As much as 96 g/ha of atrazine could be reduced relative to the use of convention tillage and surface application.

The Centerburg soils are the third most common in the project watershed. These soils have less clay content and organic matter than the Bennington and Pewamo soils. NAPRA model results suggest that soil incorporation on Centerburg soils could increase atrazine loss by as much as 72 g/ha.

PREDICTED BMP EFFECTIVENESS

The efficacy of the nonpoint source pollution abatement program in the Upper Big Walnut Creek Watershed is predicated on the ability to identify, recommend and implement the optimal and yet adoptable BMP by soil group. The interaction of how soils are managed and the application of pesticides to those specific soils affect the water quality beneficial performance of BMPs. Technology and modeling tools such as NAPRA and GIS enable watershed planners the ability to identify and recommend the optimal field-scale management scenarios prior to the implementation of nonpoint source pollution abatement programs.

The modeling report that discusses how NAPRA, GIS and data management software were applied to the Upper Big Walnut Creek Watershed Case Study is presented in the “NAPRA Modeling Report”. The report contains chapters describing the NAPRA model, the modeling process, data types and sources, model parameterization and sensitivity analysis, model data post-processing tools developed for this project, the evaluation and optimization protocols, and results and conclusions. The general conclusion provided by

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the model was that optimal BMPs can be used to meet the target reduction goal. However, the percent participation amongst land managers would need to be considerably higher than it was during the EQIP program.

Chapter 7 Implementation

INTRODUCTION

The US Department of Agriculture (USDA) sponsors an array of conservation programs targeted to address agriculturally related environmental concerns. In 1996, through the Farm Bill, USDA established the Environmental Quality Incentives Program (EQIP). EQIP provides technical, financial, and educational assistance to agricultural producers whose effluents may degrade soil, water, and related natural resources, has existed since the 1996 Farm Bill. In 1998, the Upper Big Walnut Creek Watershed was selected as a Priority Area that received funding through EQIP to address the occurrence of elevated levels of atrazine in Hoover Reservoir. Since 1999, the USDA's Environmental Quality Incentives Program (EQIP) has implemented best management practices (BMPs) on more than 23,000 cropland acres at a cost exceeding $1 million.

PUBLIC OUTREACH

A comprehensive public education and awareness program was conducted during the development of the watershed management plan. Because of the specific nature of the herbicide, atrazine in Hoover Reservoir, the public outreach program focused on the watershed's agricultural community. Numerous outreach mechanisms and activities were used to reach the watershed farmers, commercial herbicide dealers and applicators, and the pesticide manufacturing industry. Examples of public outreach mechanisms employed included:

- Newsletters;
- Newspaper articles;
- Brochures;
- Workshops (Attachment 13);
- Ohio State University Extension FactSheets (Attachment 7 and 14);
- Professional conference presentations (Attachment 15); and,
- Professional journal publications (Attachment 16).

RESULTS

GIS technology was used to track the implementation of management measures for each year of the EQIP program between 1999 and 2003.

General results of the initial EQIP application and award period in 1999 indicate that 63 farms covering 3,070 cropland acres were selected to receive funding of $110,880 distributed over five years. Detailed analysis of the 199 EQIP implementation year reveals that $85,820 or 77% of the total funding was used for alternatives to atrazine containing products. Alternative herbicide products used include isoxaflutole, flufenacet, metribuzin, alachlor, sulfonylurea and glyphosate, among other products. The remaining $25,058 were used for other conservation practices such as conservation tillage, residue management and crop rotation.

Between 1999 and 2003, more than $900,000 of EQIP dollars was allocated to farmers between 1998 and 2001 for conservation measures. More than 330 farm contracts represent 3,540 conservation practices that were implemented on 23,137 cropland acres; an estimated 32% of all watershed cropland acres. Conservation practices range from grassed waterways, crop rotation, and pesticide management. More than 69% ($633,791) of the EQIP funding was applied specifically to manage atrazine application rates through either rate reduction or total product elimination.

Chapter 8 Evaluation

INTRODUCTION

The evaluation phase for the Upper Big Walnut Creek Watershed provides the case study to demonstrate the feasibility of our approach to nonpoint source evaluation. This chapter presents the evaluation of the effect of field-scale conservation measures actually implemented on the landscape to affect atrazine runoff; and, the measured effect on water quality in Hoover Reservoir. The measured effect on Hoover Reservoir Water Quality is further sub-divided into Human Heath and Ecological endpoints. This portion of the case study will also discuss the results of the modeling framework and the array of BMPs that could have been implemented to produce a result similar to what was derived by the EQIP program but without the use of a buy down approach to load reduction.

The following report objectives are addressed in this section:

1) Simulate reduction in atrazine loss at field-scale and watershed-scale on the basis of actual best management practices applied under EQIP conditions.
2) Calculate risk for atrazine runoff at field-scale and watershed-scale from cropland in the Upper Big Walnut Creek watershed under EQIP conditions.
3) Examine relationships between simulated atrazine loss under EQIP conditions from the watershed crop fields and the Hoover Reservoir statistical model, change in atrazine concentration.
4) Develop relationships between changes (Post- minus Pre-EQIP) in risk for atrazine runoff and measured changes in atrazine concentrations in Hoover Reservoir.

SUMMARY STATEMENT

Implementation of the US Department of Agriculture Environmental Quality Incentives Program (EQIP) in the Upper Big Walnut Creek Watershed did reduce the occurrence of elevated levels of atrazine that help meet drinking water standards and ecological thresholds. During the 5 years of program implementation between 1999 and 2003, modeling results suggests that atrazine loading was reduced an average of 176 kg (388 lbs) per year.

Detailed Hoover Reservoir water quality data analysis is presented in Appendix C, and in the “NAPRA Modeling Report”. The following summarizes key findings for each analysis to answered specific project objectives.

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RESULTS – WATER QUALITY

Results of the water quality analysis to detect changes in atrazine concentrations in Hoover Reservoir have been grouped by drinking water standards and ecological thresholds. A risk-based analysis approach was used to characterize the probability of exceeding water quality standards, and determine if the exposure risk had been reduced as a result of the implementation of the watershed nonpoint source pollution abatement program.

Benefits of the risk-based water quality data analysis approach reveals the affect of climate factors on the occurrence of nonpoint source pollution. The data suggest that during low rainfall, and thus low flow rates, nonpoint source pollution levels may not be problematic. During periods of high rainfall conditions, the effect of the conservation measures is more apparent. This approach enables water resource planners to estimate the frequency of which a pollutant of concern will be at levels of concern requiring treatment. It may also be used to help water resources managers begin to determine how to balance the use of funding resources, i.e. costs for treatment, costs for watershed implementation, or combination of both.

HUMAN HEALTH

US EPA has established a maximum contaminant level (MCL) for atrazine in drinking water of 3 µg/l. This MCL is based on an average annual concentration based on four quarterly samples collected from the potable water.

During the period 1985 through 2004, average annual atrazine levels exceeded the Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) of 3.0 ppb two of the twenty years when monitoring data exists. However, the MCL was not promulgated until 1991 and implemented in 1992 and thus the City did not violate any promulgated drinking water quality standards.

OCCURRENCE

The occurrence of atrazine concentrations in Hoover Reservoir between 1985 and 2004 ranged from less than detection limits of 0.10 µg/l on four occasions to the highest detected level of 11.89 in July, 1990. Figure 2 clearly reveals the high degree of monthly, seasonal and annual variability of atrazine concentrations in Hoover Reservoir. This variability is indicative of nonpoint source pollution runoff and is consistent with state and regional research (USGS, 2006).

The period 1999 through 2004 is the period when both the USDA EQIP program and registrant’s label use application restrictions were implemented. The highest atrazine concentration detected in Hoover Reservoir during this period was 4.81 µg/l in July 2000.

Only 4,855 cropland acres planted to corn were enrolled in the EQIP program in this year. This may indicate that not enough cropland acres were participating in the nonpoint source pollution abatement program. Also, the average annual concentration was 1.48 µg/l, well below the 3 µg/l drinking water standard.

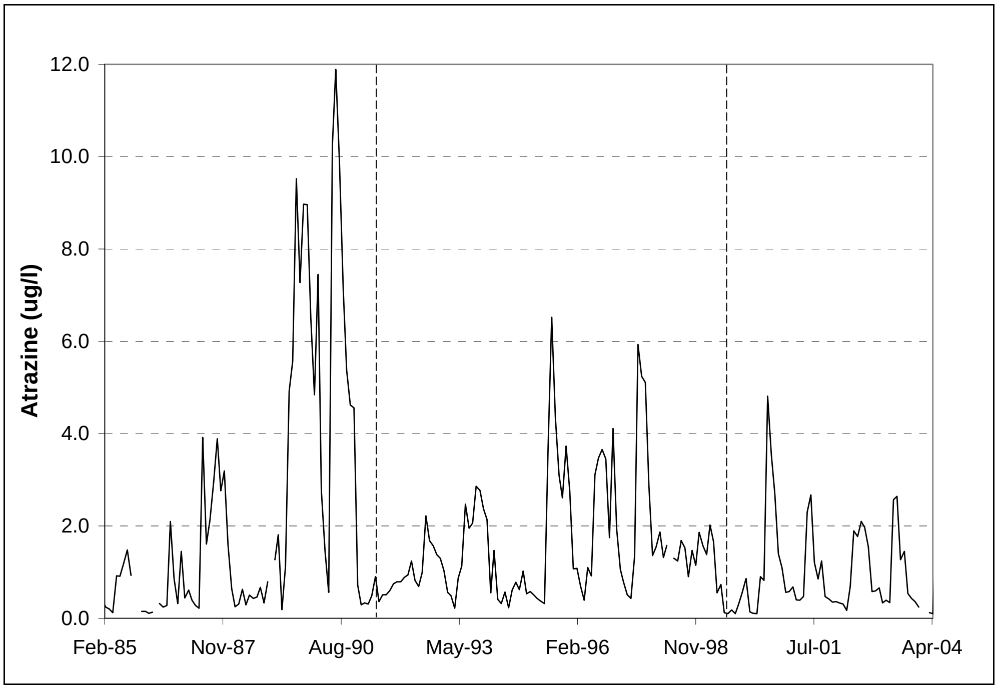

Figure 8-1 Time series plot of monthly atrazine concentrations in Hoover Reservoir (1985 - 2004).

Annual Patterns

Figure 9-2 depicts that during the 20-year water quality sampling period of Hoover Reservoir, the average annual atrazine concentration varied widely and ranged from a low of 0.5 µg/l in 1991 to a high of 5.9 µg/l in 1990.

For the period 1985 to 1990, the highest average annual atrazine concentrations of 5.1 µg/l and 5.9 µg/l were detected in 1989 and 1990, respectively. These levels were the highest average annual among all twenty-years. The average annual concentrations occurred before any label use restrictions or watershed-wide management programs were instituted in the watershed. Moreover, because of the elevated levels detected in 1989 and 1990, officials with the City of Columbus began engineering treatment technology for the Hap Cremean Water Plant and, initiated communications about the concern for atrazine in Hoover Reservoir with Ciba-Geigy, Ohio Farm Bureau Federation, and watershed stakeholders.

For the sampling period 1991 through 1998, the highest calculated average annual atrazine concentrations in Hoover Reservoir was 2.4 µg/l in 1995.

For the sampling period 1999 through 2004 when the federal USDA conservation program provided incentives to farmers to manage atrazine and label-use restrictions remained, the highest average annual atrazine concentration calculated during these five years was only 1.4 µg/l in 2000.

This data revealed that without changes in management practices or label use restrictions, Hoover Reservoir has the potential to exceed the human health drinking water MCL of an average annual 3 µg/l.

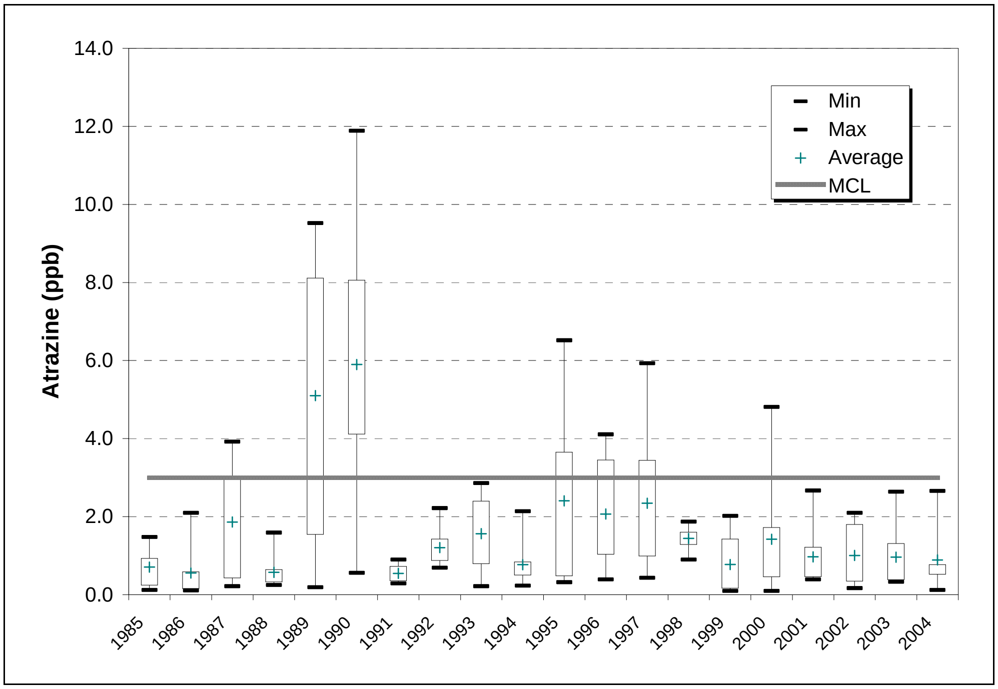

Figure 8-2 Variability of annual atrazine concentration in Hoover Reservoir in relationship to the drinking water maximum contaminant level (MCL) (1985 – 2004).

Although the range of atrazine concentrations vary widely and in some months exceed the Human Health standard of 3.0 µg/l, the MCL is based on a running annual average of a composite of four quarterly samples. Using the monthly data to average annual concentrations indicate that only 1989 and 1990 were above the lifetime MCL standard.

It is important to note that the atrazine MCL was not promulgated until 1991 and became effective in 1992. Moreover, this is raw untreated water prior to treatment and distribution. Moreover, without adequate voluntary or regulatory management measures in the watershed, this data suggests that Hoover Reservoir is susceptible to exceed the atrazine human health standard drinking water.

Average Annual Atrazine Concentration

The maximum contaminant level (MCL) for atrazine in drinking water is 3.0 µg/l based on an average of four quarterly samples.

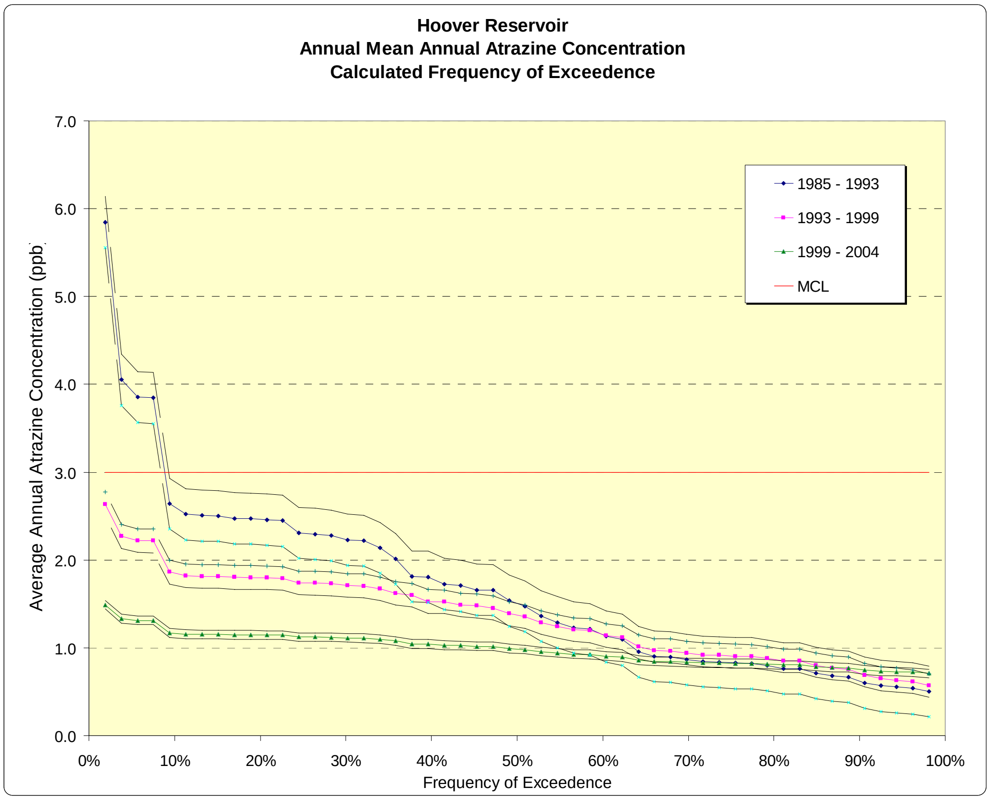

Figure 8-3 Application of risk analysis reveals probability of exceeding drinking water standards, and technique to evaluate effectiveness of watershed-wide nonpoint source pollution abatement program.

Figure 9-4 depicts the frequency of exceeding average annual concentrations in Hoover Reservoir during the three sampling periods. The probability of exceeding the atrazine MCL in Hoover Reservoir prior to 1993 was about 10%. Plotting the best-fit 50-year regressions for sampling period 1 indicate that only five of the fifty years would result in the average annual atrazine concentration in the reservoir to exceed 3.0 ppb. The years include 1957, 1972, 1989, 1990 and 2004; 1989 and 1990 had actual water quality monitoring data for this sampling period. The magnitude of exceeding the atrazine MCL in Hoover Reservoir varied from 3.0 to as high as 6.0 µg/l.

Since instituting label-use restrictions in 1993, the best-fit regression model indicates that atrazine levels should not exceed the drinking water standard MCL annual average. Similarly, adoption of federal USDA conservation programs in 1999 have further reduced the probability of the reservoir exceeding the MCL.

Average Annual Total Chloro-Triazine

Graphing the frequency of occurrence for atrazine TCT in Hoover Reservoir is quite dissimilar than the single atrazine parent compound. The average annual TCT drinking water level of concern (DWLOC) threshold for the most sensitive population, children and infants, is 18 µg/l (EPA, 2003). Clearly, the risk of average annual TCT is not, nor has been, problematic from drinking water derived from Hoover Reservoir.

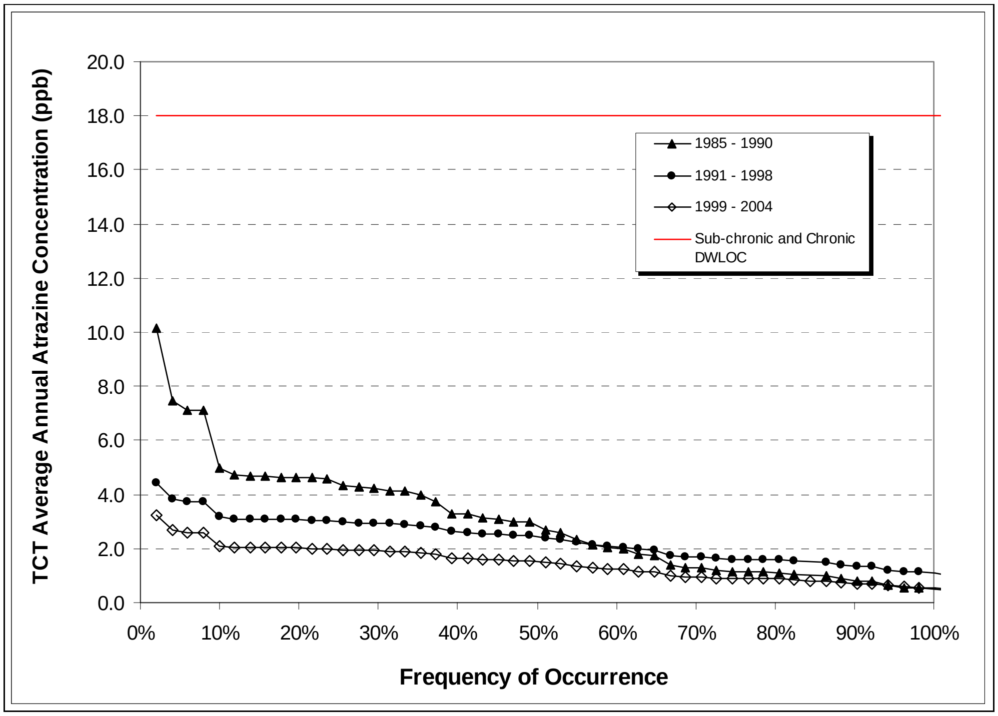

Figure 8-4 Probability of exceeding the average annual total chloro-triazine (TCT) chronic exposure drinking water level of concern (DWLOC) during the three discrete sampling periods. The DWLOC threshold is plotted for children and infant populations from drinking water in Hoover Reservoir.

RESULTS - ECOLOGICAL

EPA's concern for atrazine in the aquatic environment is the potential for direct effects on phytoplankton and macrophytes and the possibility for indirect effects on aquatic zooplankton, fish and the aquatic community. The concern for indirect effects of atrazine on aquatic communities is the subsequent changes in structure and functional changes in the aquatic habitat that will in essence, affect the availability of food resources for invertebrates and fish species.

Ecological effects from exposure to atrazine in Hoover Reservoir were evaluated based on recently published and adopted by EPA toxicological aquatic habitat levels of concerns.

REGRESSION ANALYSIS

Average Annual Atrazine Concentrations

Similar to the drinking water regression assessment, best-fit regressions between total critical period precipitation and average annual atrazine concentrations for the three sampling periods were compared to EPA aquatic habitat levels of concern endpoint thresholds. According to EPA (EPA, 2002):

> *Potential adverse effects on sensitive aquatic plants and other non-target aquatic organisms as well as other populations and their communities, are likely to be greatest where atrazine concentrations in water equal or exceed approximately 10 to 20 µg/l on a recurrent basis or over a prolonged period of time.*

Average annual atrazine concentrations did not exceed the EPA ecological toxicity threshold during any of the three atrazine sampling periods. The highest average annual atrazine concentration was 5.9 µg/l in 1990.

RISK ASSESSMENT

Based on twenty-years of water quality monitoring and regression modeling, Hoover Reservoir has low to no risk of exceeding the aquatic habitat level of concern at 10 to 20 µg/l. However, the refined ecological risk assessment proposed by EPA in 2002 does suggest Hoover Reservoir is at risk to exceed ecological levels of concern for aquatic species, especially the non-vascular phytoplankton plants.

Cumulative exceedence curves for monthly atrazine concentration data were plotted for each of the three water quality sampling periods.

For the water quality sampling period 1985 through 1990, prior to implementation of label-use restrictions, monthly atrazine concentrations exceeded the level of concern for aquatic invertebrates where populations were “likely” to be reduced 1.5% of the time. Non-vascular plants such as phytoplankton however, were more often exposed to levels where reductions in primary production were estimated to occur 30% of the time with concentrations exceeding 2.62 µg/l.

Between 1991 and 1998, the highest concentration in Hoover Reservoir was 6.52. During this period, aquatic invertebrates were not exposed to levels to cause population reductions. Non-vascular plants were exposed to levels of concern 20% of time.

For the period 1999 through 2004, atrazine was detected at levels greater than 2.3 µg/l 8.5% of time that are “estimated” to reduce aquatic primary producers. The highest concentration detected was 4.81 µg/l in 2000.

It is likely that the label-use restrictions adopted in 1990 reduced the risk of atrazine exposure to both non-vascular and invertebrate species in Hoover Reservoir. Coupled with the USDA conservation program in 1999 further reduced the risk of exposure duration and magnitude to levels that should protect the non-vascular phytoplankton species in the reservoir.

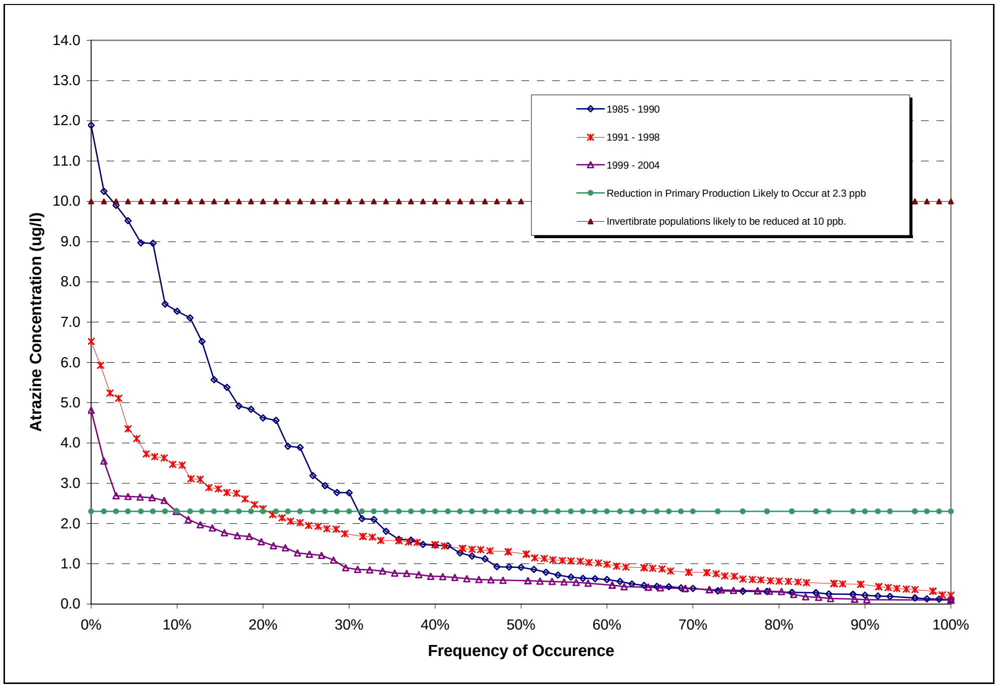

Figure 8-5 Frequency of occurrence of exceeding monthly atrazine ecological indices in Hoover Reservoir for the three discrete sampling periods.

CONCLUSIONS

EVALUATION OF EQIP PERFORMANCE

The initial motivation for implementation of the federal USDA Environmental Quality Incentives Program (EQIP) was attributed to measured elevated levels of the agricultural herbicide atrazine in public water supply for a large metropolitan community - Columbus, Ohio.

The identification and review of atrazine's regulatory history revealed significant label-use changes occurred during the period of water quality sampling in Hoover Reservoir. The sampling periods were identified and include:

- Sampling Period 1: 1985 to 1993 is the period prior to label-use restrictions affecting application rates and methods;
- Sampling Period 2: 1993 to 1999 is the period when significant label-use restrictions were implemented to protect ground and surface waters but, prior to implementation of the federal USDA watershed-wide EQIP program.
- Sampling Period 3: 1999 through 2004 is the period when both label-use restrictions and the watershed-wide EQIP program to manage atrazine were implemented in the Upper Big Walnut Creek watershed.

The occurrence of atrazine in Hoover Reservoir typically occurs after application during the "spring flush" and steadily decline during the subsequent seven months – for each sampling period. Moreover, atrazine concentrations do not significantly increase each year during the spring runoff period. These data indicate the source of atrazine loading to Hoover Reservoir is from nonpoint source pollution runoff.

The magnitude of average monthly concentration during the spring runoff period and following summer months however, decreased for each successive sampling period.

Before 1993, average monthly atrazine concentrations were greater than 3 ppb during the spring and summer month and autumn months. The highest detected atrazine concentration was 18.89 in June, 1990. Since 1993, average annual atrazine concentrations have not exceeded 3 ppb for either sampling periods.

Average annual atrazine concentrations exceeded 3 ppb in 1989 and 1990, prior to EPA promulgation of the drinking water standard maximum contaminant level (MCL) in 1991. Since 1990, average annual concentrations have not exceeded the atrazine MCL in Hoover Reservoir.

Regression equations between total critical season "spring flush" precipitation and average annual atrazine concentrations in Hoover Reservoir were developed for the three sampling periods. Higher rainfall levels during the critical season were correlated well with higher levels of average annual atrazine concentrations. Regression equations for each sampling period revealed that, with higher total precipitation during the spring critical season, atrazine levels during sampling period 2 and 3 were significantly lower than sampling period 1. The highest 50-year recorded total rainfall during the spring critical season would not result in atrazine levels above the MCL during implementation of either label-use restrictions or the EQIP conservation program.

Risk analysis of 50-years of climate data indicates that average annual concentrations in Hoover Reservoir would have exceeded 3 ppb 10% of time for sampling period 1. Risk analysis of sampling periods 2 and 3, however, indicate that average annual atrazine concentrations would not exceed the drinking water MCL. The year 2004 was estimated to have exceeded, although very slightly, the atrazine drinking water MCL. Therefore, it appears that both the label-use restrictions and Environmental Quality Incentives Program may have prevented atrazine levels in Hoover Reservoir from exceeding the drinking water standard. However, regression analysis also suggests that the label-use restriction alone may have been enough to temper atrazine levels to below the MCL.

Total chloro-triazine (TCT) in drinking water supplies were also assessed using regression and risk analysis. At the EPA recommended level of concern for TCAT at an 18 µg/l average annual concentration, TCT in Hoover Reservoir is not problematic for any of the three sampling periods.

Results of the ecological risk analysis of Hoover Reservoir reveal that before 1990 and based on monthly measured samples, atrazine levels exceeded EPA's aquatic habitat level of concern of 10 µg/l for aquatic invertebrate populations 1.5% of time. Moreover, non-vascular species such as phytoplankton were exposed to atrazine concentrations greater than 2.3 µg/l 30% of time. EPA estimates reductions in the primary producer populations at concentrations greater than 2.3 µg/l in lentic systems such as Hoover Reservoir. Adoption of label-use restrictions and the implementation of conservation measures in 1999 did reduce the risk of atrazine exposure to both aquatic invertebrate and non-vascular species. For the sampling period 3, monthly atrazine concentrations were detected at levels greater than 2.3 µg/l 8.5% of time.

It appears that the atrazine label-use restrictions adopted by the product registrants in 1990, and agreed to by EPA, and the implementation of the watershed-wide Environmental Quality Incentives Program (EQIP) in 1999 have reduced the occurrence and magnitude of atrazine in Hoover Reservoir.

From a human health drinking water perspective, it appears the label-use restrictions were enough to reduce the risk of atrazine from exceeding drinking water MCL standards. The EQIP program provided additional assurance from potentially exceeding MCL standards in Hoover Reservoir.

Ecologically, the EQIP program does appear to have reduced the risk of occurrence and magnitude on non-vascular phytoplankton species in Hoover Reservoir.

EVALUATION OF OPTIMAL BMPS

In the "NAPRA Modeling Report" the modeled EQIP program performance is compared to the target load reduction. The treatment triggering load (i.e. the one that results in a reservoir concentration greater than 2ppb) was calculated based on the sampling period 2 conditions as presented above and was used to set the range for the target load reduction. The EQIP program achieved an annual NAPRA modeled reduction in losses of between 200 and 630 lbs of Atrazine. As described above that load reduction can be shown to be sufficient to prevent violation of human health or ecological criteria in the reservoir and watershed system.

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As discussed earlier the model framework did not consider the buy down alternative within the array of optimal BMPs modeled to estimate the effectiveness of using management practices to control nonpoint source pollution. The "NAPRA Modeling Report" documents that by selecting and implementing optimal BMPs on 100% of the corn planted fields a reduction in load in the same range as that achieved by EQIP could be gained.

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The modeling report also details the cost effectiveness based on the incentive cost documented to achieve participation in those BMPs. The overall incentive cost averages out to about $ 267 per lb of atrazine reduction which is in the same range as the cost of the EQIP program which relied primarily on buy down and averaged $254 per lb of Atrazine. The $267 represents the mean cost of optimal BMPs the range includes options that could provide similar reduction for lower cost. During an implementation evaluation a cost optimization could occur that would help lower the cost of selecting optimal BMPs. Given that less than 40% of fields were enrolled in EQIP and our model results suggest that 100% of fields would need to select optimal BMPs to provide equivalent results the cost per acre would be considerably lower with an optimal array of BMPs. However, the optimal BMPs do not introduce the potential for an alternative herbicide to be introduced as would be the case with a buy down management program. Another finding important to the review of the EQIP program is that some of the BMPs chosen for practical or economic reasons actually increased the potential for runoff from specific soil types as is illustrated on Figure 9-7.

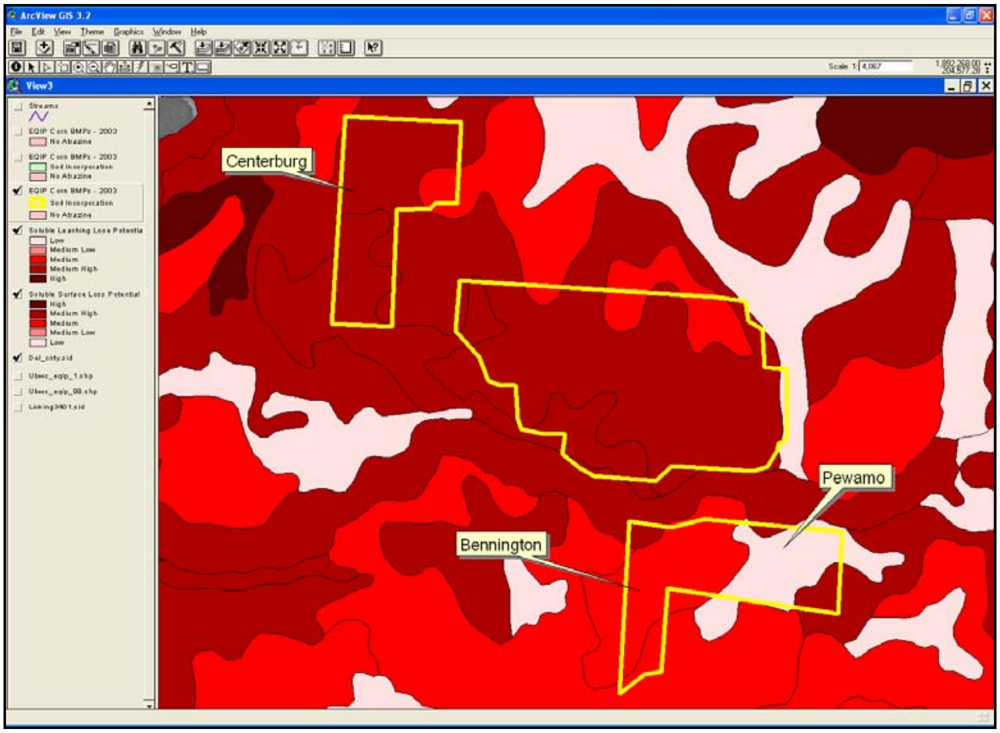

Figure 8-6 The atrazine management practice of soil incorporation on the Centerburg soils increases the risk of atrazine leaching through the soil profile. Soil incorporation on the Bennington and Pewamo soils reduces the risk of atrazine runoff. This figure illustrates the need for field-scale preplanning prior to implementation of conservation management measures.

While the results do not document a clearly better alternative than what was applied under EQIP, the modeling framework provides a useful and objective tool to calculate the relative cost and benefit of implementing different management practices to control. Had the framework been available during EQIP certain fields would not have been eligible for implementing some management practices. Even if buy down were still selected as a dominant practice the overall cost of the program could have been lowered by not funding those farm fields where certain BMPs had no potential to reduce losses from the fields or in some cases even increased load.

REFERENCES

EPA. 2002. *Reregistration Eligibility Science Chapter for Atrazine: Environmental Fate and Effects Chapter*. US Environmental Protection Agency, Office of Pesticide Programs, Environmental Fate & Effects Division. Washington, DC.

EPA, 2003. Interim Reregistration Eligibility Decision for Atrazine: Case No. 0062. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Washington, DC.

USGS, 2006. *The Quality of Our Nation's Waters: Pesticides in the Nation's Streams and Ground Water, 1992-2001*. Circular 1291. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.

Chapter 9 Recommendations and Conclusions

INTRODUCTION

The cost effectiveness of watershed-based protection programs in relationship to treatment technologies to meet drinking water standards is a critical decision element for water utilities. Conventional thinking advocates watershed-based approaches and many utilities support these programs. Currently, little information exists to fully examine the cost distribution. In this case study we propose techniques to ascertain cost effectiveness to compare treatment technologies versus watershed-based conservation programs.

We estimate that the implementation of the US Department of Agriculture's Environmental Quality Incentives Program (EQIP) has saved the City of Columbus as much as $1.5 million in treatment costs to reduce atrazine levels in the drinking water at the Hap Cremean Water Plant. The greatest savings potential was observed in 2002, when as much as $1.2 million of treatment costs were saved at the water treatment plant. In 1999, however, more money had been spent in the watershed for atrazine management than costs for atrazine reduction at the water treatment plant. This factor can be related to the lower than average rainfall which resulted in less than significant atrazine runoff.

The economic analysis conclusions indicate that conservation programs tend to take time to adequately enroll sufficient acres into the program before environmental and economic benefits are fully realized. Of the five-year program, economic benefits were not fully realized until the third year of the program (2002) when sufficient acres that exceeded 15% of the watershed's cropland were actively managing atrazine.

Also, although the cumulative five-year watershed-based atrazine management program were estimated to provide economic benefits to the City of Columbus, targeting more appropriate conservation measures could increase the conservation program's overall efficiency. Allocating funds annually strictly for atrazine reduction in the watershed provides little to no long-term environmental benefits to the watershed and water supply. The annual climatological variability is a critical factor in determining the need for atrazine reduction at the water plant. Thus, promoting lower cost environmental conservation management measures that reduce the risk of pollutant transport from cropland will optimize the balance of pollutant removal at the water treatment plant and watershed-based pollutant prevention programs.

ECONOMIC ANALYSIS

An economic cost analysis that compared the costs of the landscape management practices funded by the USDA Environmental Quality Incentives Program (EQIP) was compared with actual and project costs for atrazine removal at the Hap Cremean Water Plant (HCWP) in Columbus, Ohio.

The following objectives were examined for this report:

- Examine data and factors to complete economic analysis
- Compare actual BMP costs versus actual PAC costs
- Compare actual BMP costs versus estimated PAC costs without EQIP
- Estimate historical PAC costs and potential for BMP reduction

The total costs for BMP implementation for the period 1999 through 2003 was $484,701. The City of Columbus did use PAC treatment during this same period at a cost of $782,157. Variable factors such as number of program participation as number of acres actively managing atrazine, climate, PAC costs, and operational conditions affect the economic analysis. These factors were examined in this analysis.

BACKGROUND

Constructed in 1956, the Hap Cremean Water Plant (HCWP) is owned and operated by the City of Columbus. In 1969, treatment capacity was expanded from 50 million gallons per day (MGD) to 130 MGD. HCWP is a two-stage lime/soda softening treatment process and includes raw water screening, alum coagulation and clarification, lime-soda softening, recarbonation, rapid sand filtration, chlorination for disinfection.

Elevated levels of pesticides, especially atrazine, detected in Hoover Reservoir during the late 1980's, and the 1986 Safe Drinking Water Act (SDWA) establishment of forthcoming regulatory standards for pesticides in drinking water revealed a need cost-effective treatment technology. The City evaluated a variety to treatment technologies that included membrane softening, granular activated carbon (GAC), potassium permanganate ($KMgO_4$), and ozone (O_3) to achieve water quality goals. Powered activated carbon (PAC) was selected because of the intermittent elevated occurrence of pesticides in the raw water; ability to address taste and odor issues; application to treat organic contaminants; scalability of the technology; and, the most economical technology-based solution. Later, the PAC was found to be successful at reducing precursors to regulated disinfection by-products in the drinking water.

The PAC feed facility, completed in 1997, at HCWP is designed to deliver up to 50 ppm PAC at the plant's maximum intake flow rate of 130 MGD. This system enables the City to administer variable dosage rates to address organic contaminant scenarios where conventional treatment does not effectively remove contaminants (City of Columbus, 1992).

In 1997, the City of Columbus initiated a Watershed Partnership with the agricultural community in the Upper Big Walnut Watershed to complement the PAC treatment technology. In 1999, USDA began a watershed-wide program EQIP to help address the atrazine runoff issue. Describe Period 1, 2 and 3.

Assessing the economic impact from atrazine in raw water for the HCWP plant is warranted. Capital infrastructure costs and engineering fees for the PAC feed facility was $3.8 million. Using AAA municipal bonds at 7% interest rate, the amortized costs are about $320,000 per year for 20 years. Since the PAC facility has been used to remove taste and odor issues, and THM precursors, Capital amortization costs for atrazine removal are not included in this analysis.

RESULTS

Baseline Atrazine Concentrations: Pre-EQIP Conditions

Monthly Hoover Reservoir atrazine data were used as proxy for raw water at the HCWP intake. Figure 1 depicts the relationship of monthly atrazine levels in the reservoir and finished drinking water at the HCWP prior to the implementation of the USDA EQIP program.

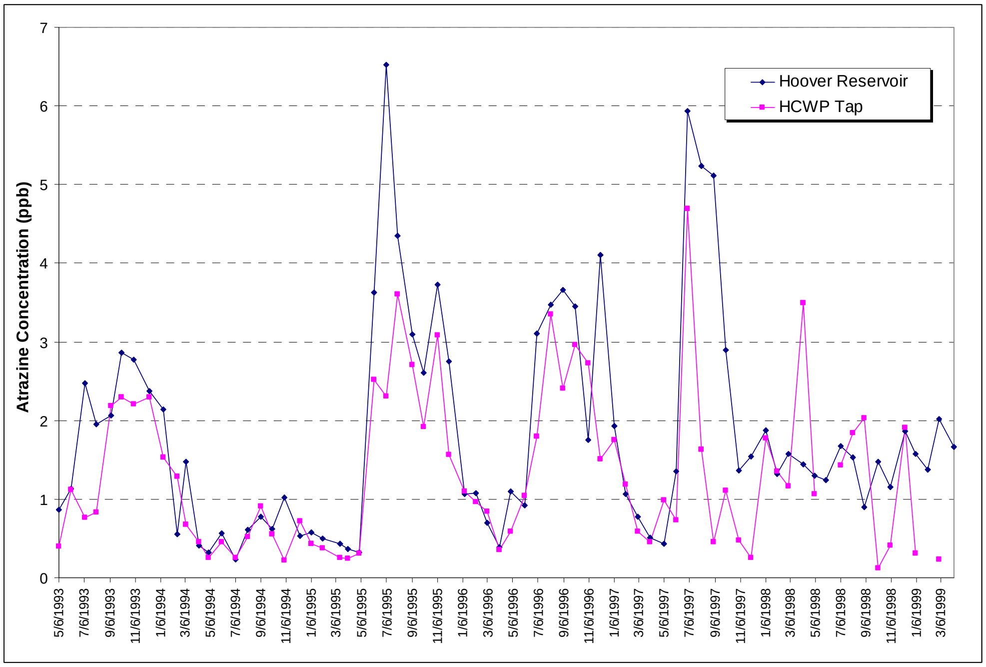

Figure 9-1: Baseline conditions prior to the period when the USDA EQIP program began. May 1997, the PAC treatment facility went online at the HCWP.

The sharp decrease of atrazine in treated water in 1997 reflects when the powdered activated carbon (PAC) facility was activated at the HCWP. The highly variable concentrations in tap water depict operational management during the initial establishment.

Atrazine Concentrations with EQIP

Results of the cost analysis of USDA Environmental Quality Incentives Program (EQIP) implemented in the Upper Big Walnut Creek Watershed are presented. The analysis focus' on the period May 1999 through April 2004 to reflect the water quality effects of the watershed-wide implementation of the EQIP program.

Monthly atrazine concentration data of Hoover Reservoir for the period May 1999 through April 2003 during the implementation of the USDA EQIP program were used to estimate the costs for powered activation carbon (PAC) treatment technology at the Hap Cremean Water Plant (HCWP).   A comparison of monthly atrazine levels in Hoover Reservoir and finished drinking water at the HCWP are presented in Figure 1.

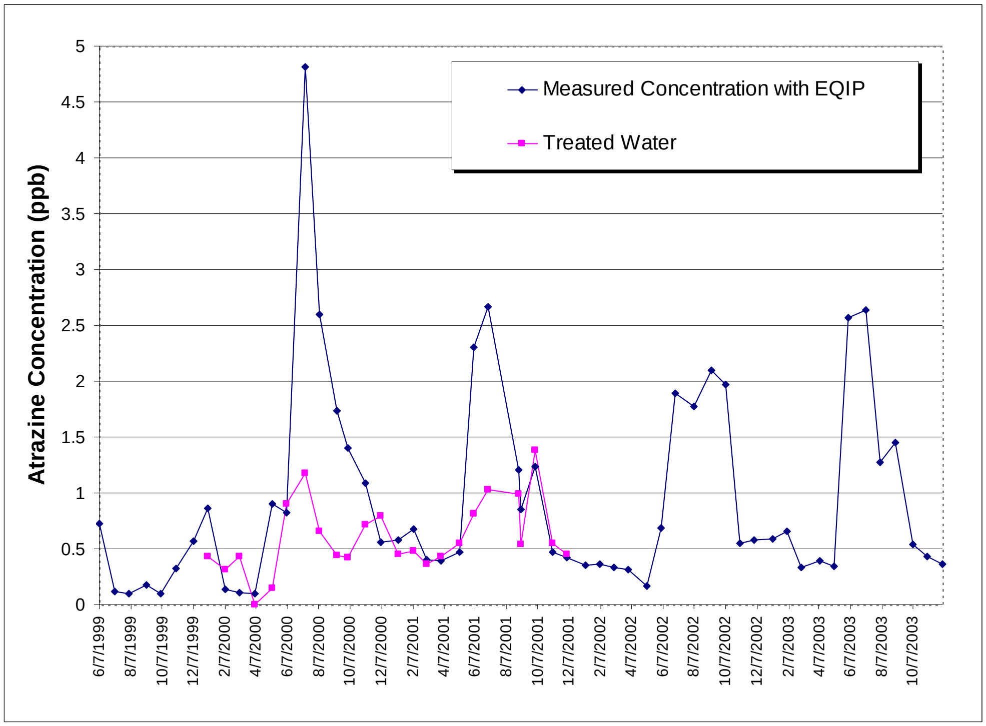

Figure 9-2: Relationship between monthly atrazine concentrations in Hoover Reservoir and Tap water at the Hap Cremean Water Plant. Atrazine levels in tap water are well below the Columbus treatment policy of 2.0 ppb.

It is the City of Columbus' policy to add PAC when atrazine levels in raw water exceed 2.0 to 2.5 ppb. Figure 2 clearly illustrates that atrazine levels were consistently maintained below the 2.0 treatment threshold. For example, for the year 2000 although the highest monthly atrazine concentration in Hoover Reservoir was 4.8 ppb, atrazine levels in drinking water were reduced to 1.2 ppb, with an average annual concentration of 0.5 ppb. The average annual concentration in raw water was 1.3, also well below the drinking water MCL of 3.0 ppb.

Cost Effects of EQIP

Table 1 itemizes the costs for the implementation of atrazine management measures and corresponding PAC treatment at the HCWP. Data in the table suggests that the combined costs for atrazine reduction over the five year period at the HCWP exceed $1.2 million, at an average rate of $253,000 per year. It may also suggest that more money spent on management measures in the watershed correspondingly decreases PAC treatment costs at HCWP. However, a greater examination of the data is warranted.

	Total EQIP Costs 1)	**Costs for Atrazine Management EQIP 2)**	**PAC Average Cost/ton ($/t)**	**PAC Treatment Costs 3)**	**Total Costs**
1999		$26,885	NA	$0	$26,885
2000		$67,000	$880	$459,786 ($491,135) 4)	$526,786 ($558,135)
2001		$112,435	$940	$235,854	$348,289
2002		$128,941	NA	$0	$128,941
2003		$149,440	$480	$86,517 (169,429)	$235,957 ($318,869)
Total:		$484,701		$782,157	$1,266,858 ($1,381,770)

Notes:

1) Includes all EQIP program costs by year.

2) Represents only those costs for atrazine management on cropland used for corn production in the specified year.

3) PAC treatment cost data provided by the City of Columbus.

4) PAC costs indexed to $940/ ton

Table 9- 1: Cost comparisons for the actual use of powdered activated carbon (PAC) versus implementation of atrazine management measures in the Upper Big Walnut Creek Watershed.

The economic cost analysis comparison between the USDA EQIP program in the Upper Big Walnut Creek Watershed and PAC technology treatment removal has been extremely difficult with the existing data. Several critical variables complicate an economic cost comparison:

1) Enrollment rate in the USDA EQIP program incrementally increased during the five-year study period. In 2000 only 4,855 acres were enrolled in the EQIP program and by 2003, more than 10,000 cropland acres were actively managed for atrazine;
2) USDA funds whole farm field conservation management. This enables EQIP funds to be expended for management measures (e.g., conservation tillage and

crop rotation) on cropland such as soybean and small grain representing years when atrazine is not used;

3) Monthly atrazine concentration data of Hoover Reservoir are used as proxy data for the atrazine levels of the HCWP raw water intake structure since this data is not available;
4) Specific PAC product removal efficiencies vary by manufacturer;
5) PAC removal efficiencies may be reduced by the presence of other organic compounds in the raw water;
6) PAC cost per ton has varied as much as $460 among years. PAC average cost per ton was about $880, nearly double the rate of 2003 costs;
7) Volume of potable water treated with PAC varies annually; and,
8) PAC facility operational factors. Spreadsheet calculated atrazine removal efficiencies and costs do not adequately characterize actual PAC operational techniques which are not precise as a spreadsheet calculation would indicate.

These variables limit the ability to accurately compare watershed-based atrazine management with PAC treatment atrazine removal. We attempt to limit effects of the identified variables in the following.

During EQIP

The amount of water requiring treatment with PAC affects the costs for atrazine removal at HCWP. Data in Table 2 estimates the costs per million gallons of PAC treated volume of drinking water for atrazine runoff management measures in the watershed, PAC technology atrazine removal, and total costs during the period 1999 through 2003.

	PAC Treated Volume (MG)	**Atrazine Prevention Management Measures Costs/MG ($/MG)**	**PAC Costs Per Treated Million Gallons ($/MG)**	**Total Costs Per Million Gallons Treated**	
1999	0	$------	$0	$------	
2000	12,979.7 (45.5%)	$5.16	$35.42 ($37.84)	$40.58 ($43.00)	
2001	8,062.6 (29.3%)	$13.94	$29.25	$43.19	
2002	0	$------	$0	$------	
2003	7,178.1 (26.9%)	$20.82	$12.05 ($23.60)	$32.87 ($44.42)	0.003
Total:	28,220.4 (19.7%)	$------	$56.04	$------	

Table 9-2: Costs per million gallons of PAC treated water for watershed-based atrazine runoff prevention management measures and PAC treatment removal costs at HCWP.

Data in Table 2 presents suggest that when PAC costs are indexed to $940 per ton, total treatment costs (Management Measures plus PAC treatment) is consistently about $43 to $44 among all years. Therefore, the data suggests that atrazine reduction costs are evenly distributed among PAC technology and watershed-based management measures.

A challenge with the data in Table 2 is that although there are no costs for PAC in 1999 and 2002, there was a cost for management measures in those years. Mathematically, the management measures cost per million gallons treated cannot be determined. Data in Table 3 was created to estimate the atrazine reduction costs per million gallons for the total drinking water production at HCWP. Also, based on a consumption rate of 150 gallons of water per day, total costs for atrazine reduction per customer is provided.

	Total Annual Potable Volume (MG)	**Atrazine Prevention Management Measures Costs/MG ($/MG)**	**PAC Atrazine Removal Costs/ MG ($/MG)**	**Total Costs/ MG ($/MG)**	**Annual Customer Costs (150 Gallons/ day)**
1999	30,696.2	$0.88	$0	$0.88	$0.0479
2000	28,535.9	$2.35	$16.10 ($17.20)	$18.44 ($19.55)	$1.0107
2001	27,528.9	$4.08	$8.57	$12.65	$0.6927
2002	29,835.0	$4.32	$0	$4.32	$0.2366
2003	26,722.4	$4.07	$3.24 ($6.92)	$7.31 ($10.99)	$0.4834
Total:	143,318.4	$3.38	$5.46	$8.84	$2.47

Table 9-3: Costs per million gallons for watershed-based atrazine runoff prevention management measures and PAC treatment removal costs at HCWP.

Data in Table 3 reveals a cost efficiency for the watershed-based implementation of the USDA EQIP program. In 2000, only 4,855 acres were enrolled in the program and cost only $2.35/ MG, but removing the atrazine at HCWP exceeded $16/ MG. Indexed for $940/ ton PAC, the total costs for atrazine reduction was estimated at $19.55/ MG. By 2003 and at $940/ ton PAC, atrazine reduction was estimated at approximately $11.00/ MG. This suggests that by not implementing enough cropland acres can be cost inefficient. The higher number of cropland acres participating in 2002 and 2003 suggests that they can reduce the peak concentration and duration of the concentration in Hoover Reservoir. Therefore, a cost savings can be gained by balancing the number of acres in the watershed with PAC treatment at HCWP. It is important to note however that the operational factor of how much PAC is added to raw water at HCWP must be considered in this analysis.

Operational Factors

The process of adding PAC to raw water at HCWP is not a precise process, nor does the City stop adding PAC when atrazine levels go below 2.0 to 2.5 ppb. Most monthly atrazine concentrations in drinking leaving HCWP were below 1.0 ppb, and are evident in Figure 1. This concentration differential between the City's treatment policy level and actual treatment levels can be expensive.

We estimate that if atrazine levels were maintained, if technically feasible, at a level not to exceed nor drop below 2.0 ppb in drinking water, then HCWP PAC costs (at $880/ pound) in 2000 could have been about $163,709. Therefore, an operational adjustment could have saved the City approximately $296,077, while maintaining average annual drinking water compliance standards for atrazine. Adding the $67,000 costs for management measures in the watershed, the total program savings in 2000 could have been about $229,077.

	Costs for Atrazine Management EQIP	**PAC Average Cost/ton ($/t)**	**PAC Treatment Costs 3)**	**Estimated PAC Treatment Costs to 2.0 ppb**	**Potential Operational Adjustment Savings**
1999	$26,885	NA	$0	0	$0
2000	$67,000	$880	$459,786	$163,709	$296,077
2001	$112,435	$940	$235,854	$54,647	$181,207
2002	$128,941	NA ($480)	$0	$7,259	-$7,259
2003	$149,440	$480	$86,517	$28,539	$57,978
Total:	$484,701		$782,157	$254,154	$528,003

Table 9-4: Effect of operational changes: Cost comparisons for the estimated use of powdered activated carbon (PAC) down to 2.0 ppb versus implementation of atrazine management measures in the Upper Big Walnut Creek Watershed.

If atrazine levels in drinking water were managed not to exceed 3.0 ppb, then the potential PAC treatment savings could have been $722,097. Approximately $55,060 of PAC would have been needed in 2000 to reduce the 4.81 ppb atrazine detected in July down to 3.0 ppb. The City could have elected not to reduce July 2000 concentration excursion and still maintained the average annual drinking water compliance standard.

Albeit the City has the potential to save $782,157 over five years, the public and City leadership may opt for lower atrazine levels even at an average annual cost of nearly $150,000. This is especially true when atrazine treatment costs are factored on a per gallon, per person and per family basis. Table 3 summarizes these annual "water quality perception" costs for consumers in Columbus, Ohio.

Atrazine Concentrations without EQIP

Data from the NAPRA model were used to project monthly atrazine concentrations in Hoover Reservoir without the implementation of the EQIP program between 1999 and 2003. Figure 2 compares monthly measured and the projected atrazine concentrations in Hoover Reservoir. Annual fluctuations are evident where the measured concentrations are consistently lower than projected concentrations. The differences are greatest during the seasonal spring runoff period. The lower concentrations during this seasonal runoff are critical to the success of the watershed-wide EQIP program.

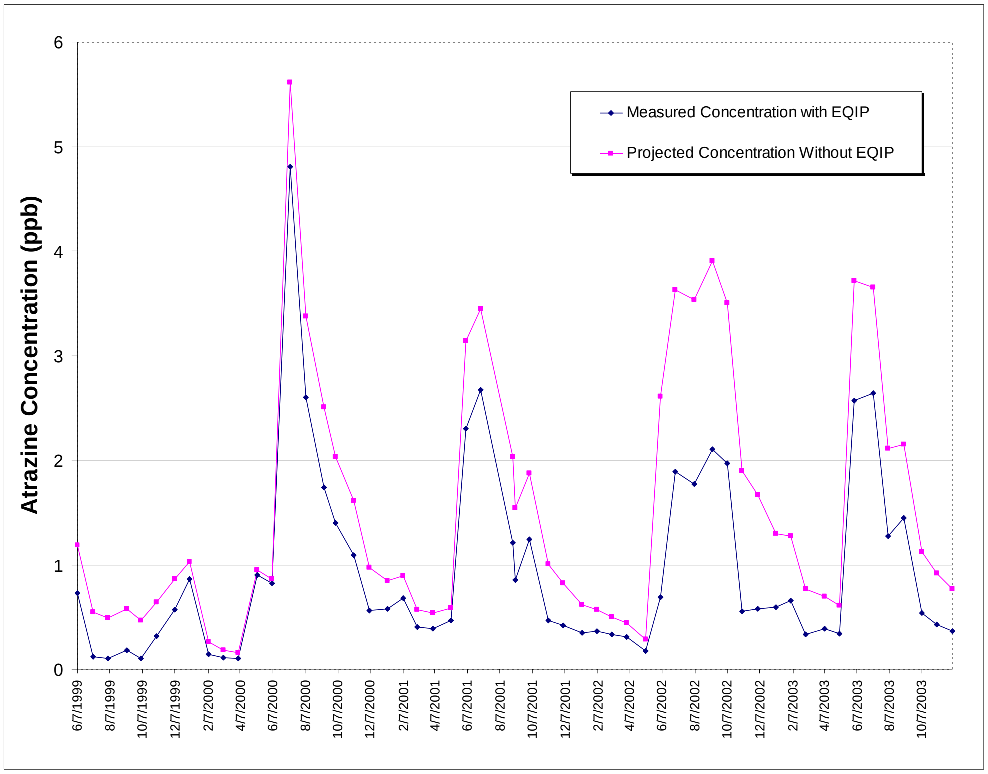

Figure 9-2: Projected atrazine concentrations in Hoover Reservoir compared to measured concentrations during the period when EQIP was implemented in the project watershed

It is evident in 1999 and 2000 that little difference exists between measured and projected atrazine levels. This can be attributed to the low enrollment of cropland in 1999 and low amount of rainfall during the spring season in 1999. During this first year, only 3 percent (1,792 acres) of total watershed cropland were enrolled in atrazine management, and total rainfall was only 350 mm or 74 mm below average. Therefore, there was little rainfall to cause atrazine to runoff the fields. In 2000, however, total seasonal rainfall after atrazine application was 46 mm higher than average, but only 4,855 acres (8.4%) of total cropland were participating in EQIP. Therefore, it is clear that not enough cropland acres were enrolled to substantially lower the runoff effect.

The effect of lower atrazine concentrations as a result of the EQIP program become more evident in 2002 and 2003 when the cumulative cropland acres enrolled in EQIP were at 9,017 (15%) and 10,374 acres (18%).

Estimated Treatment Costs without EQIP

Projected atrazine concentrations in Hoover Reservoir were used to estimate PAC treatment costs if the USDA EQIP program had not been implemented between 1999 and 2003. Figure 28 depicts the potential atrazine concentrations in Hoover Reservoir in relationship to measured atrazine levels in tap water from the Hap Cremean Water Plant.

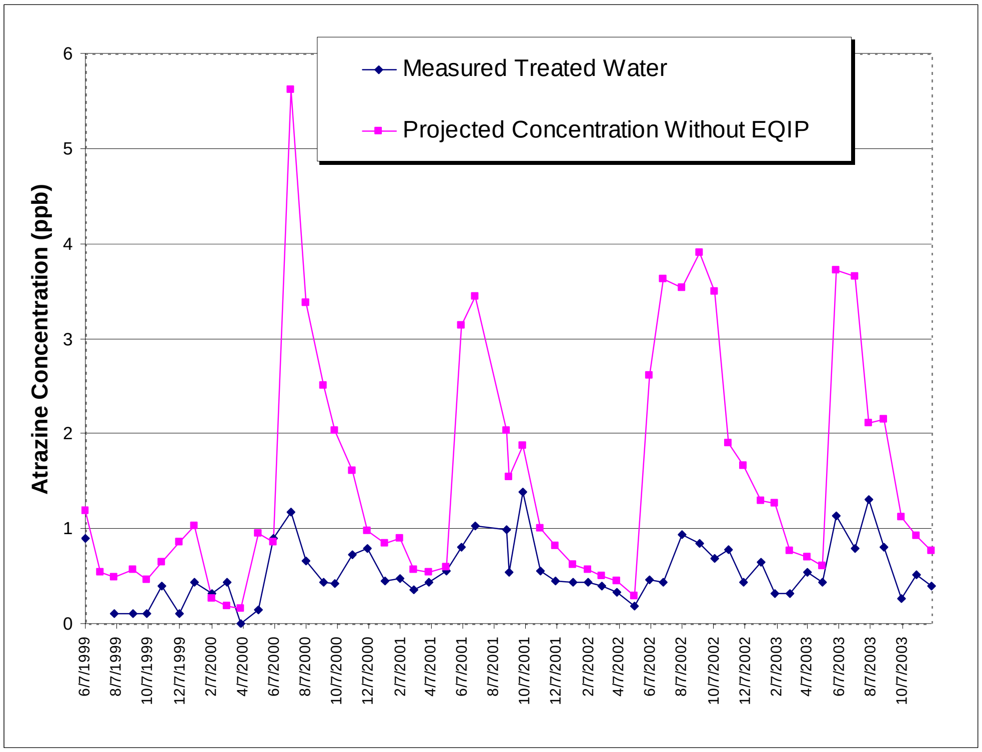

Figure 7: Relationship between projected atrazine concentrations in Hoover Reservoir without EQIP and measured levels in tap water at the HCWP

Table 5 summarizes the projected PAC treatment costs without the EQIP program in relationship to the actual costs for PAC treatment and EQIP implementation costs for the period 1999 through 2003. The data reveal the program’s savings potential range from

$730,156 to $1.5 million, depending on the PAC carbon costs which tend to vary yearly because of carbon demands and final contracts.

There exist cost savings differences among years during the EQIP implementation period. For example, the costs in 1999 were greater for watershed-based atrazine management. This is highly likely because of the nominal number of acres enrolled in the initial program year, and lower than average rainfall that did not result in an atrazine runoff event. By 2002, however, greater enrollment and higher than average rainfall during the planting season reveal a substantial potential PAC treatment cost savings. As much as $1.2 million could have been saved in 2002 because of the EQIP program.

	Costs for Atrazine Management EQIP$^{2)}$	**PAC Average Cost/ton ($/t)**	**Projected PAC Treatment Costs Without EQIP**	**Actual PAC Treatment Costs With EQIP**	**Savings Potential**
1999	$0	NA	$0	$26,885	- $26,885
2000	$0	$880 ($940)	$623,834 ($666,368)	$526,786 ($558,135)	$97,048 ($108,233)
2001	$0	$940	$489,665	$348,289	$141,376
2002	$0	NA $480 ($940)	$0 $708,240 (1,381,068)	NA $128,941 $128,941	NA $579,299 ($1,252,127)
2003	$0	$480 ($940)	$175,275 ($343,248)	$235,957 ($318,869)	- $60,682 ($24,379)
Total:	$0		-- $1,997,014 ($2,880,349)	-- $1,266,858 ($1,381,119)	--- $730,156 ($1,499,230)

Table 9-5: Cost comparisons for the actual use of powdered activated carbon (PAC) versus implementation of atrazine management measures in the Upper Big Walnut Creek Watershed.

ATTACHMENT A

Model Selection Report

Appendix A: Model Evaluation and Selection

Introduction

Nonpoint source pollution of water resources is caused, in part, by rainfall or snowmelt moving over through the ground, which occurs through multiple and complex pathways (EPA, 1993). Directly measuring these complex pathways from site-specific monitoring is difficult, expensive, and impossible in most situations. Nonpoint source pollution water quality simulation models are mathematical tools can that estimate pollutant transport through these complex pathways as a function of landscape physical features and land management practices. Today, there exists an array of readily available nonpoint source pollutant water quality models. Selecting the appropriate model, or combination of models, depends on understanding and evaluating the application needs (Parsons et al., 2004; and, EPA, 1997a).

A brief discussion of model evaluation and selection process for nonpoint source pollution is presented. The reader is referred to several excellent references cited at the end of this document for specific applications on model evaluation and selection.

For the purposes of the Case Study presented in this report, the National Agricultural Pesticide Risk Analysis (NAPRA) tool was selected because of the policy established by the US Department of Agriculture (USDA) that requires the use of approved evaluation procedures such as the Windows Pesticide Screening Tool (Win_PST), or NAPRA when federal funds are expended for the pesticide management practice (595) (USDA, 2001a; and USDA, 2001b).

Background

In general, there are three categories of models to examine the effects of land management on water resources. They include screening level models, deterministic models, and stochastic models (Novotny and Olem 1994; and, EPA, 1997b).

The simplest models are statistical routines and regression analyses commonly used as screening-level tools. These models use rudimentary equations to relate the cause and effect relationships of a system to some degree of correlation.

More advanced models utilize a governing equation, or set of equations to mathematically represent the physical environment. These types of models can be either deterministic or stochastic.

Deterministic models, also termed mechanistic or theoretical, use governing equations to determine a single set of output for each set of inputs.

Stochastic models, also characterized as empirical or statistical, are similar to deterministic models in that they are governed by a set of mathematical equations, however; stochastic models provide a probabilistic range of outputs. Stochastic models are typically applied to highly variable systems where a range of input and output possibilities may exist.

Among the model categories, five classes of environmental water quality models exist and include watershed (pollutant load), receiving surface waterbody (pollutant response), groundwater, hydrodynamic (within waterbody) and, more recently, integrated models (EPA, 1997b; and WERF 2001).

Model Evaluation and Selection

A first step towards selecting a nonpoint source pollution model is to create a conceptual model. A conceptual model is a simple diagram depicting a basic representation of the physical environment to be modeled, and used to simplify the problem and organize the data requirements. The conceptual model should be simplified as much as possible, yet adequately represent the system and the data requirements.

Project phase

The phase of the watershed restoration process can help determine how the model will be applied and the level of detail required of the model. For example, identifying water resource impairments may require little to no modeling since the water quality monitoring may be used to identify the impairment. Higher levels of modeling may be required, however, when designing for implementation and evaluation phases of the watershed process (EPA, 1997b).

Scale

The scale of the area of interest will be a factor in selecting the appropriate model. Typically, field-scale models provide an intense examination of small areas, whereas watershed-scale models evaluate a general assessment of larger areas. The scale of the processes to be modeled affects the spatial and temporal elements. For example, the project area can be small as a unit area on bench scale study to a large watershed regional area. The time of interest can range form short-term event based runoff conditions to long-term average annual pollutant loadings.

Model Inventory

Unless a specific model is required by a program policy, or other factors affecting the decision, an inventory and evaluation of environmental models is warranted. Once an inventory has been compiled, selecting an appropriate model can be selected based on evaluation criteria. An inventory of water quality type models is provided in Tables 1 through 5. This document assesses only public domain models and supported in part with universities and governmental agencies.

Evaluation criteria

The following model evaluation criteria are proposed to select an appropriate model. These broad criteria should be used as a guide to select an appropriate model and not a standardized checklist (adapted from EPA, 1997b; NRC, 2000; WERF, 2001; and, Parsons, et al., 2004):

- Model application
- Model availability

- Processes modeled
- Model performance and limitations
- Data management
- Technology and training requirements
- User interface
- User Support
- Adaptability

Model Application

In general, select and use a model that best fits the problem or objective to be answered. Models are often applied to the following categories:

- Research
- Management
- Regulatory

The selected model must focus on the water quality pollutant of concern identified during the problem identification phase. The model should be consistent with the capability to quantitatively link land use management practices to responses in the environment. The model should also be compatible the spatial and temporal scales of the problem (NRC, 2000).

The initial model evaluation criterion for environmental managers is to determine the intended use or application of a model. For example, the manager may ask, what question, or set of questions, need answered, what is the intended use of the model, how will the model be used? How will the model results be used to make decisions? What type of decisions will be made based on the model results? Defensibility of the model will affect not only the type of model to use but also how the model will be "configure and applied".

These questions can be answered by clearly stating the objectives, understanding the project purpose, and identifying the goals that will be met. These questions can be obtained from a list of available problem statements of the project watershed that may be found in watershed plans, action plans, or similar documents. Moreover, these problem statements will enable the user to define the necessary spatial and temporal resolutions (EPA, 1997b).

The model selected should be appropriate to the complexity of the situation. Simple water quality problems can be addressed with simple models. Complex water quality problems may or may not require the use of complex models (NRC, 2000).

Model availability

The source and availability of water quality models should be assessed as part of the selection process (Parsons, et al., 2004). Most watershed water quality-based projects encourage and sometimes require multiple public agencies and public participation in which model algorithms cannot be hidden in proprietary code (Parsons, 2003). As a result, public domain models are recommended for most watershed water quality model applications.

Processes Modeled

The model user must have a technically sound understanding of the physical, biological and chemical processes mathematically characterized by the model. This provides a basis of expert scientific judgment to professionally assess credibility of model output such that it is consistent with scientific theory (NRC, 2000). A review of model documentation, user manuals and journal articles can provide enough information to ascertain the processes modeled (Parsons, et al., 2004).

Model Performance and Limitations

The model evaluation process should explicitly acknowledge and identify prediction uncertainty for various management options. This provides decision-makers with an understanding of the risks of options, and allows them to factor this understanding into their decisions. To do this, prediction error estimates are required (NRC, 2000). The following model performance and limitations require an assessment of the following:

- Sensitivity analysis
- Verification
- Calibration
- Validation

The model evaluation process should examine the sensitivity of the model to various input parameters. The examination should identify the most sensitive input parameters and the affected outputs. It is also helpful to identity the least sensitive parameters (Parsons, et al., 2004).

Models often require calibration with observed field data for reasonable results. More complex models do not necessarily assure that uncertainty is reduced, and in fact can compound problems of uncertain predictions (NRC, 2000). The evaluation should discuss the suggested calibration procedures along with the required field measurements, and the expected improvements with calibration over those with generic input data (Parsons, et al., 2004).

Model prediction error can be assessed in two ways. First, Monte Carlo simulation can be used to estimate the effect of model parameter error, model equation error, and initial/boundary condition error on prediction error. This process is data-intensive and may be computationally unwieldy for large models. A second and simpler alternative is to compare prediction with observations, although the correct interpretation of this analysis is not as straightforward as it may seem. If a model is “over fitted” to calibration data and the test for “verification” data are not substantially different from the calibration data, the prediction-observation comparison will underestimate the prediction error. The best way to avoid this is to obtain independent verification data substantiated with a statistical comparison between calibration data and verification data” (NRC, 2000).

Data Management

Data management tools should be examined as part of the data assessment process. Considerations for how the data is collected, maintained, interfaced and presented should be evaluated. Data management can become a significant task when working with watershed projects and tools such as geographic information management systems (GIS) can greatly improve data management of model input parameters and output data sets.

Data management should include an assessment of the data availability (EPA, 1997b). Based on the models desired, an inventory of the model's required data must be conducted. This task can be completed using a simple spreadsheet matrix that lists the data type necessary for the model and versus potential sources of the data. A project quality assurance project plan (QAPP) should describe the level of accuracy of each data type that will be compiled in the model (EPA, 1997b).

Technology and training requirements

To develop and manage a model, the technology and staff training requirements, such as the costs to train and maintain user proficiency of a model should be assessed. The costs to acquire, maintain, and update required model technology over the long term should also be evaluated.

User interface

Model users should consider if the desired model has data input utility software during the evaluation process. The user interface of a model directly affects the technology and training requirements. Recent advances of GIS technology have enabled easy integration of model input data and output data and results in enhanced model applicability (Parsons, et al., 2004). A well-developed user interface and software integration capabilities of a model can decrease the amount of both pre-and-post-processing time.

User Support

Sufficient resources should be available for reference by the model. These resources should, at least, include readily available documentation such as user manuals and technical support.

Adaptability

Each model inventoried for potential use should be assessed for the flexibility to be updated and adaptable to new data, conditions, and understanding of future conditions in the watershed. The model's database management system should be flexible enough to readily allow these updates and improvements. Future research can be expected to improve scientific understanding, leading to refinements in models (NRC, 2000).

References:

Donigian, A. S. et al., 1991. *Modeling of Nonpoint Source Water Quality in Urban and Non-Urban Areas*. Environmental Research Laboratory, ORD. EPA 600-3-91-039. Athens, GA.

EPA, 1993. *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. EPA 840-B-92-002. Office of Wetlands, Oceans and Watesheds, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1997a. *Monitoring Guidance for Determining the Effectiveness of Nonpoint Source Controls*. EPA 841-B-96-004. Office of Water (4503F), U.S. Environmental Protection Agency, Washington, D.C.

EPA. 1997b. *Compendium of Tools for Watershed Assessment and TMDL Development*. EPA 841-B-97-006. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

Fitzpatrick, J. et al., 2001. *Water Quality Models: A Survey and Assessment. Water Environment Research Federation*. Alexandria, VA.

National Research Council (NRC). 2000. *Modeling to Support the TMDL Process in Assessing the TMDL Approach to Water Quality Management*. National Academy Press. Washington, D.C.

Novotny, V. and Olem. H. 1994. *Modeling and Monitoring Diffuse Pollution in, Water Quality: Prevention, Identification, and Management of Diffuse Pollution*. Van Nostrand Reinhold. New York, NY.

Parsons J.E., D.L. Thomas, and R.L. Huffman. 2004. *Agricultural Non-point Source Water Quality Models: Their Use and Application*. USDA-ARS Southern Cooperative Series Bulletin #398. ISBN: 1-58161-398-9.

Shirmohammadi, A. et al., 2001. W*ater Quality Models in Agricultural Nonpoint Source Pollution: Watershed Management and Hydrology*. Lewis Publishers.

USDA, 2001a. *General Manual, Title 190 – Ecological Sciences, Part 404, Pest Management.* U.S. Department of Agriculture, Natural Resources Conservation Service, Washington, D.C.

USDA, 2001b. *National Handbook of Conservation Practices, Conservation Practice Standard, Pest Management, Code 595*. U.S. Department of Agriculture, Natural Resources Conservation Service, Washington, D.C.

ATTACHMENT B

Atrazine BMP Literature Review

APPENDIX B: Atrazine BMP Literature Review

Introduction

More than 850 million acres (45%) of the coterminous United States are classified as agricultural working lands (USDA, 2006). Nonpoint source pollution from agricultural land use affects more than 48% of the identified impaired river miles in the United States. Leading causes of impairments include sediment, nutrients, pathogens, salts, pesticides and habitat alteration (EPA, 2002).

Best management practices (BMPs) have been developed to reduce the amount of pollutants generated at and/ or delivered from a source to a receiving water resource (EPA, 2003). Pesticide and nutrient runoff are best managed on the active agricultural “working-lands”. Consequently, an 80% increase in federal funding has been directed towards management practices that address conservation priorities on these working-lands (USDA, 2006).

A review was performed of publications that evaluate the effectiveness of management measures that can reduce atrazine loadings. The review focused on management measures for the agricultural “working-lands” of field-scale and watershed-scale studies that have similar climatic and soil characteristics of the Upper Big Walnut Creek Watershed. The goal of this literature review was to examine the performance of BMPs to compare with the program evaluation and optimization modeling results; identify knowledge gaps and propose future research needs.

Background

Beginning in 1993, EPA requires all drinking water purveyors to sample, and if necessary, install treatment technology to comply with atrazine drinking water quality standards. Concurrently, atrazine registrants voluntarily instituted multiple atrazine application rate reductions and set-back requirements. By 2003, EPA completed a 10-year re-registration special review of atrazine exposure in the environment and human health. Debate remains to the ecological effects of atrazine exposure. EPA has concluded that atrazine does not pose a significant human health risk and, as a result, the herbicide continues to be used in the United States. Since promulgating significant regulatory changes, atrazine continues to be detected in water resources (Graziano et al., 2006; and, USGS, 2006). Therefore, there exists a need to evaluate management measures, and understand the degree that those measures can mitigate or further reduce the occurrence of atrazine in water resources in necessary.

Literature Review Findings

Through the Federal Insecticide, Fungicide and Rodenticide Act of 1947 (FIFRA) and subsequent amendments in the Food Quality Protection Act of 1996 (FQPA), EPA has authority to regulate pesticide product formulation, application methods, instructions and rates. When pesticides are available, EPA recommends Integrated Pest Management

(IPM) measures which directs applicators to follow pesticide label instructions, assess site specific pest problems, evaluate local soil and physical conditions, reduce application rates, apply only when necessary and apply when runoff conditions are least likely, i.e. when rainfall is not forecasted (EPA, 2003).

USDA's policy on pest management is also to encourage the use of IPM and other conservation practices. Unlike EPA, USDA does not originate specific instructions, specifications, formulations or product recommendations. Instead, USDA's role in pest management is to help agricultural producers understand the environmental risks associated with management options. Currently, USDA's emphasizes the quantification of how pesticide selection and management factors have the potential to affect water resources (USDA, 1999).

A substantial amount of research and information exists on the performance of BMPs to control atrazine runoff from agricultural cropland. The major pathways through which agrochemicals leave the crop root zone are volatilization to the atmosphere, leaching to subsoil and groundwater, runoff to surface water systems, and plant uptake (Flury, 1996). We have reported recommendations of federal and state general atrazine management guidelines and findings from research on effects of management practices on atrazine transport.

Because atrazine is widely used throughout the county, especially the Midwest, many States have published bulletins describing management practices that help control atrazine runoff (OSUE, 1991; Franti et al., 1997; Smith et al., 1999; Devlin et al, 2000; Johnson et al., 2004; and Kentucky Department of Agriculture, 2005). Generally, these publications cite average and favorable atrazine reductions in runoff from the examined management practice. Potential reductions by management practices are presented in Table 1.

Caution must be exercised when referring to these federal or state general guidance documents. Management practices recommended for one state or region may not be applicable for another area. For example, early pre-plant or fall application of atrazine are recommended for Kansas and Nebraska because of the regionally dry climatic conditions during the winter months allow for this timing of application. Midwestern States with humid climates however, suggest that early atrazine applications will increase the risk of atrazine runoff and are not recommended for these areas.

There are four broad categories of pest management tools and include: chemical management, cultural management, biological management and bioengineered crops. Atrazine is a chemical management strategy for controlling weed populations. Cultural practices include crop production management scenarios such as tillage, crop rotation, water management, residue management, and other field-specific management practices that control weed pests (USDA-ERS, 2005).

Table 1: Non-structural BMP performance: Atrazine Specific

Management Practice	NRCS Code	Potential Percent Reduction[1]	References
No-till	329a	33 - 65	Baker and Johnson, 1979
		-98 - 9	Baker and Johnson, 1979
		70	Fawcett, et al., 1994
Conservation tillage	329b	42	Fawcett, et al., 1994
Ridge Tillage	329c	69	Fawcett, et al., 1994
Crop Rotation	328	50 - 66	Franti et al., 1995
Alternatives	595	100	Franti et al., 1997
Soil Incorporation	595	37	Harmon et al., 2004
		67	
		26 - 75	Ritter et al.,1974
		24 – 36	Baker and Laflen, 1979
		7 – 79	Franti et al., 1995
		35 - 66	Franti et al., 1997
		75	Smith et al., 1999
		60 -75	Devlin et al., 2000
Early Pre-plant	595	50	Devlin et al., 2000
Post emergence	595	50	Franti et al., 1997
		60 - 70	Devlin et al., 2000
Reduced Rates	595	33	Devlin et al., 2000
		33 - 50	Franti et al., 1997
Banding	595	50 - 66	Franti et al., 1997
		50 - 67	Devlin et al., 2000

1) Percent reductions are compared with surface application of atrazine.

Residue Management (329)

Conservation tillage is a group of practices that reduces soil tillage that retains at least 30 percent of the soil surface covered with crop residue. For USDA-NRCS practice standards, tillage is grouped into No-till (329A), Conservation tillage (329B), and Ridge tillage (329C).

Research on the effectiveness of tillage practices for the control of atrazine runoff has revealed mixed results. For example, examinations of no-tillage and conservation tillage management versus conventional tillage have reported an increase of atrazine losses by 6 to 98% (Baker and Johnson, 1979). Some have reported ranges of atrazine reductions of 29 to 100% relative to conventional tillage (Hall et al., 1991), while others have reported nominal effects of tillage on water flow or chemical losses (Gaynor et al., 1992; Buhler et al., 1993; and Logan et al., 1994). The greatest effects were attributed to crop type and weather (Logan et al., 1994). Concern that reduced tillage may require increased atrazine usage was examined and determined not significantly higher than conventional tillage management (Day et al., 1999).

A comprehensive review of published papers by Fawcett et al., (1994) concluded that although substantial average reductions in atrazine and other herbicide losses can result, occurrence of heavy rainfall events after application on improperly managed crop fields can yield increased herbicide losses. They concluded that the use of conservation tillage as a surface water BMP should be matched to site-specific conditions.

Crop Rotation (328)

Crop rotation is considered a readily adoptable cultural practice where producers vary crop type on the same field. It has been estimated that nearly 81 percent of all corn acres planted are in rotation with other row crops such as soybeans and wheat (USDA-NASS, 2001). Crop rotation alters the planting and harvesting patterns, cultivation, and timing of pesticide applications that suppress pests from adapting to cropping schemes. A benefit of crop rotation for atrazine management is the reduction of total amount of atrazine applied in the watershed. Thus, the reported atrazine reduction potential of 50 to 66 percent reflects the elimination of atrazine use in years when alternative crops are planted (Franti et al., 1995).

Pesticide Management (595)

The purpose of pesticide management (595) is to reduce or eliminate adverse impacts of pest management on natural resources. Specific practices to mitigate environmental risks associated with pesticide use include timing of pesticide application; adjuvants that increase pesticide efficacy; reduced application rates; and, pest scouting for targeted pesticide applications.

Alternatives

Alternative herbicide products to atrazine have become widely available in recent years. Alternatives have been developed by manufactures because of occurrences of triazine resistant weed populations and concern for water resources. Clearly, alternative herbicides provide a 100 percent reduction in atrazine runoff. Although alternatives to atrazine exist, environmental and human health effects of those alternatives should be considered in the whole farm conservation planning process.

A rapidly developing arena for weed control is the use of genetically modified organisms (GMO) crops. Recently introduced, by 2005, an estimated 52 percent of corn acres planted was using GMO type crops (Schnepf and Cox, 2007). Producers have embraced GMO crops because of better pest control, reduced costs for pesticides, and helps break the cycle of single herbicide dependence (Schnepf and Cox, 2007).

Soil Incorporation

Soil incorporation is the mixing of atrazine from spray application on the soil surface into the top two inches of the soil profile. Incorporation can reduce volatilization, runoff potential and even wind transport via wind erosion. However, incorporation cannot be used with no-till systems and can increase energy costs. Soil incorporation offers potential to decrease atrazine loss in the surface runoff pathways, however atrazine leaching into ground waters can occur if not properly managed (Franti et al., 1997; and Devlin et al., 2000).

Application Timing

In relationship to pre-emergence surface application of atrazine, early pre-plant and post-emergence application can reduce atrazine losses. Early pre-plant atrazine application is not a suitable management measure for the Upper Big Walnut Creek Watershed since this approach applies the herbicide during the late Winter early Spring months when runoff risk is highest.

Post-emergence application occurs after the crop has been planted and has grown to a height of less than 12 inches. Postponing atrazine application following crop planting reduces the use rate up to 67 percent. This also moves the application timing away from some the heaviest early spring rains when soils are saturated and unprotected. The combined effect of these two benefits could reduce runoff losses by as much as 67 percent compare with pre-emergence surface applications (Franti et al., 1997; and Devlin et al., 2000).

Reduced rates or banded applications

Reducing the application rate or banding the atrazine along the row where the crop is planted offers the ability to use atrazine while reducing the total runoff loss potential. The total atrazine load reduction is proportional to the application rates (Hallberg, 1989; and Bedos et al., 2002). However, application rate reductions beyond 25 to 50% of the recommended label rates usually results in reduced herbicide efficacy (Baker, et al., 1994).

References

Baker, J.L., and H.P. Johnson, 1979. *The effect of tillage system on pesticides in runoff from small watershed.* Trans. ASA 22554-559.

Baker, J.L., and S.K. Mickelson, 1994. *Application technology and best management practices for minimizing herbicide runoff.* Weed Technology 8(4):862-869.

Bedos, C.P. P. Cellier, R. Calvet, E. Barriuso, and B. Gabrielle, 2002. *Mass transfer of pesticides into the atmosphere by volatilization from soils and plants: over-view.* Agronomie 22:21-33.

Bonta, J.V., and B. Cleland, 2003. *Incorporating Natural Variability, Uncertainty, and Risk into Water Quality Evaluations Using Duration Curves*. Journal of American Water Resources Association (JAWRA) 39(6):1481-1496.

Buhler, D.D., G.W. Randall, W.C. Koskinen, and D.L. Wyse, 1993. *Atrazine and alachlor losses from subsurface tile drainage of a clay loam soil*. J. Environ. Qual. 22:583-588.

Day, J.C., C.B. Hallanhan, C.L. Sandretto, and W.A. Lindamood, 1999. *Pesticide use in U.S. corn production: Does conservation tillage make a difference?* J. of Soil and Water Conserv. Second Quarter:477-484.

Devlin, D.L., D.L.. Regehr, P.L. Barnes, 2000. *Managing to Minimize Atrazine Runoff*. MF2208, Kansas State University Agricultural Experiment State and Cooperative Extension Service.

EPA, 2002. *National Water Quality Inventory: 2000 Report to Congress*. EPA 841-R-02-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA, 2003. *National Management Measures for the Control of Nonpoint Pollution from Agriculture*. EPA-841-B-03-004. U.S. Environmental Protection Agency, Office of Water (4503T), Washington, D.C.

Fawcett, R.S., B.R. Christensen, D.P. Tierney, 1994. *The impact of conservation tillage on pesticide runoff into surface water: A review and analysis*. J. Soil and Water Conserv. 49:126-135.

Flury, M. 1996. *Experimental Evidence of Transport of Pesticides through Field Soils – A Review*. J. Environ. Qual. 25:25-45.

Franti, T.G., F.W. Roeth, G.L. Zoubek, 1997. *Best Management Practices to Reduce Atrazine Runoff from Corn Fields in Nebraska.* University of Nebraska, Lincoln, NE.

Garbrecht, J.D., P.J. Starks, and J.L. Steiner, 2006. *The Under-appreciated climate factor in CEAP*. J. Soil & Water Conservation Vol. 61, No. 4: 110A-111A.

Gaynor, J.D., D.C. MacTavish, and W.I. Findlay, 1992. *Surface and subsurface transport of atrazine and alachlor from a Brookston caly loam under continuous corn production*. Arch. Environ. Contam. Toxicol. 23:240-245.

Hall, J.K., N.L. Hartwig, and L.K. Hoffman, 1983. *Application mode and alternative cropping effects on atrazine losses from a hillside*. J. Environ, Qual. 12:336-340.

Hall, J.K., R.O. Mumma, and D.W. Watts, 1991. *Leaching and runoff losses of herbicides in a tilled and untilled filed. Agric*. Ecosyst. Environ. 37:303-314.

Hallberg, G.R., 1989. *Pesticide pollution of groundwater in the humid United States*. Agriculture, Ecosystems and Environment 26:299-367.

Johnson, B., F. Whitford, L. Hahn, D. Flake, J. Frankenberger, C. Janssen, and T. Bailey, 2004. *Atrazine and Drinking Water: Understanding the Needs of Farmers and Citizens*. Purdue University, Purdue Extension, Purdue Pesticides Programs.

Kentucky Department of Agriculture, 2005. *Guidelines for Atrazine Use and Application for Groundwater and Surface Water Protection: Best Management Practices*. Kentucky Department of Agriculture.

Logan, T.J., D.J. Eckert, D.G. Beak, 1994. *Tillage, crop and climatic effects on runoff and tile drainage losses of nitrate and four herbicides*. Soil & Tillage Research 30:75-103.

Miller, F.P. et al., 1991. *Best Management Practices for Preventing Contamination of Ohio's Ground and Surface Waters*. Extension Bulletin 818, The Ohio State University, Ohio Cooperative Extension Service.

Scarsbrook, M.R., C.G. McBride, G.B. McBride, and G.G. Bryers, 2003. *Effects of Climate Variability on Rivers: Consequences for Long Term Water Quality Analysis*. Journal of American Water Resources Association (JAWRA) 39(6):1435-1447.

Smith, M.B., P.E. Blanchard, W. Johnson, and G. Smith, 1999. *Atrazine Management and Water Quality*. Missouri Manual 167, University of Missouri-Columbia.

USDA, 1999. *CORE4 Conservation Practices Training Guide: The Common Sense Approach to Natural Resource Conservation.* U.S. Department of Agriculture, Natural Resources Conservation Service, Washington, D.C.

USDA, 2001. *Pest Management Practices 2000 Summary*. Special Circular 1(01). 36 pp. U.S. Department of Agriculture, National Agricultural Statistics Service, Washington, D.C.

USDA, 2006. *Agricultural Resources and Environmental Indicators*, EIB-16, U.S. Department of Agriculture, Economic Research Service, Washington, D.C.

ATTACHMENT C

Water Quality Report

Water Quality – Case Study

Overview

Water quality monitoring is a critical element of the watershed approach for environmental management and decision making. Determining whether water resource are safe enough to swim in, fish from, or use for drinking or irrigation purposes is predicated on using the appropriate water quality sampling and analyses techniques (EPA, 2005c). Water quality monitoring is an integrated activity for evaluating the physical, chemical, and biological character of water in relation to human health, ecological conditions, and designated water uses (ITFM, 1995 and EPA, 1997c).

The City of Columbus, Ohio Division of Water has maintained a comprehensive watershed water quality monitoring program since the 1980's. The City routinely monitors the streams, rivers, reservoirs, and ground water wells throughout Central Ohio. Samples are collected for analysis of physical, nutrients, pesticides, biological and microbial water quality parameters. The City coordinates with US Geological Survey, The Ohio State University, Ohio EPA, and among other research organizations.

Figure 1: North-facing view of Hoover Dam and reservoir (City of Columbus, 1992).

The City's staff has collected monthly grab samples of Hoover Reservoir near the dam using appropriate pesticide sampling procedures. Water quality monitoring of the reservoir includes nutrients such as nitrate-N and phosphorus; and, common agricultural pesticides such as acetochlor, alochlor, atrazine, cyanazine, metolachlor, metribuzin, and simazine. Data from the reservoir's long-term water quality sampling program have revealed that only the herbicide atrazine has been detected at levels of concern. The water quality monitoring data depict the occurrence, variability and magnitude of atrazine in Hoover Reservoir.

The occurrence of atrazine in Hoover Reservoir is an indicator of land use in the Upper Big Walnut Creek Watershed where the herbicide is used to control weeds for agricultural row crop production of corn.

In response to the City's long-term water quality data observations, the City began development of a pro-active multiple barrier approach to attain compliance with the drinking water standard for atrazine's maximum contaminant level (MCL). The City initiated engineering and construction of a Powdered Activated Carbon (PAC) treatment facility for the Hap Cremean Drinking Water Plant (HCWP). By 1997, and at a cost of $4.5 million, the PAC treatment facility was completed to treat taste and odor, pesticides, and a range of organic contaminants should they be detected in the water supply.

Concurrent to a treatment process operations solution, the City referred to it's long-term water quality data and initiated communication with the Ohio Farm Bureau Federation (OFBF) and atrazine's primary registrant, Syngenta (formerly Ciba-Geigy). The purpose was to initiate dialogue with the herbicide manufacture and agricultural producers who use the product.

Literature Review

Atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-trainzine) is a synthetic systemic herbicide used for the selective control of annual broadleaf and certain annual grass weeds. Atrazine is in the triazine family which includes cyanazine, metribuzin, propiazine, simazine, among others. (DuPont voluntarily phased out of production of cyanazine in 2002). Triazines have common toxicity and mode of action that inhibit photosynthesis in plants. Triazines block the process where plants convert sunlight into chemical energy used for plant growth (Loux, et al., 1998).

Use Profile

Atrazine is one of the most widely used agricultural herbicides in the United States where an estimated 64 to 453 thousand kilograms (76 million pounds) of active ingredient are applied annually. More than 98% of atrazine is applied to agricultural cropland and used primarily on field corn (86%), sorghum (10%) and sugarcane (3%). The remaining application of atrazine is used in forestry, turf and other non-agricultural uses (EPA, 2003d). However, since 1990 atrazine is used only in corn production in the Upper Big Walnut Creek Watershed.

Regulatory History

Atrazine was registered as a systemic triazine herbicide by Syngenta (then Ciba-Geigy) in 1958.

EPA issued a Registration Standard in 1983 because of growing concerns over carcinogenic potential and possible dietary exposure risks to atrazine from treated foods and drinking water. EPA required atrazine registrants to submit generic and product-specific data that would support for the continued registration of atrazine containing herbicide products. By the late 1980's, EPA classified atrazine as a "possible human carcinogen" (EPA, 2003d).

Amendments to the 1986 Safe Drinking Water Act (SDWA) required EPA to develop safe drinking water quality standards for atrazine, among other chemicals. EPA established two sets of standards known as health advisories (HA) and maximum contaminant level's (MCL). Non-enforceable HA's are guidance levels for short-term and lifetime exposures to contaminants in drinking water. For atrazine, the 10-day HA is 100 ppb, and 7-year HA is 48 ppb for children and 168 ppb for adults. Unlike the HA, the MCL is an enforceable standard limit for drinking water purveyors. EPA established the lifetime HA and, subsequently, the MCL for atrazine.

Because of the increased documentation of widespread occurrence of atrazine in the environment, EPA Office of Water promulgated in 1991 and effective on July 30, 1992, EPA established the atrazine drinking water MCL at 3 µg/l based on a running annual average of four quarterly samples (EPA, 2003).

Effective September 1, 1990 and due to increasing concerns for groundwater contamination, Ciba-Geigy (today Syngenta), the primary registrant for atrazine, voluntarily instituted risk reduction measures through label use restrictions that included (EPA, 2003):

Atrazine-containing products were classified as Restricted Use Pesticides (RUPs) except for lawn care, turf, and conifer uses. (Restricted Use Pesticides require all product applicators to be licensed and maintain records for at least two years on when aand where the product was applied);

- Maximum seasonal application rate for corn was reduced from 4.5 kg/ha (4 lb ai/acre) to 3.36 kg ai/ha (3 lb ai/acre);
- Maximum application rate on non-cropland and total vegetation was reduced from 44.8 kg ai/ha (40 lb ai/ acre) to 11.2 kg ai/ ha (10 lb ai/acre).
- Required post emergence applications be applied before corn reaches a height of 30.48 cm (12 inches);
- Prohibited application to rangeland, proso millet, and pineapple uses;
- Prohibited chemigation (applying atrazine through irrigation systems);

- Required development of well-head protection plan of 15.2 meters (50 foot) setbacks around all wells for mixing, loading, or applying atrazine-containing products; and,
- Instituted construction requirements for bulk storage facilities.

In 1992 and effective in 1993, Ciba-Geigy instituted additional management measures through label use restrictions because of concerns to surface water contamination (EPA, 2003);

- Further reduced total annual application rates for corn and sorghum from 3.0 lb ai/acre to 2.5 lb ai/acre (1.5 lb ai/acre for pre-plant and emergence, and 1.0 lb ai/acre post emergence programs);
- Prohibited all uses for total vegetation control on non-cropland (effectively reducing atrazine application rate from 10 lb ai/acre to 0 lb ai/acre);
- Expanded restricted use criteria to include surface water quality concerns;
- Required 15.2 meters (50 foot) setback around surface water sources for mixing and loading;
- Required 20.2 meters (66 foot) application setback from point of entry where field surface water runoff enters surface water sources; and,
- Required 61 meters (200) foot application setback around lakes and reservoirs.

In 1994, because of cancer risk concerns to humans exposed to triazines through dietary intake of food and water and under authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), EPA initiated the Special Review for the triazine pesticides that include atrazine, simazine and cyanzine (EPA, 2003).

In 1996, because of continued surface water concerns, additional label use restriction were added for tile-terrace fields containing standpipes (tile-terrace fields are not found in the Upper Big Walnut Creek watershed) and include the following label restrictions (EPA, 2003d);

- Do no apply within 66 feet of standpipes in tile-outletted terraced fields;
- Apply to the entire tile-outletted terraced field and immediately incorporate to a depth of 5.1-7.6 cm (2-3 inches); or,
- Apply to tile-outletted field under no-till practice only when practicing high crop residue management.

Beginning In 1999, watershed-wide federal funding from the US Department of Agriculture, Natural Resources Conservation Service USDA NRCS) became available to farmers in the watershed to implement management measures and best management practices (BMPs) with the goal to reduce atrazine runoff from agricultural cropland into Hoover Reservoir.

In June 2000, based on recommendations by the FIFRA Scientific Advisory Panel, in June 2000, EPA classified atrazine a "not likely human carcinogen" because the mode of action by which atrazine causes mammary gland tumors is specific to the female Sprague-Dawley rat (EPA, 2001).

In 2003, EPA completes the Special Review known as the Interim Re-registration Eligibility Decision (IRED) and results in additional label use restrictions that include (EPA, 2003):

- Require closed mixing and loading systems for mixing and loading liquid formulation for aerial application at a rate greater than 3.4 kg ai/ ha (3 lb ai/acre) and, mixing and loading dry flowable formulations for aerial application
- Require maximum PPE (long-sleeved shirt and long pants, shoes socks, and coveralls; gloves and a dust/ mist respirator) for mixers/ loaders/applicator for both liquid and dry flowable formulations;
- Require wettable powders be packaged in water soluble bags for both aerial and groundboom application;
- Require closed cockpit for aerial applications;
- Restrict the impregnation of bulk fertilizer to commercial facilities (prohibit on-farm impregnation)
- Restrict the impregnation of dry bulk fertilizer to 500 tons per day for no more than 30 days per year
- Reduce the maximum application rate for handlers applying liquids with rights-of-way sprayers to 1.0 lb ai/acre;
- Require closed cabs for flaggers, in accordance with current agricultural practices;
- Require a 60-day PHI for pre-emergent and post-emergent field corn forage uses;
- Require a 45-day PHI for pre-emergent and post-emergent sweet corn forage uses; and,
- Require a 60-day PHI for pre-emergent uses and 45-day PHI for post emergent sorghum forage uses.

Occurrence in Water Resources

The occurrence of atrazine in water resources has been well documented (Wauchope, 1978; Baker et al., 1985; Thurman et al., 1991; Richards and Baker, 1993; Stamer and Wieczorek, 1996; Battaglin et al., 2003; and, Graziano et al., 2006). Atrazine in water resources closely correlate with the geographical distribution of corn production; especially throughout the Midwest (Thurman et al., 1991; and, USGS, 2006). Atrazine was detected in more than 90% of all surface waters sampled, but less than 40% in ground waters. Despite the high amount of atrazine use in the Midwest, the lower detection of atrazine in groundwater resources has been attributed to the widespread use of subsurface drainage in the low permeable glacial till soils (Baker et al., 1985; Thurman, et al., 1991; Richards and Baker, 1993; USGS, 2006).

The occurrence of atrazine in surface waters exhibit seasonal patterns during mid-April to end of July, which closely resemble when corn is planted throughout the Midwest. Atrazine concentrations are generally highest during periods of storm runoff following application in the spring and early summer (Wauchope, 1978; Baker et al., 1985; Clark, et al., 1999; and, USGS, 2006). Seasonal trends of atrazine, and other pesticides, in surface waters indicate a "spring flush", or the period following pesticide application (Thurman et al., 1991). Although these excursions can exceed maximum contaminant level (MCL) values, the annual means by which those regulations are based are rarely exceeded (Larson et al., 1997; and EPA, 2003).

Atrazine Transformation Products

Once in riverine surface water resources, atrazine is transported conservatively with nominal degradation loss and could be considered as an organic chemical analogue of the chloride ion (Capel et al., 2001). Longer residence times of months to years common in reservoirs, lakes and alluvial aquifers can enable degradation of atrazine (Chapel et al., 2001).

Recent research is assessing the levels of pesticide parent compounds and subsequent transformation products (TP) in water resources (Battaglin et al., 2003). Following application to soil surfaces, atrazine is metabolized to form desethyl atrazine (DEA), desisopropyl atrazine (DIA), diaminochlorotriazine (DACT), and hydroxy-triazine and hydroxyl-atrazine (HA) metabolites. EPA does not consider hydroxy-metablolite concentrations to be of significance in water resources (EPA, 2002). Herbicide transformation products were found to occur as frequently or more frequently than source herbicides and at concentration that were often larger than their source herbicides (Battaglin et al., 2003).

Because of the lack of extensive water quality data for the chlorinated metabolites, EPA Environmental Fate and Effects Division (EFED) developed a series of linear regression models that estimate total chlorinated atrazine and metabolite compound in drinking water based on atrazine concentration data. These equations were used to estimate drinking water human health exposure estimates to the total chlor-triazine compounds (EPA, 2001).

Toxicology

Recently, EPA conducted human health and environmental risk assessments for atrazine to provide technical support for the Interim Re-registration Eligibility Decision (IRED). These assessments summarize atrazine's toxicology, hazard characterization, exposure assessment, risk assessments for occupational, residential, dietary (food + drinking water) exposures, and risk assessments for various terrestrial and aquatic species (EPA, 2003; and, EPA, 2002).

Human Health: Drinking Water Exposure

To determine the dietary human health risk to atrazine from drinking water, EPA first assessed the overall dietary exposure to atrazine. USDA's Pesticide Data Program (PDP), Food and Drug Administration (FDA), and Food Safety and Inspection Service (FSIS) monitoring data suggest that dietary food exposure to the atrazine is negligible. The "drinking water level of comparison" (DWLOC) is the difference in dietary human health risk exposure to atrazine. Thus, the DWLOC is the maximum concentration in drinking water that when coupled with dietary food exposure, does not exceed a level of concern for various population groups (EPA, 2002a).

Dietary exposure to atrazine from drinking water is regulated through the Safe Drinking Water Act (SDWA). In 1991, EPA's Office of Water (OW) established a chronic lifetime exposure Maximum Contaminant Level (MCL) of 3 ppb, and acute toxicity one-day Health Advisory Level (HAL) of 100 ppb (EPA, 2002a).

Drinking water purveyors are required to conduct compliance monitoring for the parent compound atrazine in treated water four times annually. The running annual average of atrazine in treated water cannot exceed 3 ppb. Water purveyors can obtain monitoring waivers if atrazine is not detected after three consecutive monitoring quarters in a given year, and/ or there is documentation that atrazine is not used in areas affecting source water supplies (EPA, 2002a).

In 2001, EPA Office of Pesticide Programs, Health Effects Division (HED) included atrazine and its three chlorinated metabolites, known as total chloro-triazines (TCT) in the human health risk assessment for drinking water. EPA, established acute, sub-chronic/ chronic drinking water levels of concern (DWLOC) for total chloro-triazines (TCT). These levels assume dietary food exposure to TCT is negligible. EPA established TCT acute DWLOC for pregnant woman at 298 µg/l. EPA could not establish a TCT acute DWLOC for men, non-pregnant women, children and infants. The TCT sub-chronic (90-day to six month) and chronic (greater than six-month) DWLOC was set at 63, 63, 18, and 18 µg/l for men, women, children and infants, respectively (EPA, 2001).

Ecological

Effects of atrazine, as well as the family of triazines, on the ecological habitat in the environment are currently highly debated. Recent development of the Interim Re-registration Eligibility Decision (IRED) also assessed the ecological effects of exposure to atrazine. In summary, EPA found that in areas where atrazine is widely used, there is potential for widespread environmental exposure that (EPA, 2002b):

- results in direct acute effects on many terrestrial plant species at both maximum and typical use rates;
- may have caused direct effects on aquatic non-vascular plant which in turn could have caused reduction in primary productivity;

- may have caused reduction in population of aquatic macrophytes, invertebrates and fish; and,
- may have caused indirect effect on aquatic communities due to loss of species sensitive to atrazine and resulting in changes in structure and functional characteristics of the affected communities.

Essentially, potential adverse effects to sensitive aquatic plants and other non-target aquatic organisms as well as their communities, are likely to be greatest where atrazine concentrations equal or exceed 10 to 20 µg/L on a recurrent basis or over a prolong time period (EPA, 2002b).

EPA published recommendations for ecological aquatic habitat levels of concern (AHLOC) in the "refined risk assessment" for atrazine. These LOC measures provide an expanded view of direct and indirect effects of atrazine on aquatic assemblages. These endpoints are functions of both the magnitude and duration of exposure of aquatic species to atrazine that potentially adversely affect aquatic communities and/ or ecosystems (EPA, 2002b). Endpoints of concern for lentic freshwater environments (reservoirs and lakes) are provided for non-target organisms where populations are likely to be reduced and include (EPA, 2002b):

- Fish: populations reduced at 62 µg/l, and likely to be reduced at 20 µg/l due to loss of food and habitat;
- Invertebrates: populations reduced at 62 µg/l, and likely to be reduced at 10 µg/l;
- Non-vascular plants (algae): acute effects on phytoplankton estimated at 32 µg/l, and reductions in primary production are estimated to occur at 2.3 µg/l; and
- Vascular plants: acute effects on macrophytes (number and diversity) and likely to occur at 20 µg/l.

Materials and Methods

Environmental data was compiled from multiple sources to asses the occurrence and trends of atrazine in Hoover Reservoir.

Environmental Data

The City of Columbus, Ohio Division of Water's Water Quality Assurance Laboratory (WQAL) provided monthly atrazine concentration data of Hoover Reservoir. The lab's staff collected monthly grab samples of the reservoir near the dam using appropriate pesticide sampling procedures. Samples were analyzed by the lab's Ohio EPA certified staff using EPA Method 507 for atrazine. For the period January 1985 through June 2005, 239 monthly grab samples were collected in which 95.4% were above detection limits (Table 1).

Table 1: Monthly, average annual, adjusted average annual atrazine, and calculated total chloro-triazine concentration data (µg/l) of Hoover Reservoir (1985 – 2005).

Month	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
January	NA	0.15	0.44	1.59	NA	4.84	0.72	0.79	1.03	2.14	0.58	1.07	1.93	1.87	1.57	0.86	0.58	0.35	0.59	0.24
February	0.40	0.15	0.61	0.64	1.27	7.45	<0.29	0.89	0.56	0.55	0.5	1.08	1.06	1.32	1.38	0.14	0.68	0.36	0.66	NA
March	0.24	0.11	0.39	0.25	1.81	2.77	<0.33	0.94	0.49	1.47	0.43	0.7	0.78	1.58	2.02	0.11	0.40	0.33	0.33	NA
April	0.20	0.13	0.28	0.31	0.19	1.46	<0.31	1.24	0.22	0.41	0.37	0.39	0.51	1.44	1.66	<0.1	0.39	0.31	0.39	0.12
May	0.12	NA	0.22	0.63	1.12	0.56	0.49	0.82	0.87	0.32	0.32	1.1	0.43	1.3	0.55	0.9	0.47	0.17	0.34	<0.1
June	0.92	0.32	3.92	0.29	4.92	10.25	0.9	0.69	1.13	<0.57	3.63	0.92	1.35	1.24	0.73	0.82	2.30	0.69	2.57	2.66
July	0.91	0.24	1.61	0.5	5.57	11.89	0.36	0.99	2.47	<0.23	6.52	3.11	5.93	1.68	0.12	4.81	2.67	1.89	2.64	0.52
August	1.19	0.28	2.12	0.43	9.52	9.9	0.51	2.22	1.95	<0.61	4.35	3.47	5.24	1.53	<0.1	3.55	1.21	1.77	1.27	1.70
September	1.48	2.10	2.94	0.46	7.27	7.11	0.51	1.68	2.06	0.78	3.1	3.66	5.11	0.9	0.18	2.69	0.85	2.10	1.45	0.76
October	0.93	0.86	3.89	0.67	8.97	5.38	0.6	1.57	2.86	0.62	2.61	3.45	2.89	1.47	<0.1	1.4	1.24	1.97	0.54	0.77
November	NA	0.32	2.76	0.33	8.96	4.62	0.75	1.38	2.77	1.02	3.73	1.75	1.36	1.15	0.32	1.09	0.47	1.55	0.43	0.61
December	NA	1.45	3.19	0.79	6.52	4.56	0.79	1.3	2.37	0.53	2.75	4.11	1.54	1.86	0.57	0.56	0.42	0.58	0.36	0.63
Annual Average	0.7	0.6	1.9	0.6	5.1	5.9	0.5	1.2	1.6	0.8	2.4	2.1	2.3	1.4	0.8	1.4	1.0	1.0	1.0	0.9
Adjusted Annual Average	0.6	0.7	2.0	0.7	5.8	4.7	0.7	1.1	1.8	0.5	2.5	2.2	2.5	1.5	0.3	1.5	0.9	1.1	1.0	1.0
Average Annual TCT	1	1.0	3.3	1.2	9.4	7.7	1.3	1.9	2.9	1.0	4.3	3.6	4.2	2.4	0.7	2.5	1.6	1.9	1.4	1.3

Notes:

NA: Sample not available

<: Sample less than detection limit

TCT: Total Chloro-Triazines

Daily total precipitation data were obtained via internet data transfer from the National Oceanographic and Atmospheric Administration's (NOAA) Midwestern Regional Climate Center (MRCC). Climatic data was measured at the Centerburg, Ohio gauge station for the period 1953 through 2004.

For the period 1953 though 2003, there were 889 days without total daily precipitation data (4.9%). During the period 1985 though 2003, there were 91 missing total daily precipitation data (1.3%). The MRCC provides estimates of daily precipitation data when data is missing and were used for this project.

Statewide average weekly percent corn planted data was obtained from the Ohio Department of Agriculture Department of Statistics. This data was used as a surrogate to estimate the period of atrazine application in the project watershed. The rational for using Ohio weekly average percent crop development data is substantiated by an earlier survey of commercial herbicide applicators who operate in the project watershed. Results of the survey indicate that the period of atrazine application typically occur in a two to four week period during the spring crop planting season (Malcolm Pirnie, 1999). The period of atrazine application in the project watershed correlate well with the Ohio statewide average weekly crop progress reports.

Average weekly water surface elevation data was obtained from the City of Columbus, Division of Water. The Division records the reservoir's water surface elevation daily using visual assessment measurement of a pooled staff gauge developed by US

Geological Survey elevation datum. The Division calculates and reports the average weekly reservoir water surface elevation data from the daily water surface elevation data.

This data was used to estimate the volume of water in Hoover Reservoir. The Hoover Reservoir Elevation Conversion Equation will be used to convert the reservoir's average weekly elevation data to average weekly volume.

Average weekly water volume data, derived from the Hoover Reservoir Elevation Conversion Equation, was used to estimate the mass of atrazine in Hoover Reservoir as a function of the Hoover Reservoir Atrazine Mass Flux Model

Average weekly Hoover Reservoir discharge volume data, derived from the Hoover Reservoir Discharge Volume Equation, was used to estimate the mass of atrazine discharging from Hoover Reservoir between atrazine sample events as a function of the Hoover Reservoir Atrazine Mass Flux Model.

Hoover Reservoir water discharge volume data will be estimated from the Big Walnut Creek Stream Flow Conversion Equation.

Atrazine Regression Analysis

Monthly atrazine concentration data of Hoover Reservoir were compiled by calendar year to calculate the average annual atrazine concentration. Total daily precipitation data was compiled for the period April through July. This period was determined to be the critical season when atrazine runoff from the watershed is most probable (Williams and Miller, 1992). Regression of critical season total precipitation versus average annual atrazine concentration data were analyzed for the sampling periods:

Sampling Period 1: 1986 through 1990;

Sampling Period 2: 1991 through 1998; and,

Sampling Period 3: 1999 through 2004.

Linear and best fit regression analyses were performed to determine which set of equations better characterize the occurrence of atrazine in Hoover Reservoir.

Since atrazine is typically applied during the month of May, an adjusted annual average atrazine concentration was calculated. The months of May through April represent the adjusted average annual concentration and better reflect a cause and effect relationship.

The following regression equations were developed using Microsoft Excel® software and were used to estimate the annual average atrazine concentration in Hoover Reservoir for each year from 1953 to 2004. These estimates were thus applied to estimate the frequency of occurrence in which average annual atrazine levels would have exceeded the drinking water human health standard.

Linear Regression

Results of the linear regression analysis provide the following equations for the three periods and include:

Sample Period 1:

$y = 0.0155x – 4.8992$

$R^2 = 0.9171$ (Equation 1)

Sample Period 2:

$y = 0.0049x – 0.7335$

$R^2 = 0.66$ (Equation 2)

Sample Period 3:

$y = 0.0003x + 0.8422$

$R^2 = 0.0058$ (Equation 3)

Best-fit Regression

Results of the best-fit regression analysis provide the following equations for the three periods and include:

Sample Period 1:

$y = 1.2757 \text{ x } 10^{-8} \, x^{3.0573}$

$R^2 = 0.966$ (Equation 4)

Sample Period 2:

$y = 1.4516 \text{ x } 10^{-4} \, x^{1.5016}$

$R^2 = 0.555$ (Equation 5)

Sample Period 3:

$y = 3.5579 \text{ x } 10^{-6 \text{ x}2.0246}$

$R^2 = 0.459$ (Equation 6)

Total Chloro-triazine Degradates Regression Analysis

Limited data exists for the concentration of total chloro-triazine degradates (TCT) in surface water source community water systems (CWS). EPA Environmental Fate and Effects Division (EFED) of the Office of Pesticide Program (OPP) used these data, however, to develop annual and seasonal regression equations that correlate known atrazine concentration data to total chloro-triazine compounds. The following equations were developed (EPA, 2001 and 2003):

$$\text{Whole year: } y = 0.1418x + 0.240$$

$$r^2 = 0.541 \qquad \text{(Equation 7)}$$

$$1^{st} \text{ quarter: } y = 1.535x + 0.223$$

$$r^2 = 0.502 \qquad \text{(Equation 8)}$$

$$2^{nd} \text{ quarter: } y = 1.394x + 0.107$$

$$r^2 = 0.710 \qquad \text{(Equation 9)}$$

$$3^{rd} \text{ quarter: } y = 1.394x + 0.123$$

$$r^2 = 0.482 \qquad \text{(Equation 10)}$$

$$4^{th} \text{ quarter } y = 1.630x + 0.122$$

$$r^2 = 0.582 \qquad \text{(Equation 11)}$$

These equations were used to convert measured atrazine concentrations into seasonal and annual average TCT in Hoover Reservoir. Cumulative exceedence frequency curves for total chloro-triazines were developed for the three sampling periods.

Risk Assessment

Monthly atrazine concentration data of Hoover Reservoir collected during the period 1985 through 2004 were ordered and ranked for the three sampling periods using Microsoft Excel® software, Data AnalysisTool Pack, Rank and Percentile tool. Data was plotted in Excel and compared to the drinking water maximum contaminant level threshold for human health and ecological endpoint thresholds.

Watershed Load Equation

A watershed runoff load equation was developed to estimate the amount of atrazine runoff from the watershed on an annual basis.

Hoover Reservoir Elevation Conversion Equation

Weekly reservoir elevation data was recorded by City of Columbus officials. Hoover Reservoir volume is calculated from observed weekly elevation data recorded by staff of the City of Columbus, Division of Water. The elevation data is recorded in feet above sea level (AMSL). The conversion equation from elevation (feet) to volume (gallons) is (Figure 4)

$$y = 0.0099x^2 - 16.829x + 7137.8$$

$$R^2 = 0.9975 \quad \text{(Equation 12)}$$

Big Walnut Creek Stream Flow Conversion Equation

The volume of water discharged from Hoover Reservoir is derived from converting average daily stream flow (cfs) to volume (MG) recorded 0.4 miles downstream of Hoover Dam in Big Walnut Creek at Central College Road Bridge. The conversion equation is (Culp and Williams, 1986, page 1030):

$$\text{MG} = 0.646 \text{ x cfs x 1 day} \qquad \text{(Equation 13)}$$

Hoover Reservoir Atrazine Mass Flux Model

The Hoover Reservoir atrazine (mass flux) monthly load model attempts to quantify the watershed’s monthly atrazine load. It accounts for Hoover Reservoir’s average residence time of six months. amount of atrazine entering into or discharging from Hoover Reservoir between water quality sampling events. The following equation is used to calculate atrazine mass flux:

$$\Delta\text{Mass} = \left[\left(C_f V_f \right) + \left[\frac{\left(C_i 0.833 + C_f 0.167 \right)}{2} V\left(D_{i \to f} \right) \right] - C_i V_i \right] A$$

Where:

ΔMass = Estimated monthly atrazine mass flux into the reservoir;

C_i = Initial observed atrazine concentration (ug/l);

V_i = Initial volume of Hoover Reservoir (MG);

C_f = Final observed atrazine concentration (ug/l);

V_f = Final volume of Hoover reservoir (MG);

$\left[\frac{\left(C_i + C_f \right)}{2} V\left(D_{i \to f} \right) \right]$ = is an estimated throughput term;

$V\left(D_{i \to f}\right)$= Discharge volume between atrazine sample events (MG); and,

A = Conversion constant (0.00834 l/MG x lb/ug).

(Equation 14)

The atrazine mass flux model estimated throughput term is an approximation of the amount of atrazine discharging from Hoover Reservoir between atrazine concentration sample events. This linear throughput term does not consider the complex internal mixing dynamics of Hoover Reservoir.

Results and Discussion: Human Health

During the period 1985 through 2004, average annual atrazine levels exceeded the Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) of 3.0 ppb two of the twenty years when monitoring data exists. However, the MCL was not promulgated until 1991 and implemented in 1992 and thus the City did not exceed drinking water quality standards.

Occurrence

The occurrence of atrazine concentrations in Hoover Reservoir between 1985 and 2004 ranged from less than detection limits of 0.10 µg/l on four occasions to the highest detected level of 11.89 in July, 1990 (Table 1). Figure 2 reveals the high degree of monthly, seasonal and annual variability of atrazine concentrations in Hoover Reservoir. This variability is indicative of nonpoint source pollution runoff and is consistent with state and regional research (Richards and Baker, 1993, and USGS, 1999).

For this project, three discrete monitoring periods were delineated to account for significant changes in atrazine application rates and methods presented in the Regulatory History section (Figure 2).

Sampling Period 1: 1985 to 1990, is the period prior to voluntary product label use restrictions instituted by Ciba-Geigy in September, 1990. During this period, the highest atrazine concentrations of 10.25 and 11.89 µg/l were reported in the months of June and July, 1990, respectively. There were no less than detection limits reported during this period.

Sampling Period 2: 1991 through 1998, is the period when label use restrictions were instituted but prior to watershed-wide implementation of the federal USDA conservation program. Monthly atrazine concentrations detected in Hoover Reservoir ranged from a minimum of 0.22 µg/l in April, 1993 to a high of 6.52 µg/l in May, 1995.

Sampling Period 3: 1999 through 2004 is the period when both the USDA EQIP program and registrant's label use application restrictions were implemented. The highest atrazine concentration detected in Hoover Reservoir during this period was 4.81 µg/l in July 1999.

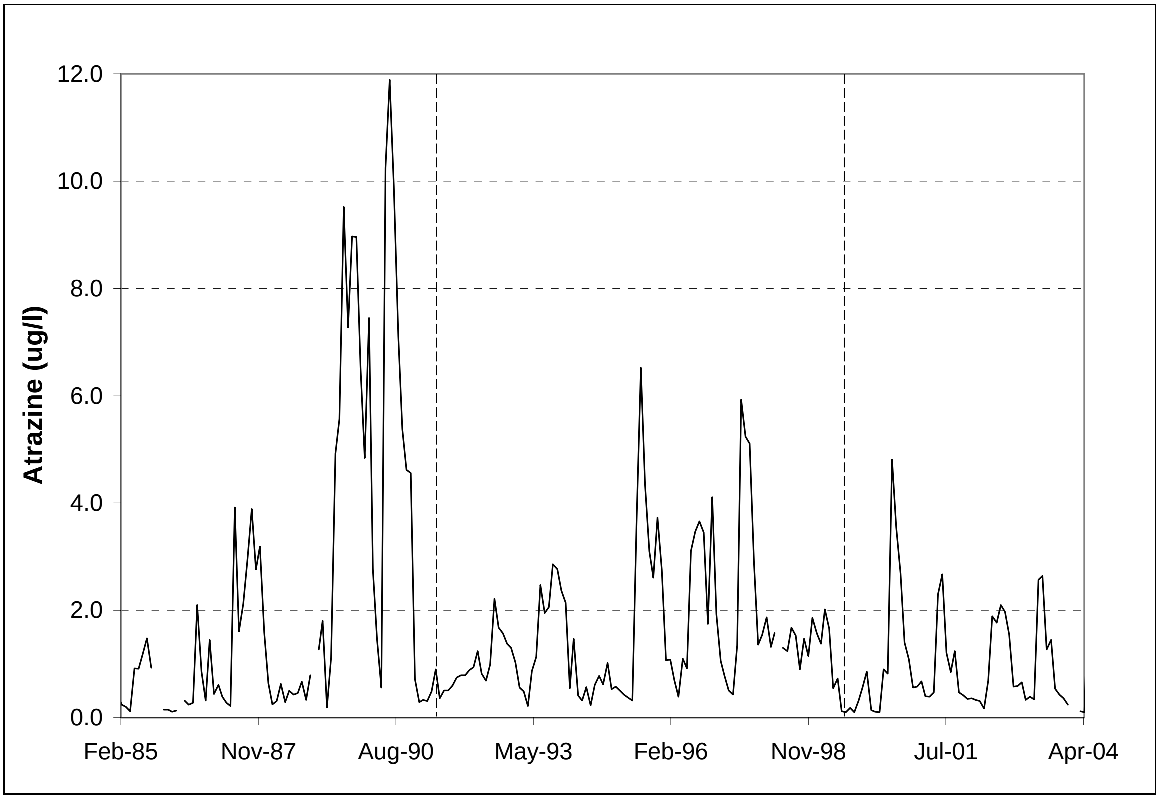

Figure 2: Time Series plot of monthly atrazine concentrations in Hoover Reservoir (1985 - 2004).

The occurrence of atrazine concentrations in the reservoir between 1985 and 2004 have ranged from less than 0.10 µg/l on four occasions to the highest detected level of 11.89 in July, 1990. Figure 2 illustrates the high degree of monthly, seasonal and annual variability.

Annual Patterns

Average annual concentrations reveal that only 1989 and 1990 exceeded the drinking water atrazine standard of 3 ppb. The average annual atrazine concentration in Hoover Reservoir has varied from a low of 0.55 ug/l in 1991 to a high of 5.90 ug/l in 1990. These data are presented in figure 3.

Although the monthly range of atrazine concentrations vary widely and in some months exceed the Human Health standard of 3.0 µg/l, the drinking water maximum contaminant level (MCL) is calculated from the running annual average of four quarterly samples. Moreover, this data represents raw water in the reservoir prior to treatment and distribution; and, EPA did not promulgate the atrazine MCL until 1991 and became effective in 1992. The samples taken from the raw water do not represent the concentration in the finished treated water which never exceeded the MCL.

These data suggested Hoover Reservoir is susceptible to atrazine runoff to levels that necessitate corrective measures that include atrazine removal treatment at the downstream drinking water treatment facility and collaborating with the agricultural community to implement BMPs. The development of that collaboration clearly identified a need for a methodology to evaluate the effectiveness of any agricultural BMPS that were implemented in order to be able to define the costs and benefit to all stakeholders.

During the 20-year water quality sampling period of Hoover Reservoir, the average annual atrazine concentration varied widely and ranged from a low of 0.5 µg/l in 1991 to a high of 5.9 µg/l in 1990 (Figure 3).

For the period 1985 to 1990, the highest average annual atrazine concentrations of 5.1 µg/l and 5.9 µg/l were detected in 1989 and 1990, respectively. These levels were the highest average annual among all twenty-years. The average annual concentrations occurred before any label use restrictions or watershed-wide management programs were instituted in the watershed. Moreover, because of the elevated levels detected in 1989 and 1990, officials with the City of Columbus began engineering treatment technology for the Hap Cremean Water Plant and, initiated communications about the concern for atrazine in Hoover Reservoir with Ciba-Geigy, Ohio Farm Bureau Federation, and watershed stakeholders.

For the sampling period 1991 through 1998, the highest calculated average annual atrazine concentrations in Hoover Reservoir was 2.4 µg/l in 1995 (Figure 3).

For the sampling period 1999 through 2004 when the federal USDA conservation program provided incentives to farmers to manage atrazine and label-use restrictions remained, the highest average annual atrazine concentration calculated during these five years was only 1.4 µg/l in 2000 (Figure 3).

This data revealed that without changes in management practices or label use restrictions, Hoover Reservoir has the potential to exceed the human health drinking water MCL of an average annual 3 µg/l.

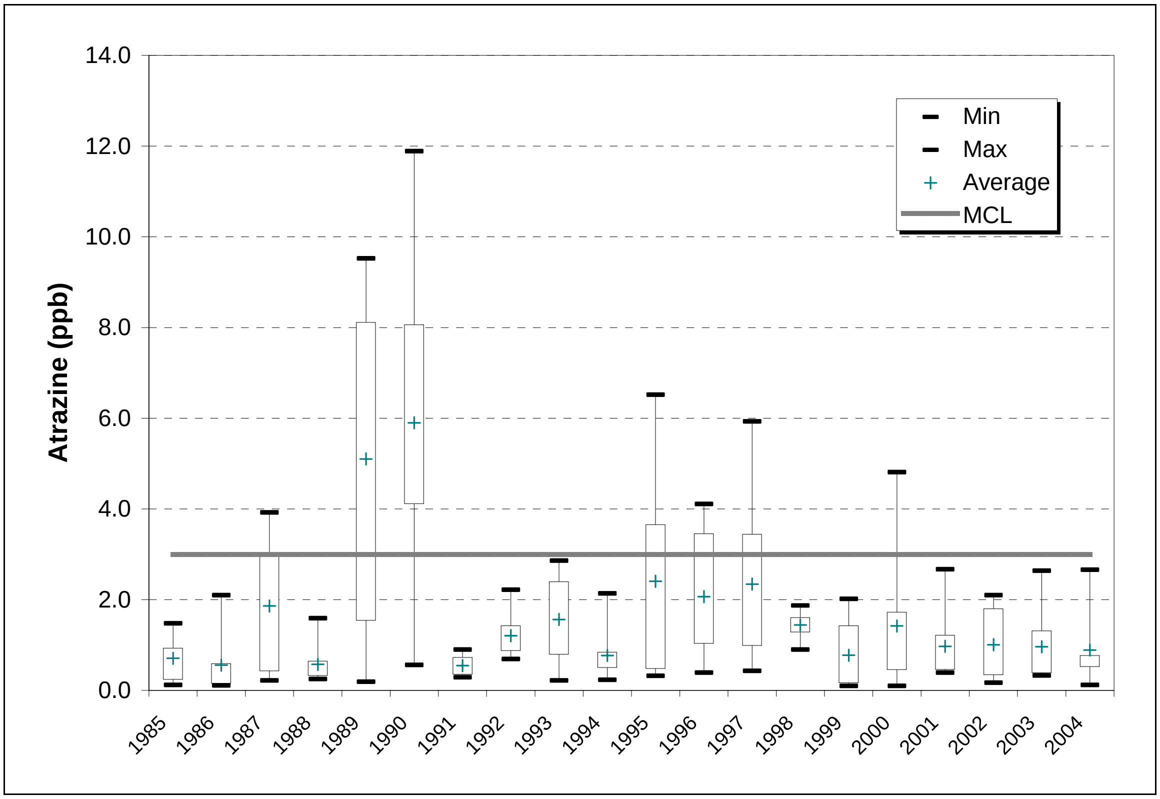

Figure 3: Variability of annual atrazine concentration in Hoover Reservoir in relationship to the drinking water maximum contaminant level (MCL) (1985 – 2004).

Although the range of atrazine concentrations vary widely and in some months exceed the Human Health standard of 3.0 µg/l, the MCL is based on a running annual average of a composite of four quarterly samples. Using the monthly data to average annual concentrations indicate that only 1989 and 1990 were above the lifetime MCL standard.

It is important to note that the atrazine MCL was not promulgated until 1991 and became effective in 1992. Moreover, this is raw untreated water prior to treatment and distribution. Moreover, without adequate voluntary or regulatory management measures in the watershed, this data suggests that Hoover Reservoir is susceptible to exceed the atrazine human health standard drinking water.

Seasonal Patterns

Graphing average monthly atrazine concentration data reflects the hydrological features of the Hoover Reservoir where concentrations tend to increase during the spring runoff season and then steadily decease during the following six months (Figure 4). This corresponds with the “spring flush”, Hoover Reservoir’s hydrologic residence time of an average of 180 days, and relatively slow degradation rate of atrazine in water (Wauchope, 1978; Baker et al., 1985; Thurman et al., 1991; and, EPA, 2002b). Therefore, reservoir discharge appears to be the primary mechanism of decreasing atrazine levels in the reservoir. Residual annual carryover does not appear to be significant.

Percent corn planted serves as a quantitative proxy for when atrazine and other herbicide products are applied in the Upper Big Walnut Creek watershed. Atrazine is typically applied to cropland in the watershed during the months April through mid June. This data reflects similar state and regional research (Wauchope, 1978; Thurman et al., 1991; and, Baker and Richards, 1985).

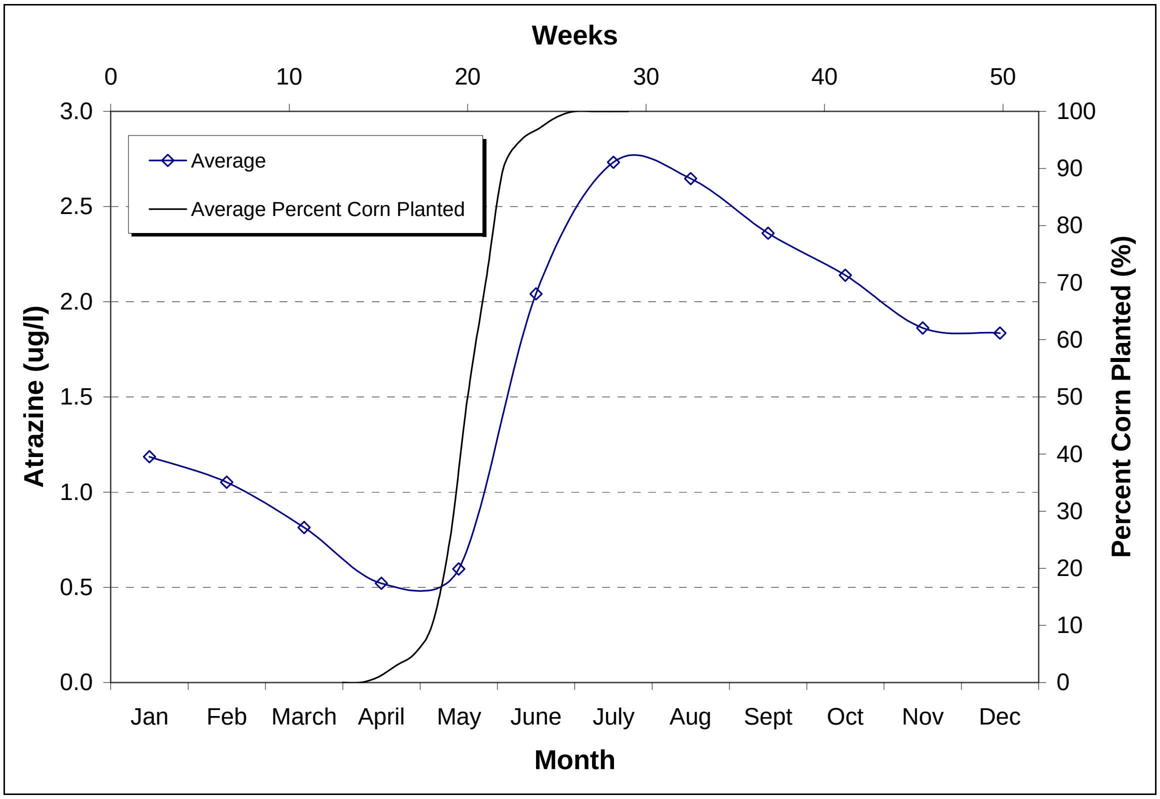

Figure 4: Relationship between percent corn planted and occurrence of atrazine in Hoover Reservoir.

Average monthly atrazine concentration data prior to label use restrictions and implementation of the EQIP program shows considerable concentration increases between the months of May and June are noticeable (Figure 5). Maximum average atrazine concentrations are 3.8 µg/l and occur in August. Moreover, protracted elevated concentrations are apparent even until the month of December before concentrations tend lower until May of the following year. This may be due to the fall application of atrazine that was authorized until Ciba-Geigy restricted this application use in 1990.

The pattern of increasing atrazine concentrations from May to June and into July continue in subsequent monitoring periods. However, maximum average monthly concentrations increase to 2.7 µg/l in July. Because of the fall application label use restriction, the reservoir's six-month hydrologic residence time is more apparent as concentrations continue to decrease from the month of July until the following May. A slight increase observed in monitoring period 2 might be attributed to 1995 when an unusually cool wet spring may have delayed the seasonal epilimneon and hypolimneon turnover in Hoover Reservoir. Elevated atrazine from early spring runoff events may have been trapped in the lower levels of the reservoir until fall turnover that was detected in the December sampling event.

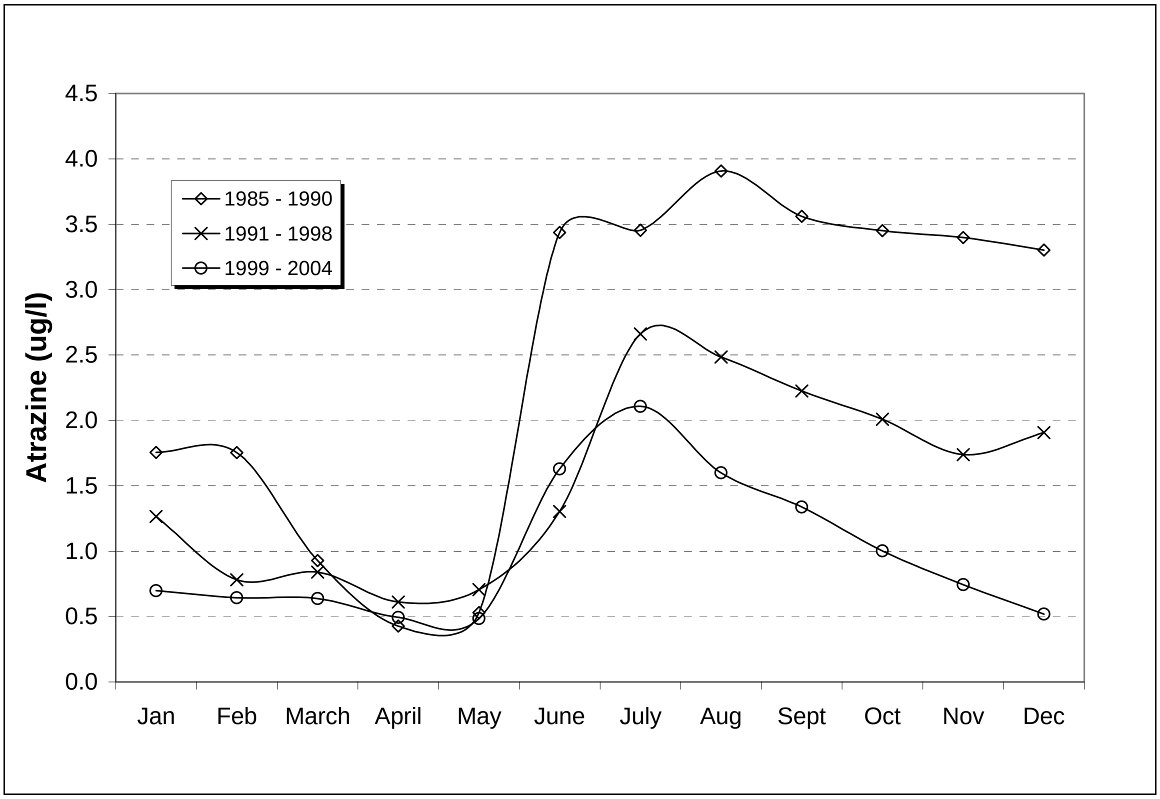

Figure 5: Comparison of average monthly atrazine concentrations during the three discrete sampling periods.

Average monthly concentration data during sampling period 1, 1985 through 1990, reveal wide variability within and among months (Figure 6). The months of April and May tend to have the lowest concentrations with least amount of variability. The month of July has the highest amount of variability and ranges from a low of 0.24 µg/l in 1986 to as high as 11.89 µg/l in 1990. Interestingly, the highest average monthly atrazine concentration during this period was in the month of August at 3.9 µg/l. The remaining months following atrazine application and runoff also demonstrate high monthly variability with average atrazine concentrations well above 3.0 µg/l.

This data clearly demonstrates the characteristic nonpoint source pollution signature in which although atrazine is widely used at high application rates, and multiple application periods, some years do experience elevation atrazine concentrations. This also indicates that climatological conditions, specifically rainfall, are likely and relatively unpredictable drivers that cause atrazine to leave the intended application sites.

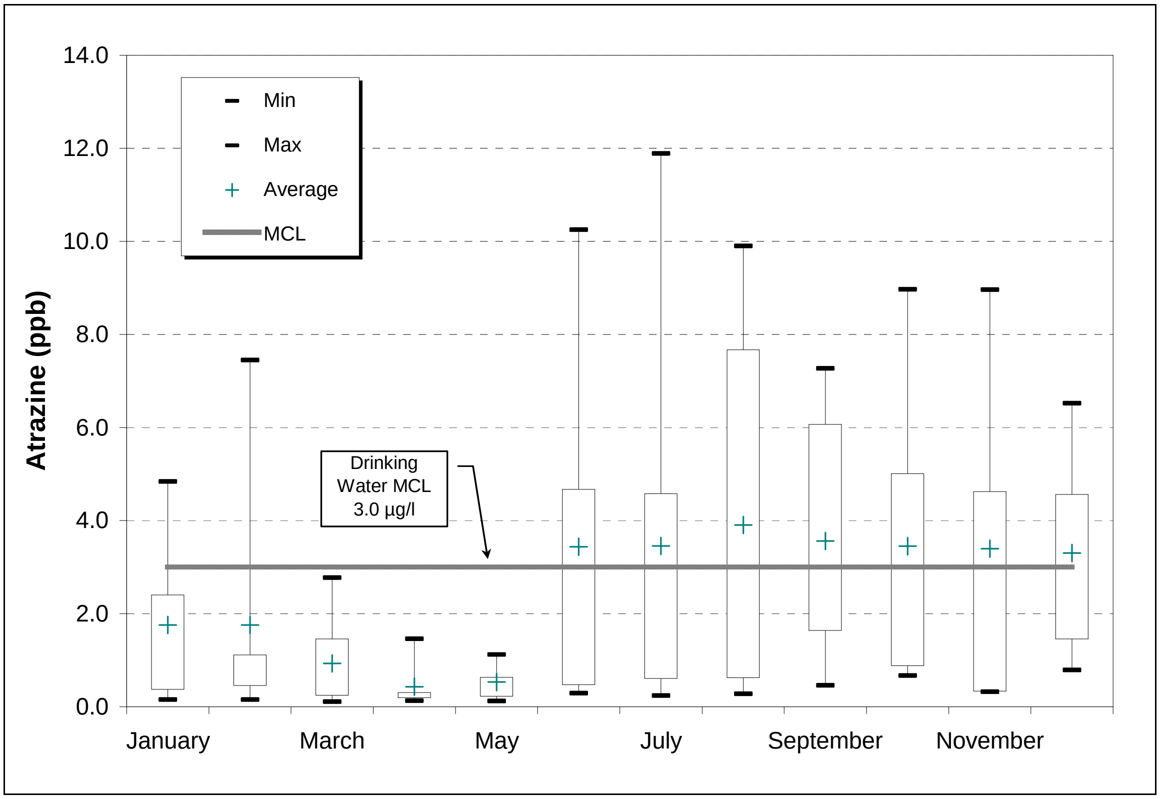

Figure 6: Range of monthly atrazine concentration in Hoover Reservoir: Prior to label use restriction and EQIP implementation period (1985 – 1990).

Average monthly concentration data in sampling period 2, following label use restrictions but prior implementation of the federal USDA EQIP program, shows considerably less monthly variability and July with the highest average atrazine levels during the year (Figure 7). The highest atrazine concentration during the period was only 6.52 µg/l was detected in July, 1995, as compared to 11.89 µg/l in July, 1990. Although atrazine levels are detected above 3 µg/l during this monitoring period, the average atrazine concentrations during any month is below 3 ppb.

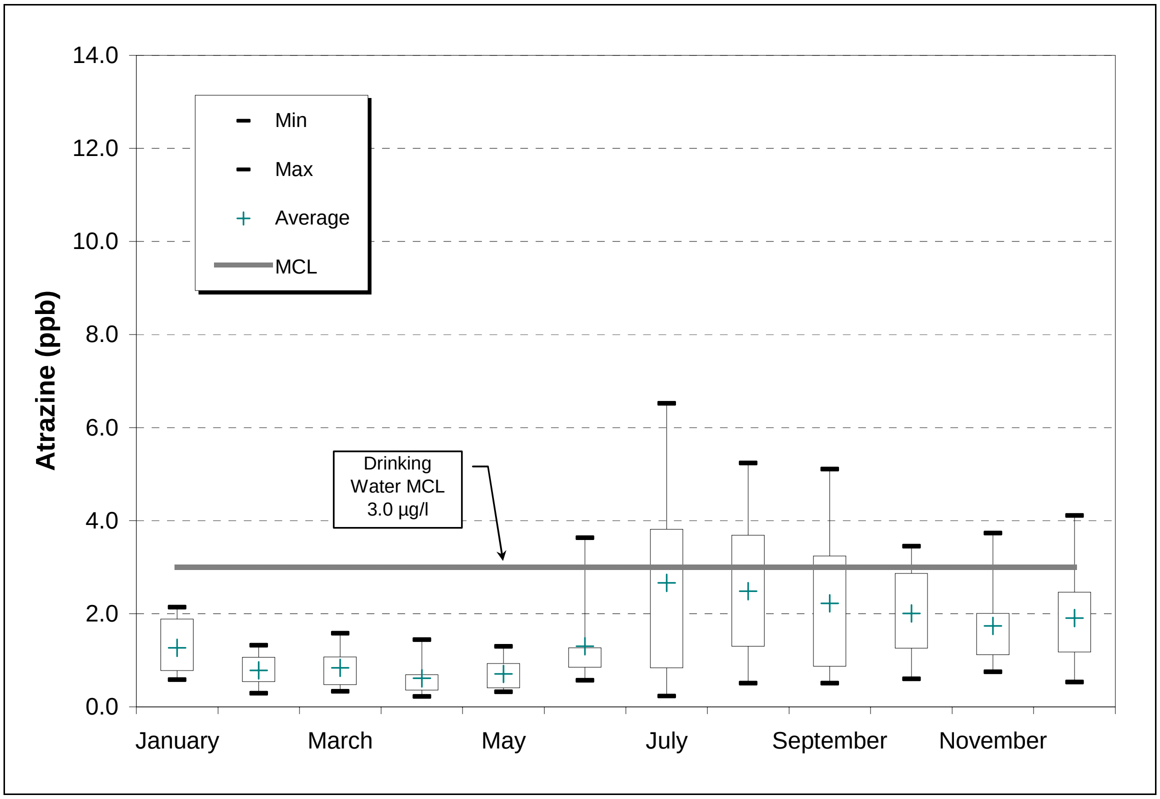

Figure 7: Range of Monthly Atrazine Concentration in Hoover Reservoir: Pre-EQIP Implementation Period (1991 - 1998).

During sampling period 3, when the EQIP program was implemented, average monthly concentration data shows continued variability within and among months (Figure 8). The occurrence of atrazine in Hoover Reservoir follows similar seasonal trends of previous sampling periods and July remains as having the highest average monthly and detected atrazine levels, Although July and August had detection levels greater than 3 ppb, these occurred in 2000, which was the second year of the program with only 1,950 hectares enrolled in atrazine management measures. Later years exceeded three thousand hectares in the program.

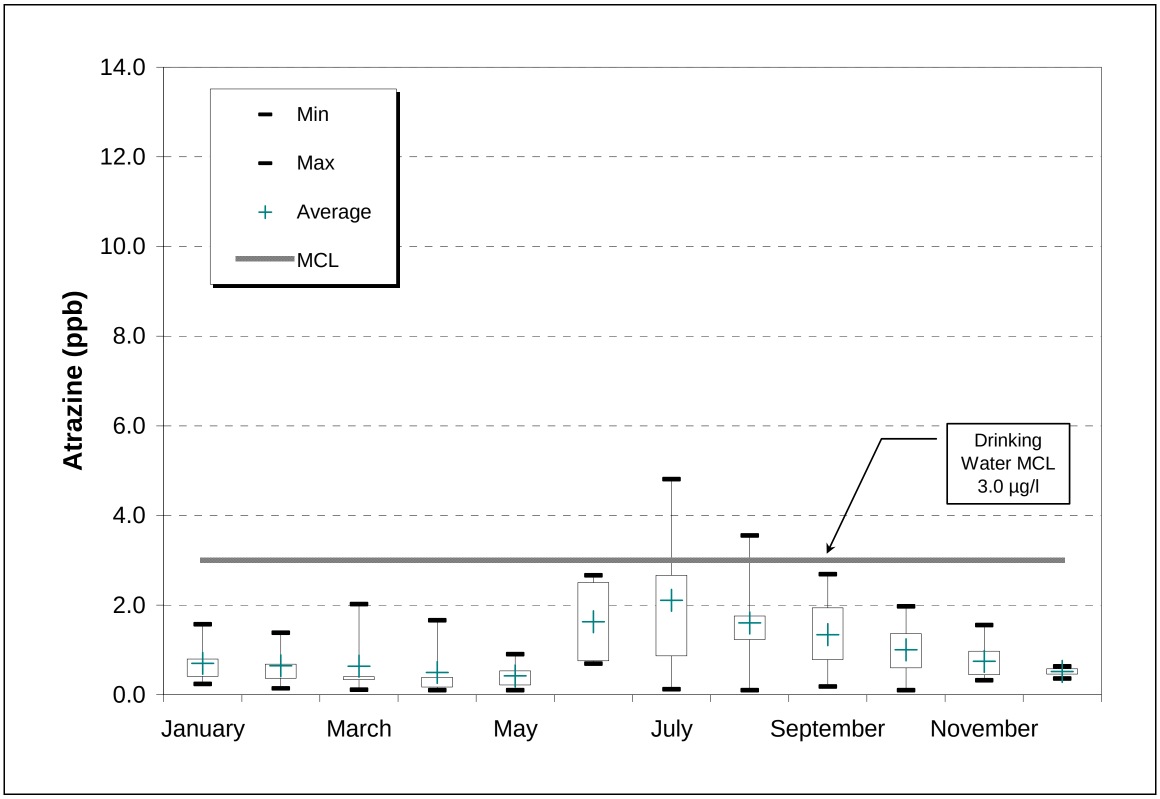

Figure 8: Range of Monthly Atrazine Concentration in Hoover Reservoir: EQIP Implementation Period (1999 - 2004).

In all three sampling periods, atrazine levels in Hoover Reservoir are lowest in early April and the general seasonal trend remains. These data suggest that both the label use restrictions and subsequent EQIP program lowered the magnitude of concentrations in the reservoir and also reduced the duration and overall exposure of atrazine in Hoover Reservoir.

Precipitation Analysis

Total Annual Rainfall

Total annual rainfall for the period 1953 to 2004 varied as much as 843 mm (33.2 in.) at the Centerburg, Ohio rain gauge station (Figure 9). Precipitation ranged from a low of 621.3 mm (24.5 in.) in 1966 to a high of 1464.3 mm (57.6 in.) in1990. The 50-year average annual rainfall was 989.0 mm (38.9 in.) and closely resembles the Ohio statewide average of 965.2 mm (38 inches) (Brown, 1994).

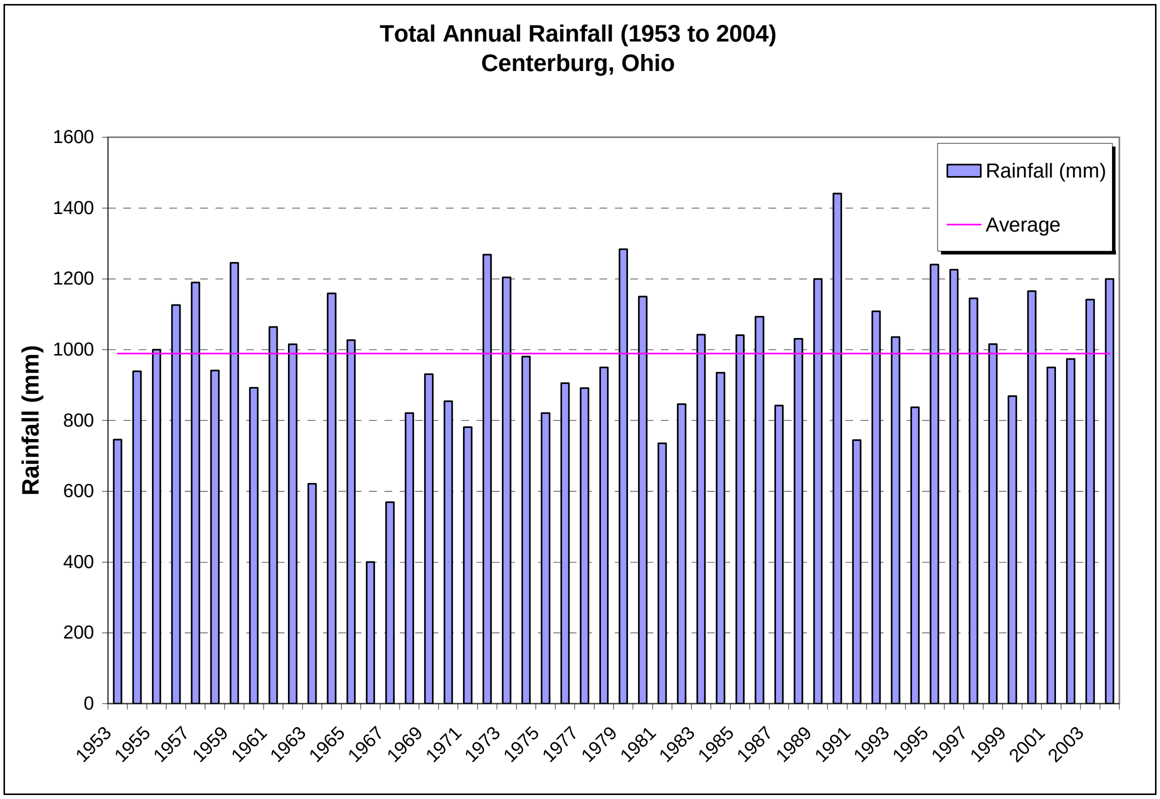

Figure 9: Total annual precipitation and 50-year average rainfall (1953 - 2004).

The average annual rainfall between 1985 through 2004, the period for Hoover Reservoir atrazine water quality monitoring data, was 1065.0 mm, 12.3% higher than the preceding 30 year period and 10.3% higher than the statewide average (Figure 10).

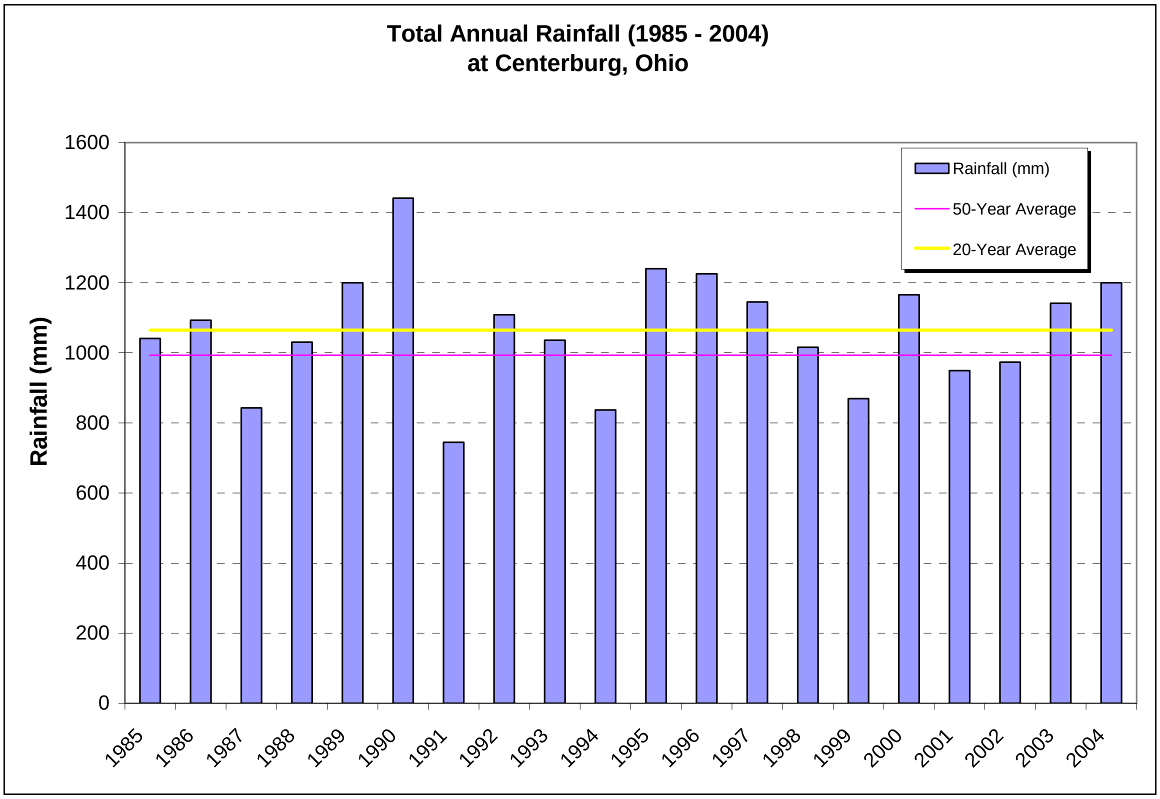

Figure 10: Total Annual Average Precipitation (1985 - 2004)

Monthly Rainfall Data

Rainfall variability within each month can be considerable (Figure 11). The annual average monthly rainfall is 86.3 mm. Average monthly rainfall ranges from a low of 55.6 mm in February to a high of 114.6 mm in July.

Interestingly, the months of May, June and July have the highest average monthly precipitation. This is the period when atrazine is most commonly applied to cropland in the Midwest and Upper Big Walnut Creek watershed.

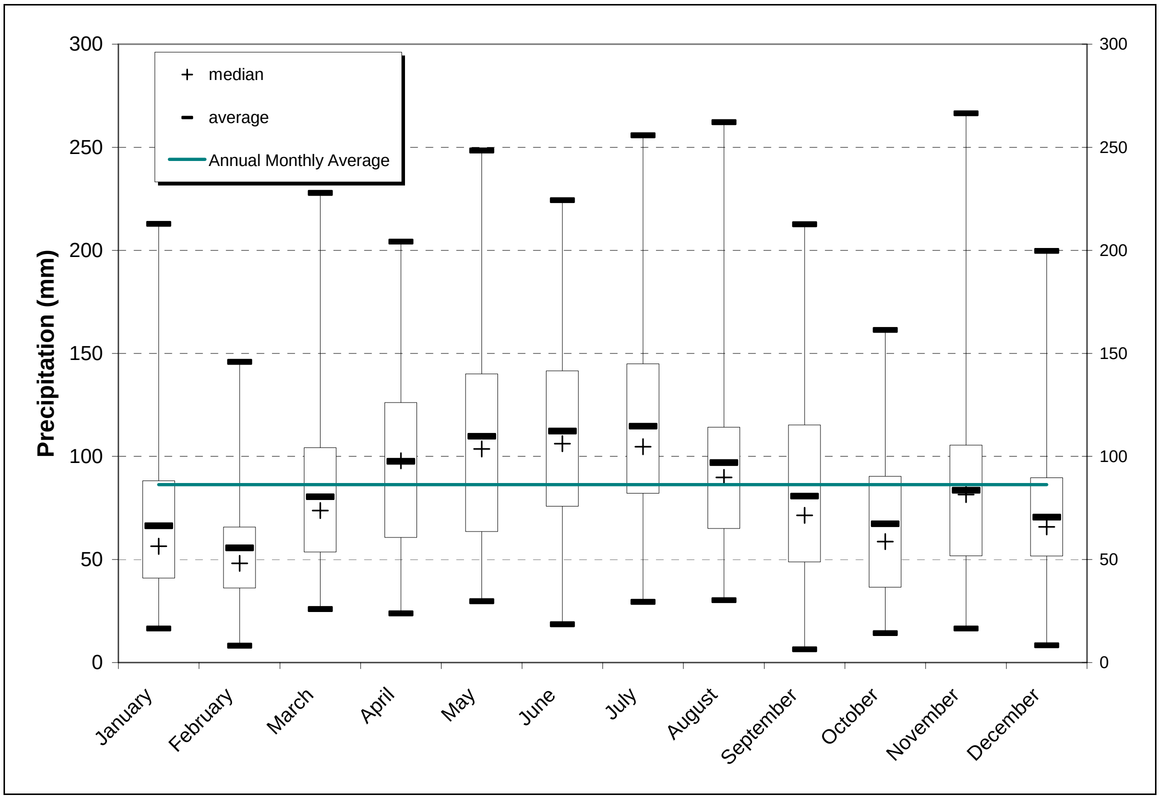

Figure 11: Range of monthly rainfall data (1953 – 2004).

Critical Season Precipitation

Total precipitation for the months of April through July was characterized as the "critical season" (Williams and Miller, 1992). This is typically the period when atrazine and other herbicides are applied to agricultural cropland throughout the Midwestern US corn-belt region and the Upper Big Walnut Creek watershed. This period has the highest potential for runoff (Wauchope, 1978; Thurman et al., 1991; Richards et al., 1991).

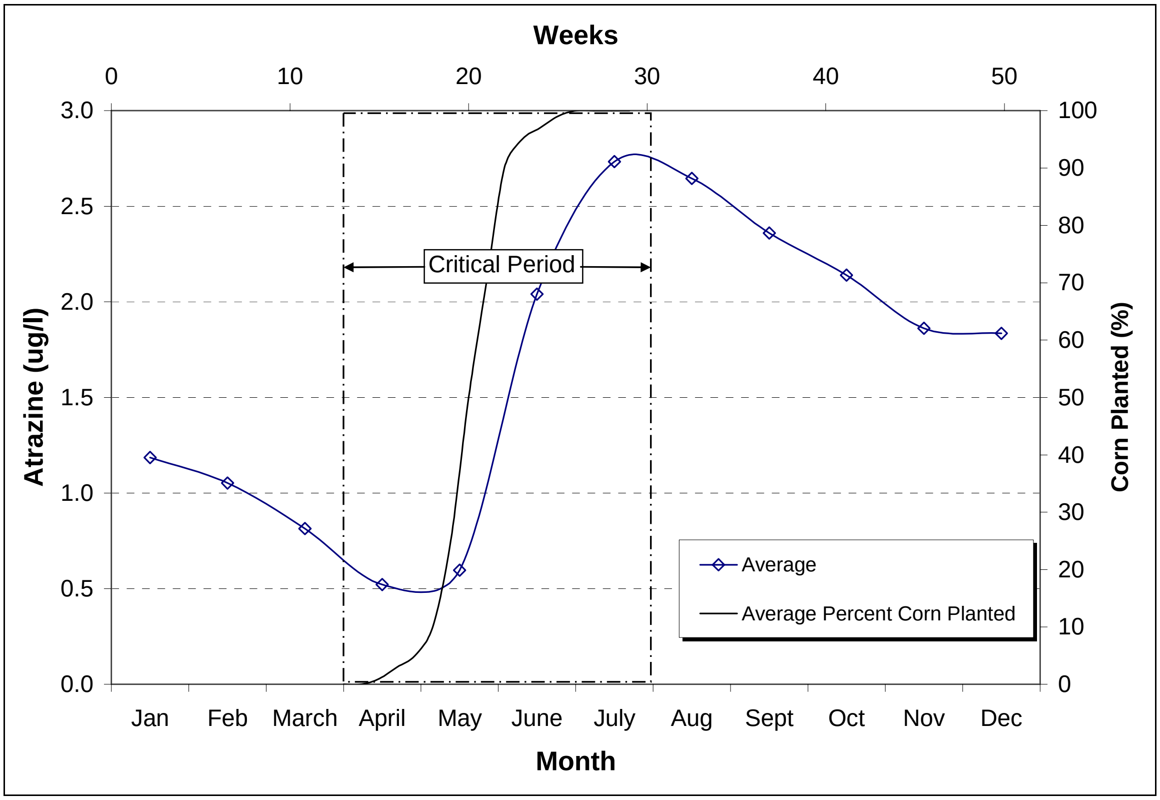

Figure 12: Critical season for atrazine runoff.

Linear regression analyses were conducted between average annual atrazine concentrations and total rainfall among multiple periods at the Centerburg, Ohio rain gauge station. Total rainfall during the four month period of April to July revealed a high positive coefficient of determination with average annual atrazine concentrations (r^2 = 0.92). Greater total precipitation during this period was correlated well with higher average annual atrazine concentrations in Hoover Reservoir.

It is important to note however, that correlation coefficient alone is not a measure of the strength of casualty between two variables.

Between 1953 and 2004, average total rainfall during the four-month "critical season" was 423.7 mm and varied as much as 438.4 mm (17.9 in.). Rainfall ranged from a low of 247.9 mm (1.1 in.) in 1983 to as much as 686.3 mm (27.0 in.) in 1990. Twenty-seven of the historical fifty years exceeded the critical season average rainfall.

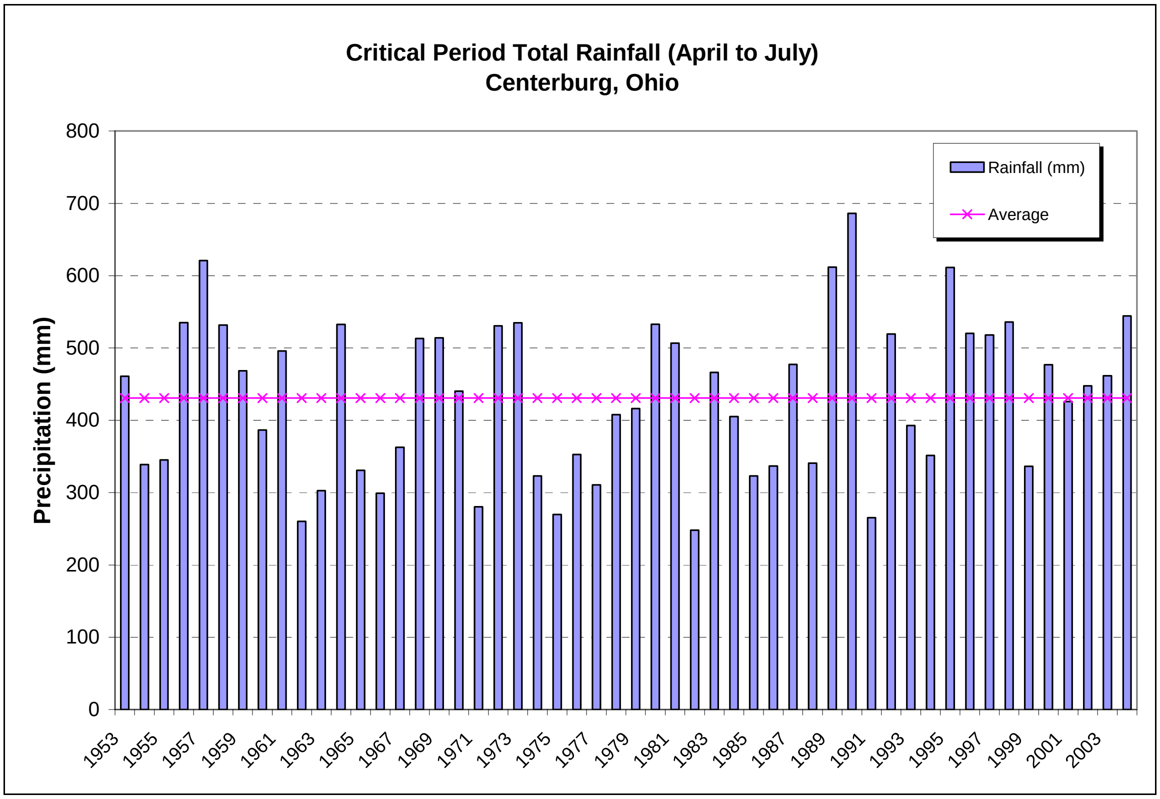

Figure 13: "Critical season" total rainfall (1953 – 2004).

Average critical season rainfall did not vary significantly among the three monitoring periods and was 462.6, 464.2, and 471.2mm, respectively.

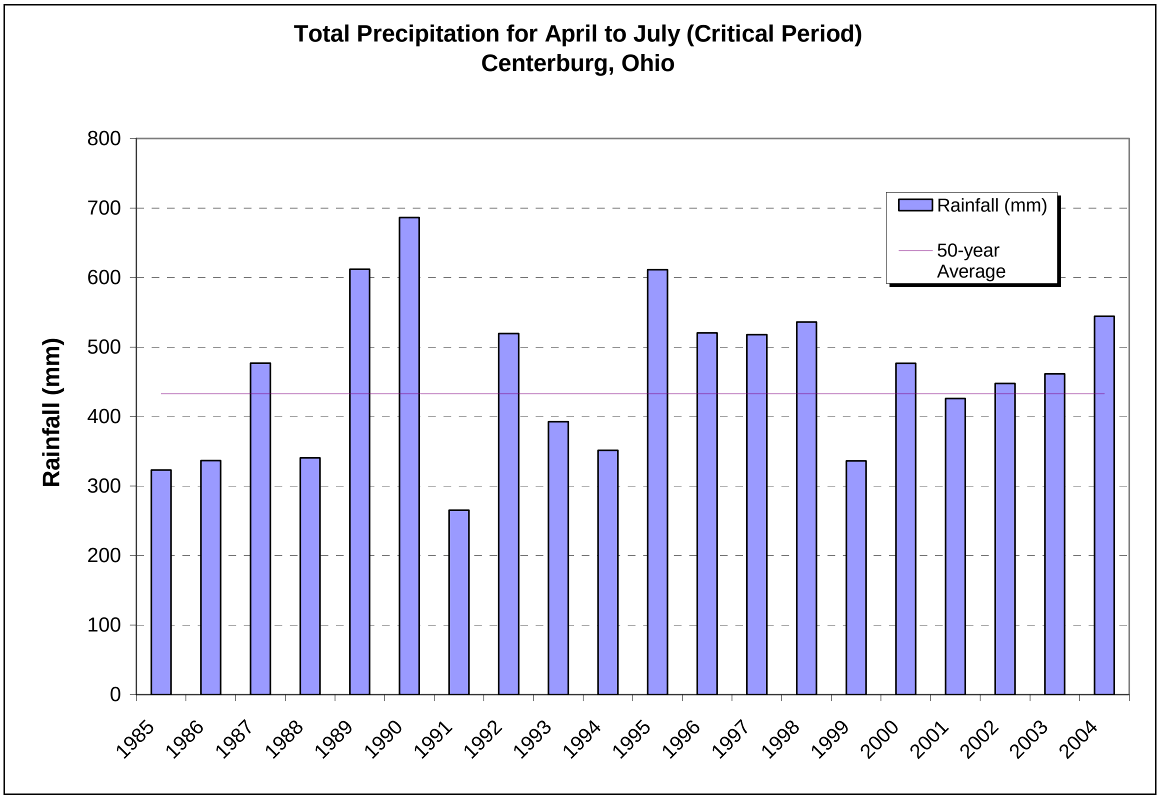

Figure 14: Total "critical season" precipitation (1985 – 2004).

During the 20 year period 1985 through 2004, twelve of the twenty exceeded the average critical period rainfall.

Flow Analysis

Flow data exists for two USGS gaging stations located upstream and downstream of Hoover Reservoir. However, the gage station downstream of the reservoir's dam is highly influenced by the dam's release schedule. The remaining stream flow gage station's period of record is limited to 1970 through current. Therefore, a regression analysis between stream flow and average annual atrazine concentrations were not performed.

Regression Analysis

Regression is a method for fitting a curve, and not necessarily a straight line, through a set of pints suing some goodness of fit criteria.

Regression analysis reveals trends in the occurrence of atrazine in Hoover Reservoir. Regression analysis between average annual atrazine concentration and precipitation were developed to compare occurrences of atrazine in Hoover Reservoir among the three discrete sampling periods.

In a previous study of Hoover Reservoir, linear regression analyses were performed where average annual atrazine concentrations were the dependent variable, and total rainfall among multiple periods measured at the Centerburg, Ohio rain gauge station were the independent variables. Total rainfall during the April to July period revealed a high positive coefficient of determination with average annual atrazine concentrations (r^2 = 0.92). R2 represents the proportion of variance in y attributed to the variance in x.

Conversely, the correlation coefficient is the square (r) of coefficient of determination and is a measure of association between two variables. Thus, with a correlation coefficient of 0.96, greater total precipitation during this period were correlated with higher average annual atrazine concentrations in Hoover Reservoir.

It is important to note however, that correlation coefficient is not a measure of the strength of casualty between two variables.

A previous Hoover Reservoir study (Williams and Miller, 1992) used the calendar average annual atrazine concentrations. Average annual atrazine concentration data were adjusted to better reflect the twelve month period following the rise in atrazine levels in Hoover Reservoir (Table 1). On average, atrazine levels tend to increase in early June, continue to increase through July, and steadily trend lower until May of the following year.

Except for years 1989 and 1990, most years were not significantly different than the calendar year average annual concentrations.

Average Annual Atrazine: Linear Regression

Linear regression analysis of the period 1985 through 1990 was replicated from Williams and Miller, 1992. Results indicate that rainfall exceeding 500 mm (19.7 in.) following atrazine application could result in atrazine levels to exceed the MCL of 3 ppb annual average.

Similar analyses were performed for the subsequent sampling periods 1991 to 1998 and 1999 to 2004. Results indicate that the label rate use reductions beginning in 1991 did reduce the occurrence of atrazine in Hoover Reservoir. Similarly, the linear regression analysis of the EQIP program suggests further reductions in the occurrence of atrazine in the reservoir.

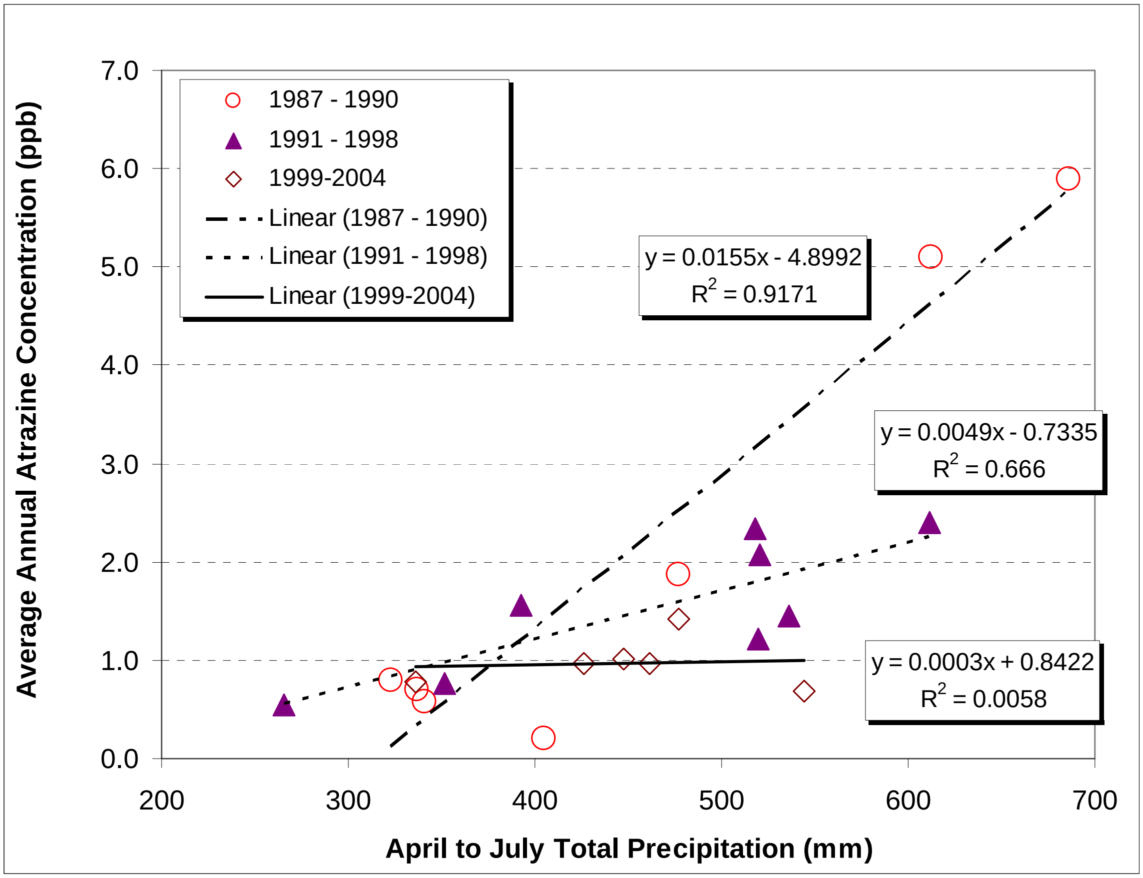

Figure 15: Correlation coefficients and equations from linear regression analysis for the three monitoring periods.

These regression equations provide the basis to estimate the annual average atrazine concentration in Hoover Reservoir for each year from 1953 to 2004. Although linear regression provides a highly positive coefficient of determination ($r^2 = 0.92$) for the period 1985 to 1990, the 50-year historical data reveal that in some years, the average annual atrazine concentrations in Hoover Reservoir would be less than zero (Figure 16).

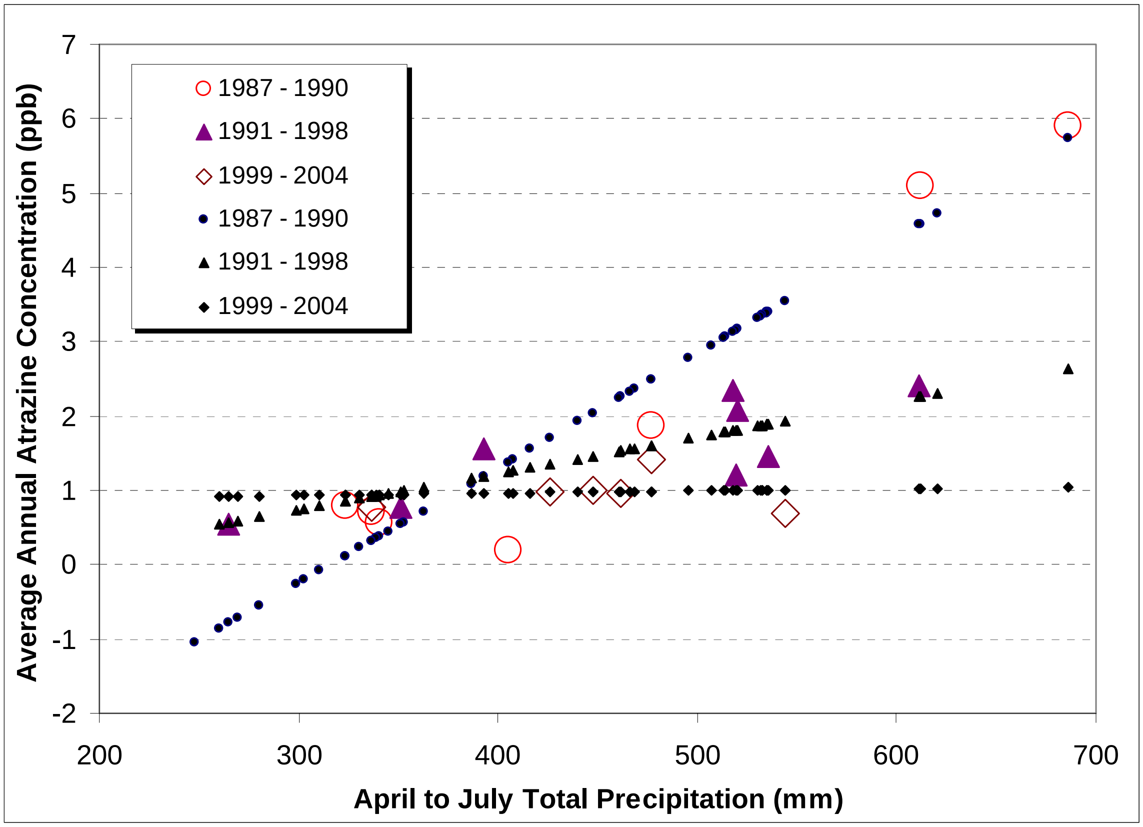

Figure 16: Linear regression prediction analysis of historical 50 years.

One could argue that when precipitation is less than 350 mm, little to no atrazine should enter into Hoover Reservoir and therefore, any residual from the previous year would discharge from the reservoir and thus decrease concentrations. However, a similar, and more pronounced and parallel trend should also be observed with the other two periods (1991 to 1998 and 1999 to 2004) when less total atrazine was applied with application set-backs. Therefore, the linear regression equations to estimate average annual atrazine concentrations is questionable.

Average Annual Atrazine: Best-Fit Regression

"Best-fit" regressions were calculated between total critical season rainfall and average annual atrazine concentrations. These regressions were plotted for the three separate sampling periods. Regression equations were derived for each sampling period and are presented in the Methods and Materials section.

Similar to the linear regression, a highly positive correlation of determination exists (r^2 = 0.97) during the period 1985 to 1990. Caution must be observed with this elevated positive correlation since only two data points represent at the extreme upper precipitation events (Figure 17).

"Best-fit" regression for the monitoring period 1991 through 1998 reveal that although average annual atrazine levels in the reservoir are relatively similar to the monitoring period prior to 1990 at average critical season total rainfall, a separation from the sampling period one regression equation occurs at about 500 mm (19.7 in.) total critical season rainfall. The departure becomes more evident at higher critical season total precipitation.

In general, average annual atrazine concentrations for the sampling period 1999 through 2004 follow a similar trend as the previous two monitoring periods; as the amount of rainfall increases, the average annual concentration tends to increase. "Best-fit" regression indicates a significantly lower departure from both previous monitoring periods. At all total critical season precipitation levels, lower average atrazine concentrations are calculated.

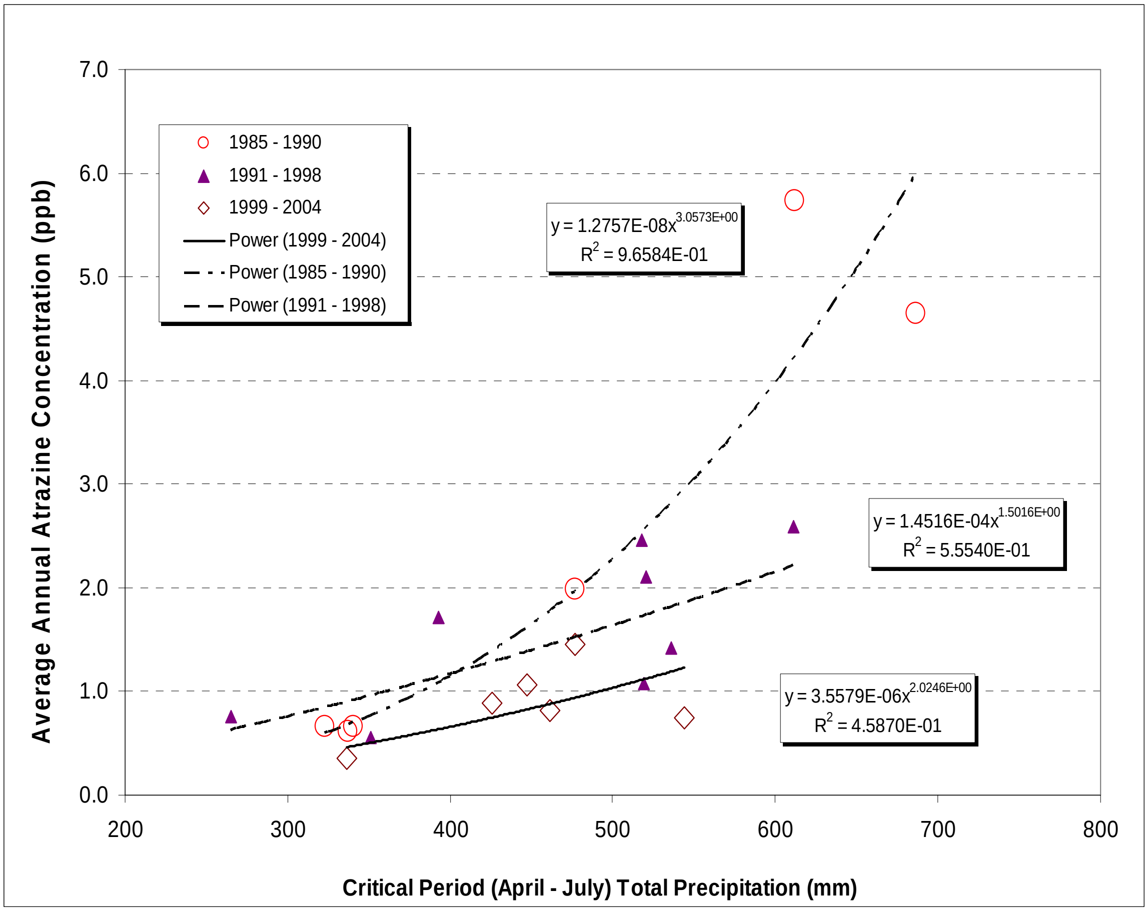

Figure 17: Best-fit regression analysis reveals relationship between precipitation and average annual atrazine concentration is likely not linear.

The “best-fit” regression equations were used to estimate the average annual atrazine concentrations for the 50-year period 1953 through 2004 (Figure 18).

What is evident from the plotting of the three sampling periods is that total rainfall less than the 50-year average of 432.8 mm during the “critical season” should not result in Hoover Reservoir to exceed human health standards. Therefore, average precipitation or less during the critical season should not result in elevated levels of atrazine in the reservoir - under any of the three sampling scenario periods. It is those years to which elevated precipitation during this period is problematic to water quality. This pattern clearly articulates the occurrence of atrazine in the reservoir as nonpoint source pollution runoff.

For sampling period 1, the regression equation estimated that five of the fifty years (10%) would have exceeded the MCL; two years 1989 and 1990 did exceed the average annual 3 ppb. The years 1957, 1995 and 2004 (at 2.95 µg/l and rounding up to 3.0 µg/l) were estimated to exceed the MCL based on total rainfall during the total critical season rainfall. Therefore, if the label application changes were not instituted and/ or without the federal USDA conservation program, we would have expected atrazine levels in Hoover

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Reservoir in 2004 to have also exceeded the atrazine drinking water MCL. Although Hoover Dam and reservoir were completed in 1955, it is likely that atrazine levels did not exceed 3 µg/l in 1957 because agricultural herbicides were not widely used until the 1960's.

Unlike the sampling period 1, regression equations for the period 1991 to 1998 indicate at higher rainfall during the critical season does not result in average annual atrazine concentrations that exceed the human health drinking water standard. This relationship indicates that as rainfall amount increases during the critical season, less atrazine runoff occurs in the watershed which is paramount to a successful nonpoint source pollution abatement program. Therefore, it could be argued that the label use restrictions endorsed by EPA and implemented by the registrants in 1991 were effective nonpoint source pollution control measures for Hoover Reservoir.

The regression equations developed for the monitoring period 1999 through 2004 suggest that the Environmental Quality Incentives Program (EQIP) lowers, or buffers from, the occurrence of atrazine levels in Hoover Reservoir. Thus, one might suggest that the EQIP program provides the opportunity to further reduce the risk of elevated levels of atrazine in the reservoir.

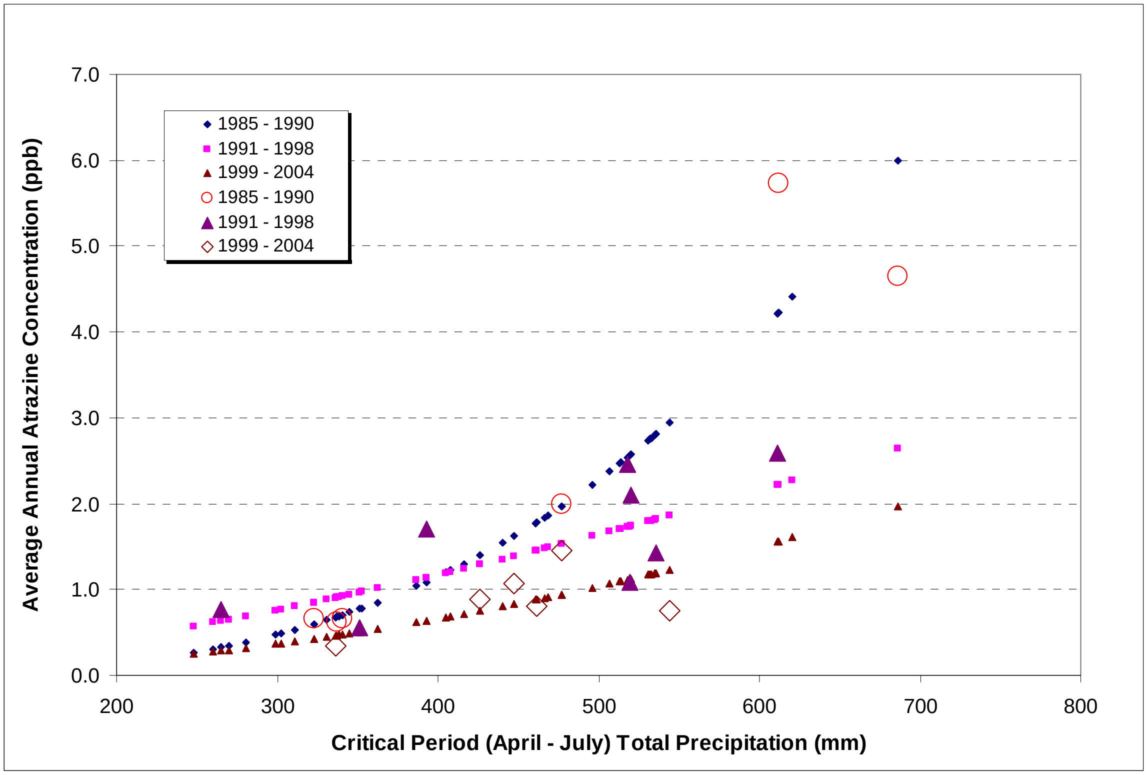

Figure 18: Best fit regression analysis for 50 years of historical rainfall data.

When solving for x, where y is 3.0 ppb, for the period 1985 to 1990, at least 547.2 mm of total rainfall during the four month critical period would be required to cause Hoover Reservoir to exceed the MCL. For the period 1991 to 1998, at least 747.8 mm would be necessary. The probability of 750 mm falling during the "critical period" exceed the historical 50 years of precipitation data. At least 845.2 mm of total rainfall would be required to occur with the subsequent implementation of conservation management measures to cause the atrazine levels exceed the MCL. Clearly, both the change in label application rate and conservation management measures reduced the probability of atrazine levels in Hoover Reservoir exceed the human health MCL.

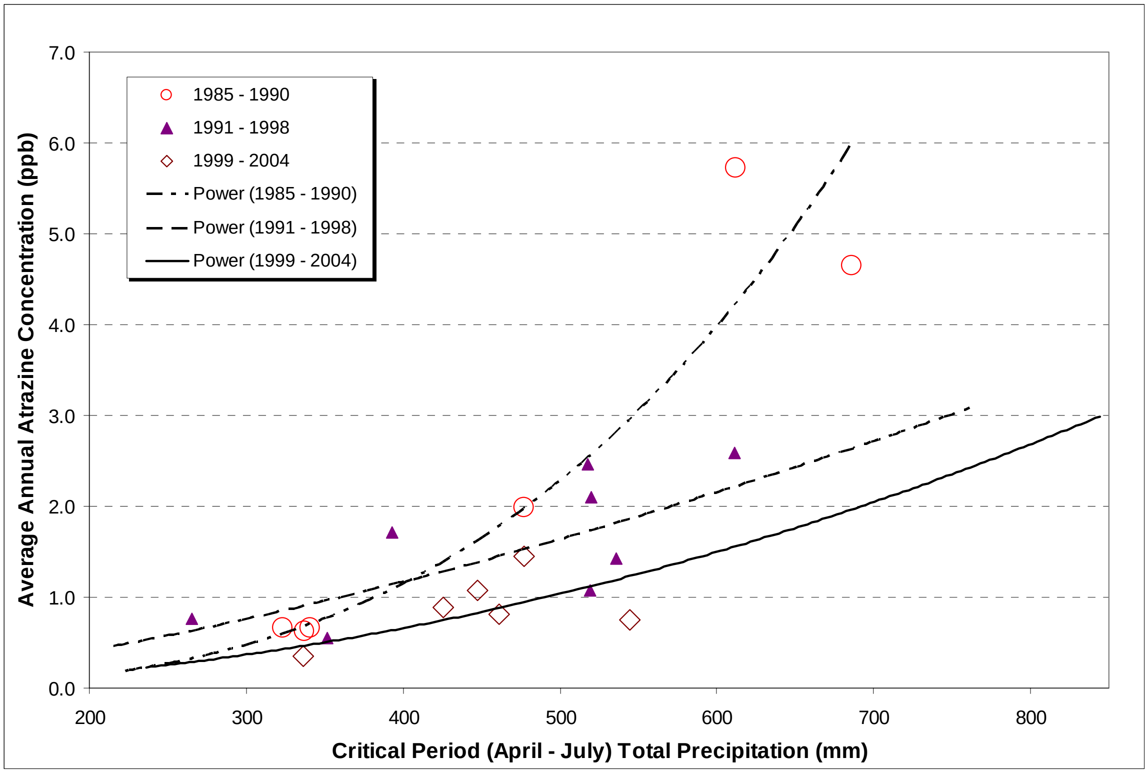

Figure 19: Estimating the amount of rainfall required to raise average annual atrazine levels above 3 ppb in Hoover Reservoir.

Average Annual Total Chloro-Triazine: Best-fit

In 2001, during development of the Triazine Interim Reregistration Eligibility Decision (IRED), EPA published a drinking water exposure assessment for atrazine and its chloro-triazine and hydroxy-triazine degradates. Chloro-triazine degradates includes deethly-atrazine (DEA), deisopropyl-atrazine (DIA), and diaminochloro-atrazine (DACT). As a group, these atrazine degradates are known as total chloro-triazines (TCT). Average annual atrazine concentrations were converted to average annual TCT concentrations using regression equations provided by EPA. These equations are provided in the Methods and Materials section.

Best-fit regressions were developed for the relationship between total critical season precipitation as the independent variable and average annual total chloro-triazine as the dependent variable. These best-fit regressions were estimated for the three separate sampling periods.

Similar to the average annual atrazine concentrations, higher levels of average annual TCT are expected with higher levels of rainfall during the critical season (Figure 20). Subsequent label-use restrictions and conservation programs reduce the TCT levels in Hoover Reservoir at similar critical season total rainfall.

In general, plotting the three sampling period regression equations resemble the average annual atrazine levels (Figure 17). A y-axis positive “shift” of the regression equations is apparent in the average annual TCT best-fit regression (Figure 20). For example, a total critical season rainfall of 430 mm could result in 1.5 µg/ average annual atrazine concentration. Whereas, at the same rainfall amount, average annual TCT concentrations would be about 2.3 µg/l. Therefore, the divergence between sampling period 1 and sampling period 2, separates at higher average annul concentrations.

That is, and except at higher total critical season rainfall, at an average annual concentration of 3 ppb, there does not appear to be a significant departure between the effects of the label use restrictions; hat is between sampling period 1 and 2. When both the label use restriction and the conservation programs were implemented in the watershed, average annual TCT appears to have been significantly reduced.

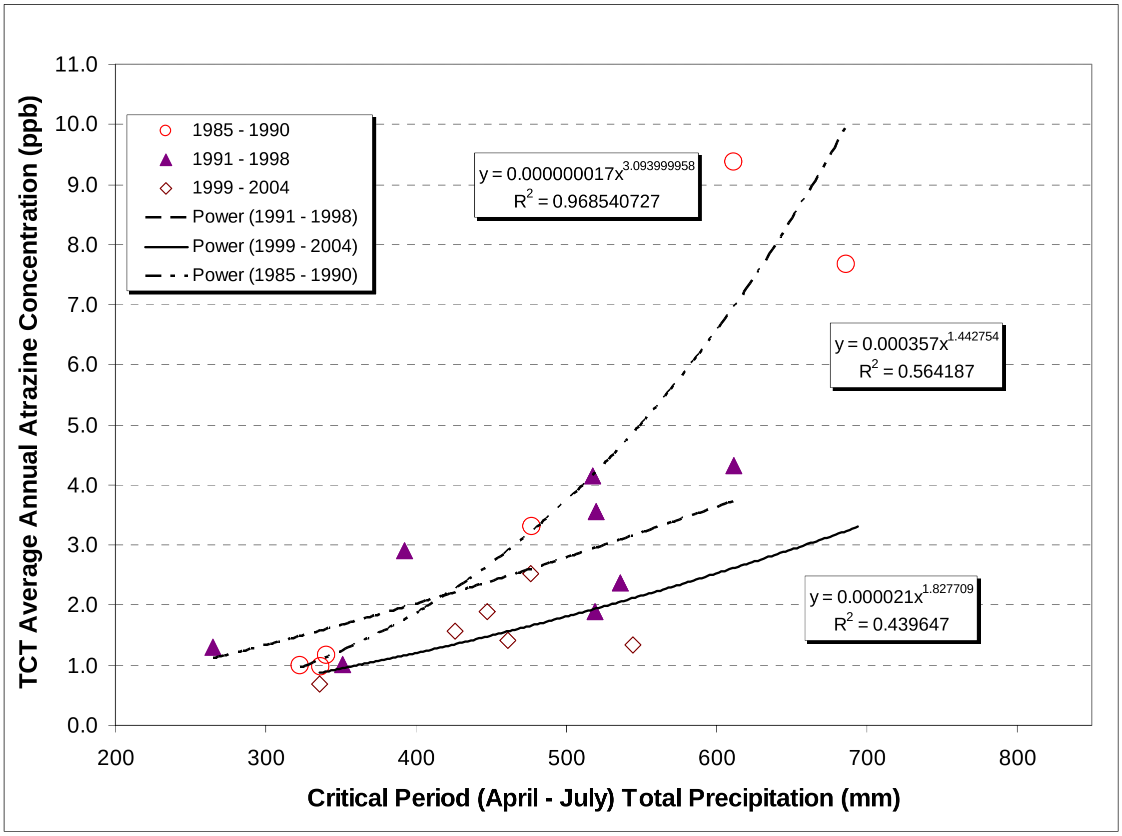

Figure 20: Best-fit regression analysis reveals relationship between precipitation and average annual total chloro-triazine concentration is likely not linear.

These TCT "best-fit" regression equations provide the basis to estimate the annual average TCT concentration in Hoover Reservoir for each year from 1953 to 2004 for each of the three sampling periods (Figure 21).

Similar to average annual atrazine concentration regression, the plotting of the three periods reveals that total rainfall less than the 50-year average of 432.8 mm during the "critical season" does not cause sufficient atrazine runoff to increase concentrations in Hoover Reservoir that would impact human health standards; under any of the three monitoring scenario periods. Although, the federal USDA conservation program appears to reduce the amount of average annual TCT in Hoover Reservoir during average and less than average total critical season precipitation. Again, it is important to note that managing for nonpoint source pollution runoff should not target "average" conditions because non-point source runoff occurs during infrequent elevated precipitation events.

Unlike the average annual atrazine concentration, the average annual TCT regression equation estimated that twenty-five of the fifty years (50%) would have exceeded the MCL (Figure 21). The highest estimated average annual TCT concentration in Hoover Reservoir is 10.2 µg/l occurred in 1990.

The regression equations developed for the monitoring period 1999 through 2004 suggest that the Environmental Quality Incentives Program (EQIP) lowers, or buffers from, the occurrence of TCT levels in Hoover Reservoir. Moreover, one might suggest that the EQIP program provides the opportunity to further reduce the risk of elevated levels of TCT in the reservoir.

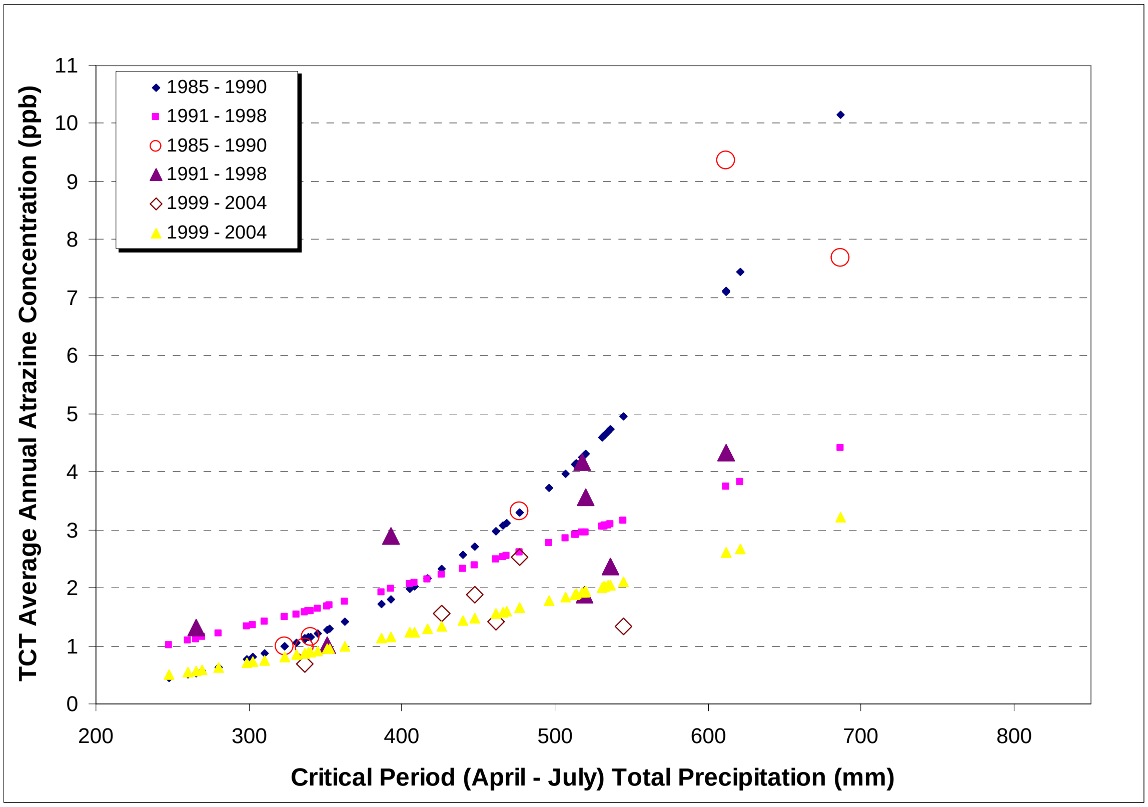

Figure 21: Best-fit regression analysis for 50 years of historical rainfall data.

Solving for x, where y is 3.0, for the period 1985 to 1990, at least 462.2 mm of total rainfall would be required to cause Hoover Reservoir to exceed the 3.0 µg/l TCT. For the period 1991 to 1998, at least 524.9 mm would be necessary to increase atrazine levels above the 3.0 µg/l TCT threshold. The probability of 750 mm falling during the "critical period" exceed the historical 50 years of precipitation data. At least 661.3 mm of total rainfall would be required to occur with the subsequent implementation of conservation management measures to cause the atrazine levels exceed the 3.0 µg/l TCT.

Clearly, both the change in label application rate and conservation management measures reduced the probability of TCT levels in Hoover Reservoir exceed the drinking water human health standard.

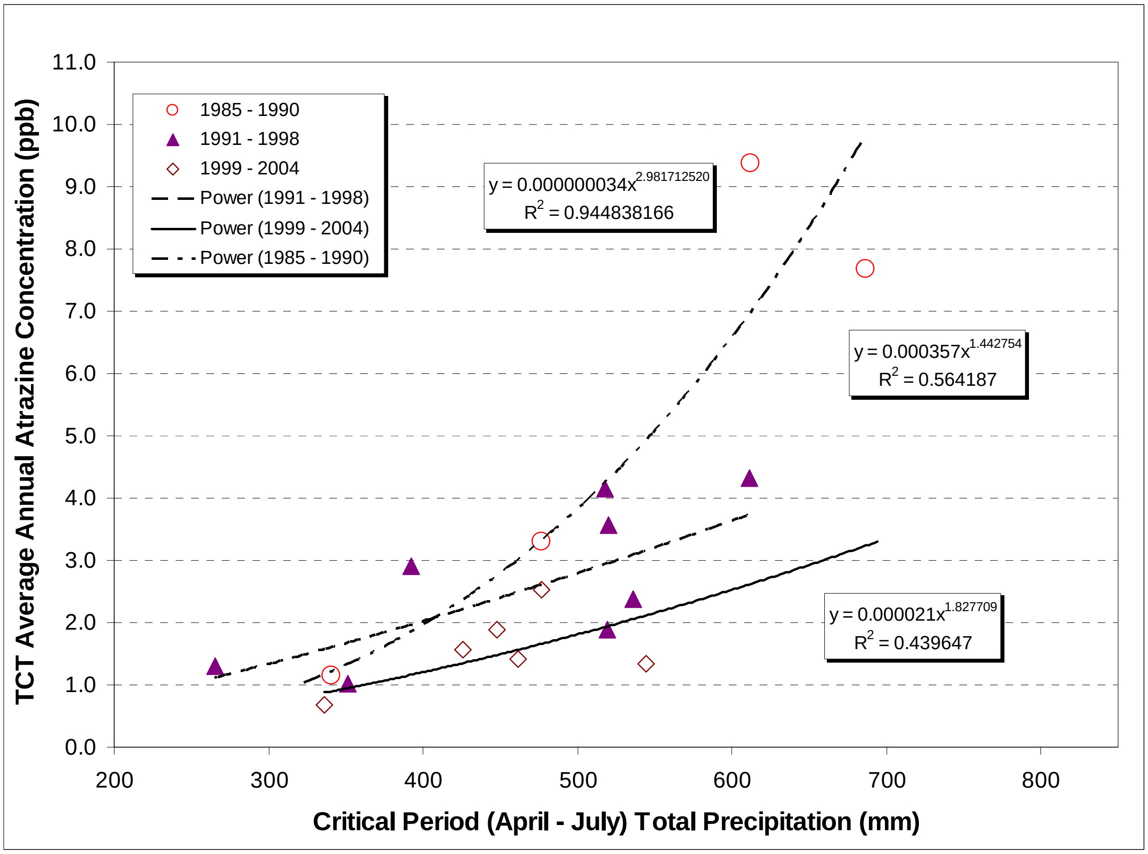

Figure 22: Projecting amount of total precipitation during the critical season required to cause average annual TCT concentrations exceed 3 ppb.

Risk Assessment

In general, risk implies something is both that is both uncertain and undesired. Risk is defined as "a characteristic of a situation of action wherein two or more outcomes are possible, the particular outcome that will occur is unknown, and at least one of the possibilities is undesired" (Covello, and Merkhofer, 1993).

Average Annual Atrazine Concentration

The maximum contaminant level (MCL) for atrazine in drinking water is 3.0 µg/l based on an average of four quarterly samples.

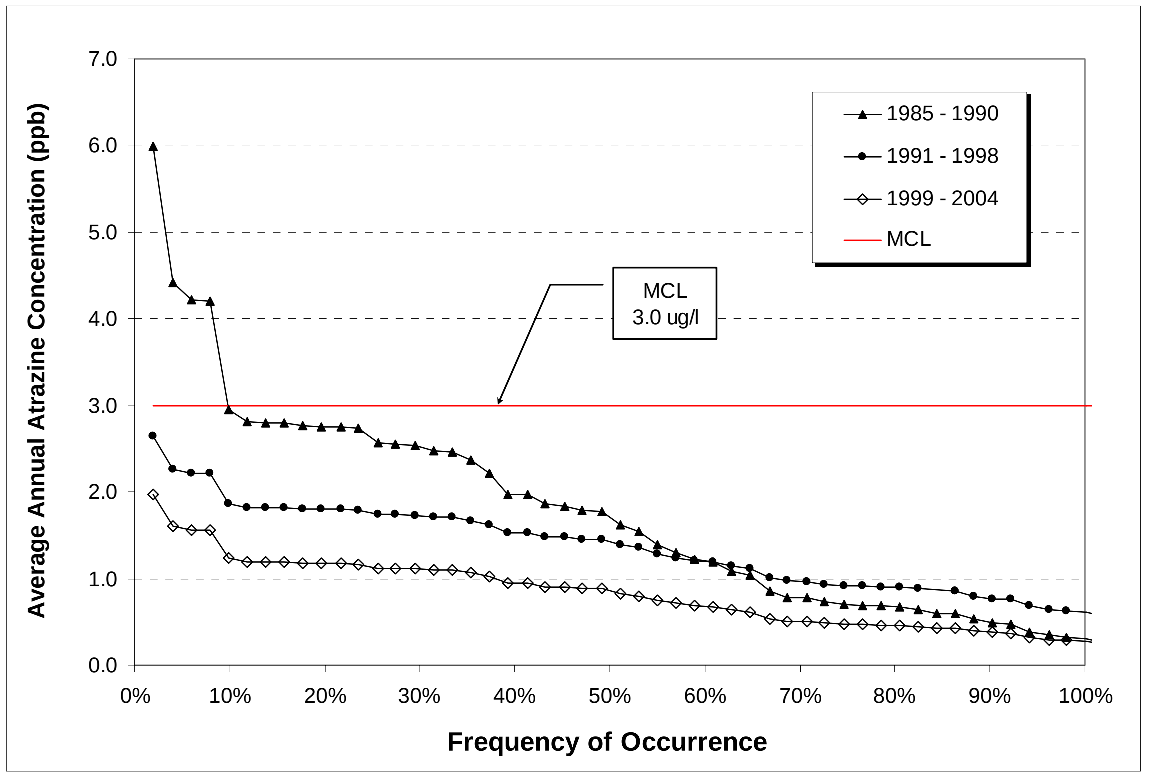

Figure 23: Probability of exceeding drinking water atrazine MCL during three discrete sampling periods.

The probability of exceeding the atrazine MCL in Hoover Reservoir prior to 1990 was 10%. Plotting the best-fit 50-year regressions for sampling period 1 indicate that only five of the fifty years would result in the average annual atrazine concentration in the reservoir to exceed 3.0 ppb. The years include 1957, 1972, 1989, 1990 and 2004; 1989 and 1990 had actual water quality monitoring data for this sampling period. The magnitude of exceeding the atrazine MCL in Hoover Reservoir varied from 3.0 to as high as 6.0 µg/l (Figure 23).

Since instituting label-use restrictions in 1990, the best-fit regression model indicates that atrazine levels should not exceed the drinking water standard MCL annual average. Similarly, adoption of federal USDA conservation programs in 1999 have further reduced the probability of the reservoir exceeding the MCL.

Average Annual Total Chloro-Triazine

Graphing the frequency of occurrence for atrazine TCT in Hoover Reservoir is quite dissimilar than the single atrazine parent compound. The average annual TCT drinking water level of concern (DWLOC) threshold for the most sensitive population, children and infants, is 18 µg/l. Clearly, the risk of average annual TCT is not, nor has been, problematic from drinking water derived from Hoover Reservoir.

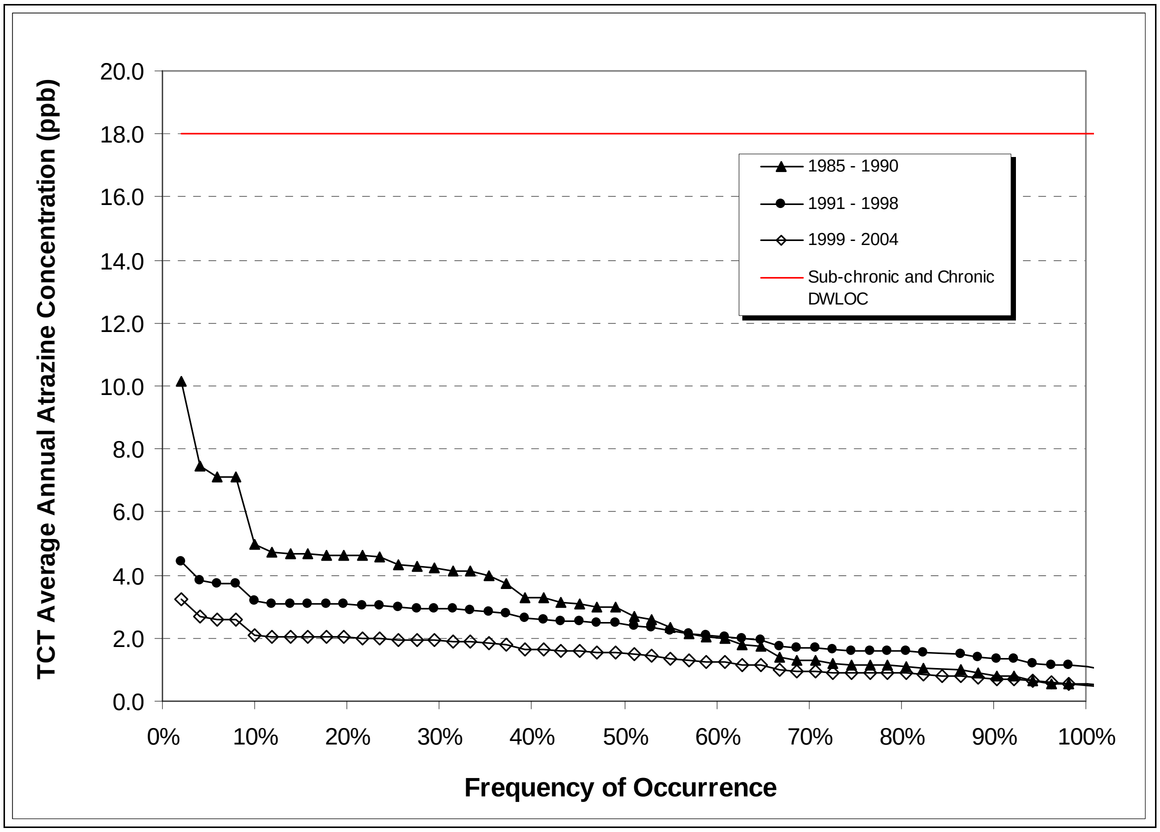

Figure 24: Probability of exceeding the average annual total chloro-triazine (TCT) chronic exposure drinking water level of concern (DWLOC) during the three discrete sampling periods. The DWLOC threshold is plotted for children and infant populations from drinking water in Hoover Reservoir.

Results and Discussion - Ecological

EPA's concern for atrazine in the aquatic environment is the potential for direct effects on phytoplankton and macrophytes and the possibility for indirect effects on aquatic zooplankton, fish and the aquatic community and habitat itself. The concern for indirect effects of atrazine on aquatic communities is the subsequent changes in structure and functional changes in the aquatic habitat that will in essence, affect the availability of food resources for invertebrates and fish species.

Ecological effects from exposure to atrazine in Hoover Reservoir were evaluated based on recently published and adopted by EPA toxicological aquatic habitat levels of concerns.

Regression Analysis

Average Annual Atrazine Concentrations

Similar to the drinking water regression assessment, best-fit regressions between total critical period precipitation and average annual atrazine concentrations for the three sampling periods were compared to EPA aquatic habitat levels of concern endpoint thresholds (Figure 25). According to EPA (EPA, 2002b):

> *Potential adverse effects on sensitive aquatic plants and other non-target aquatic organisms as well as other populations and their communities, are likely to be greatest where atrazine concentrations in water equal or exceed approximately 10 to 20 µg/l on a recurrent basis or over a prolonged period of time.*

Average annual atrazine concentrations did not exceed the EPA ecological toxicity threshold during any of the three atrazine sampling periods (Figure 25). The highest average annual atrazine concentration was 5.9 µg/l in 1990.

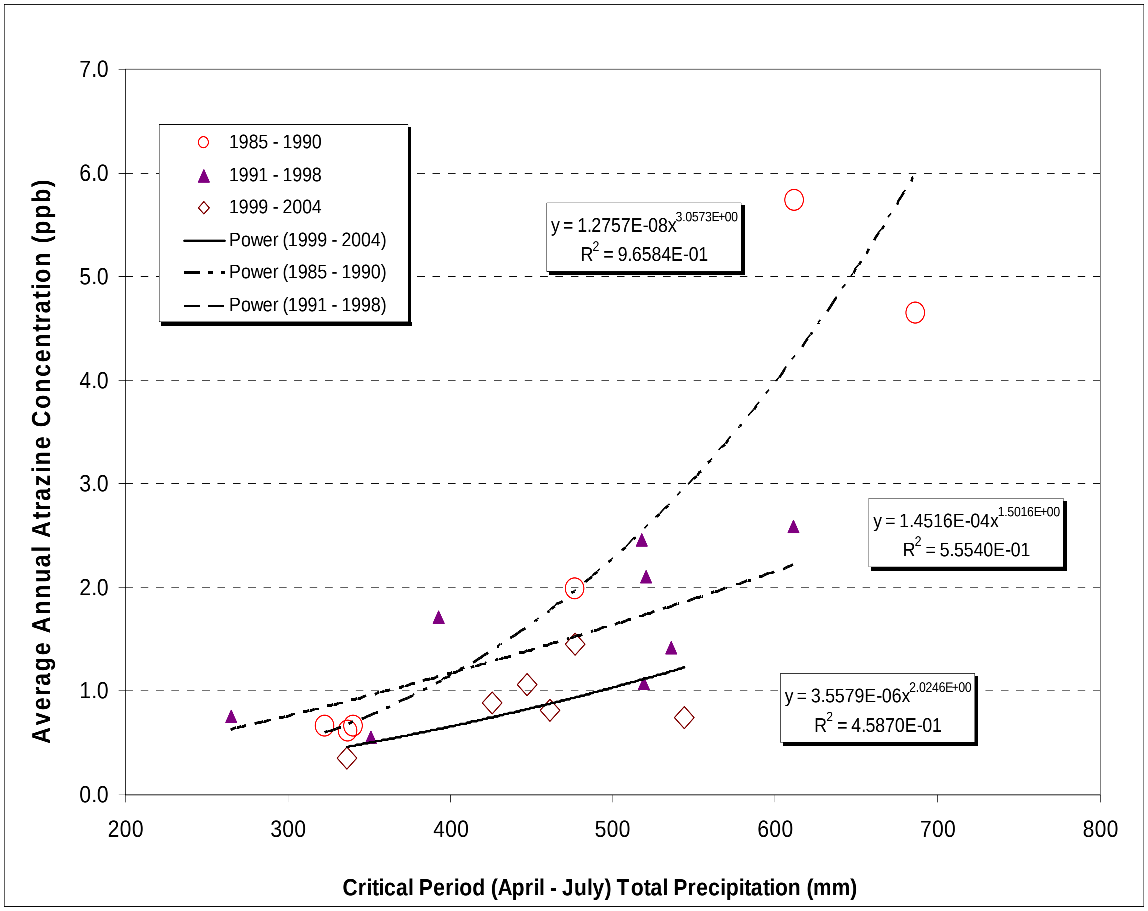

Figure 25: Best-fit regression analysis reveals that ecological exposure to atrazine in Hoover Reservoir did not exceed EPA's aquatic habitat level of concern of 10 to 20 µg/l during the water quality monitoring period 1985 to 2004.

Using regression equations developed for each of the sampling periods to estimate historical average annual atrazine levels in Hoover Reservoir indicate that none of the historical 50-years would have expected to have exceeded the aquatic habitat levels of concern (Figure 26).

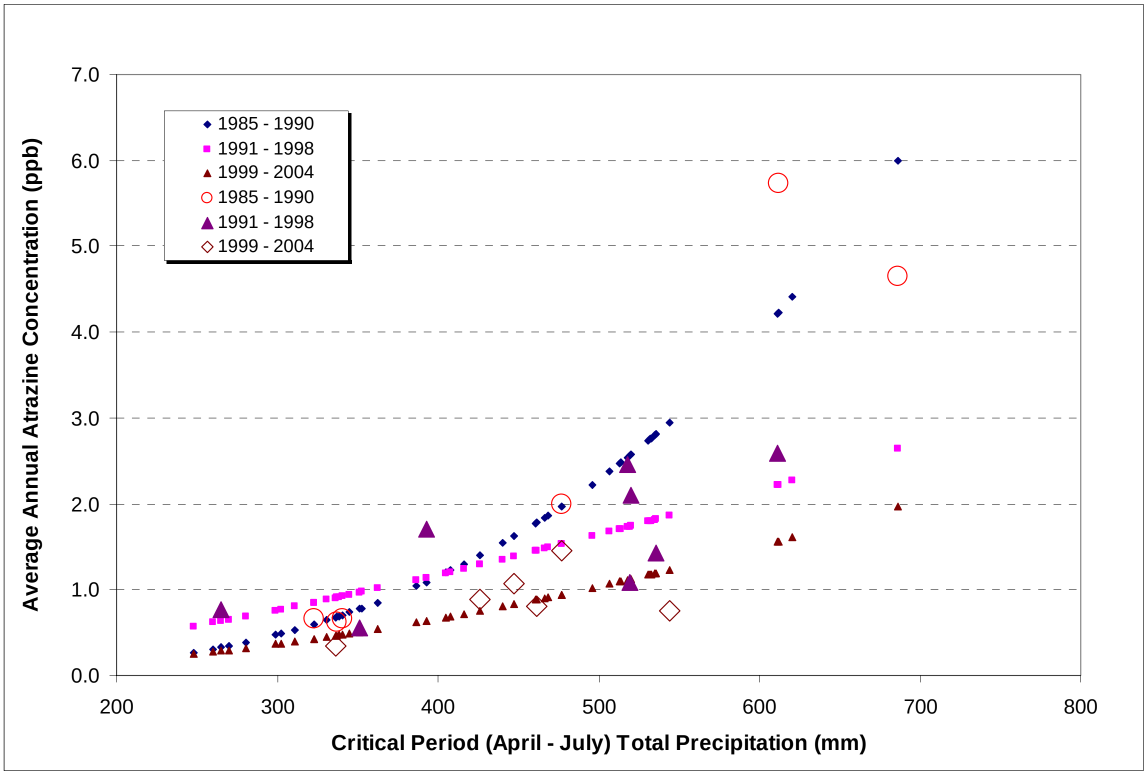

Figure 26: Best-fit regression analysis reveals that the historical 50-year ecological exposure to atrazine in Hoover Reservoir likely did not and would not exceed EPA's aquatic habitat level of concern of 10 to 20 µg/l.

Risk Assessment

Based on twenty-years of water quality monitoring and regression modeling, Hoover Reservoir has low to no risk of exceeding the aquatic habitat level of concern at 10 to 20 µg/l. However, the refined ecological risk assessment proposed by EPA in 2002 does suggest Hoover Reservoir is at risk to exceed ecological levels of concern for aquatic species, especially the non-vascular phytoplankton plants.

Cumulative exceedence curves for monthly atrazine concentration data were plotted for each of the three water quality sampling periods.

For the water quality sampling period 1985 through 1990, prior to implementation of label-use restrictions, monthly atrazine concentrations exceeded the level of concern for aquatic invertebrates where populations were “likely” to be reduced 1.5% of the time. Non-vascular plants such as phytoplankton however, were more often exposed to levels where reductions in primary production were estimated to occur 30% of the time with concentrations exceeding 2.62 µg/l.

Between 1991 and 1998, the highest concentration in Hoover Reservoir was 6.52. During this period, aquatic invertebrates were not exposed to levels to cause population reductions. Non-vascular plants were exposed to levels of concern 20% of time.

For the period 1999 through 2004, atrazine was detected at levels greater than 2.3 µg/l 8.5% of time that are "estimated" to reduce aquatic primary producers. The highest concentration detected was 4.81 µg/l in 2000.

It is likely that the label-use restrictions adopted in 1990 reduced the risk of atrazine exposure to both non-vascular and invertebrate species in Hoover Reservoir. Coupled with the USDA conservation program in 1999 further reduced the risk of exposure duration and magnitude to levels that should protect the non-vascular phytoplankton species in the reservoir.

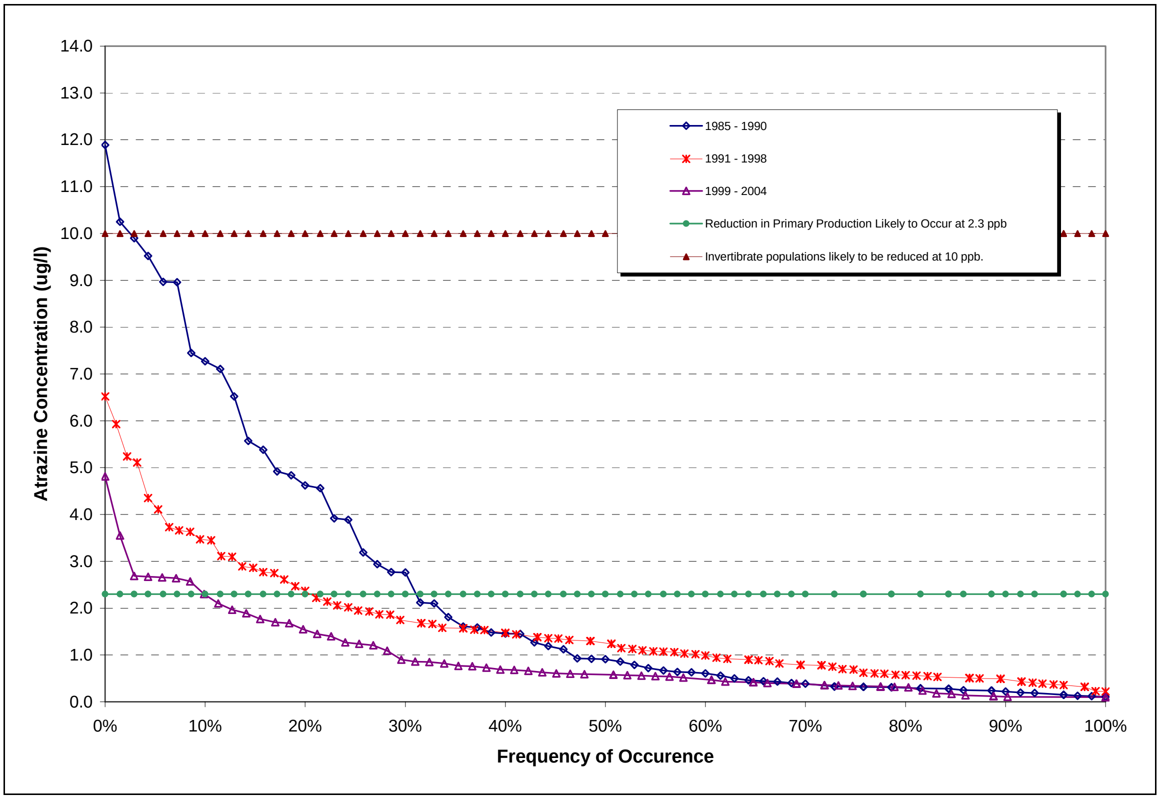

Figure 27: Frequency of occurrence of exceeding monthly atrazine ecological indices in Hoover Reservoir for the three discrete sampling periods.

Conclusions

The initial motivation for implementation of the federal USDA Environmental Quality Incentives Program (EQIP) was attributed to measured elevated levels of the agricultural herbicide atrazine in public water supply for a large metropolitan community - Columbus, Ohio.

The identification and review of atrazine's regulatory history revealed significant label-use changes occurred during the period of water quality sampling in Hoover Reservoir. The sampling periods were identified and include:

- Sampling Period 1: 1985 to 1990 is the period prior to label-use restrictions affecting application rates and methods;
- Sampling Period 2: 1991 to 1998 is the period when significant label-use restrictions were implemented to protect ground and surface waters but, prior to implementation of the federal USDA watershed-wide EQIP program.
- Sampling Period 3: 1999 through 2004 is the period when both label-use restrictions and the watershed-wide EQIP program to manage atrazine were implemented in the Upper Big Walnut Creek watershed.

The occurrence of atrazine in Hoover Reservoir typically occurs after application during the "spring flush" and steadily decline during the subsequent seven months – for each sampling period. Moreover, atrazine concentrations do not significantly increase each year during the spring runoff period. These data indicate the source of atrazine loading to Hoover Reservoir is from nonpoint source pollution runoff.

The magnitude of average monthly concentration during the spring runoff period and following summer months however, decreased for each successive sampling period.

Before 1990, average monthly atrazine concentrations were greater than 3 ppb during the spring and summer month and autumn months. The highest detected atrazine concentration was 18.89 in June, 1990. Since 1991, average monthly atrazine concentrations have not exceeded 3 ppb for either sampling periods.

Average annual atrazine concentrations exceeded 3 ppb in 1989 and 1990, prior to EPA promulgation of the drinking water standard maximum contaminant level (MCL) in 1991. Since 1990, average annual concentrations have not exceeded the atrazine MCL in Hoover Reservoir.

Regression equations between total critical season "spring flush" precipitation and average annual atrazine concentrations in Hoover Reservoir were developed for the three sampling periods. Higher rainfall levels during the critical season were correlated well with higher levels of average annual atrazine concentrations. Regression equations for each sampling period revealed that, with higher total precipitation during the spring critical season, atrazine levels during sampling period 2 and 3 were significantly lower than sampling period 1. The highest 50-year recorded total rainfall during the spring critical season would not result in atrazine levels above the MCL during implementation of either label-use restrictions or the EQIP conservation program.

Risk analysis of 50-years of climate data indicates that average annual concentrations in Hoover Reservoir would have exceeded 3 ppb 10% of time for sampling period 1. Risk analysis of sampling periods 2 and 3, however, indicate that average annual atrazine concentrations would not exceed the drinking water MCL. The year 2004 was estimated to have exceeded, although very slightly, the atrazine drinking water MCL. Therefore, it appears that both the label-use restrictions and Environmental Quality Incentives Program may have prevented atrazine levels in Hoover Reservoir from exceeding the drinking water standard. However, regression analysis also suggests that the label-use restriction alone may have been enough to temper atrazine levels to below the MCL.

Total chloro-triazine (TCT) in drinking water supplies were also assessed using regression and risk analysis. At the EPA recommended level of concern for TCAT at an 18 µg/l average annual concentration, TCT in Hoover Reservoir is not problematic for any of the three sampling periods.

Results of the ecological risk analysis of Hoover Reservoir reveal that before 1990 and based on monthly measured samples, atrazine levels exceeded EPA’s aquatic habitat level of concern of 10 µg/l for aquatic invertebrate populations 1.5% of time. Moreover, non-vascular species such as phytoplankton were exposed to atrazine concentrations greater than 2.3 µg/l 30% of time. EPA estimates reductions in the primary producer populations at concentrations greater than 2.3 µg/l in lentic systems such as Hoover Reservoir. Adoption of label-use restrictions and the implementation of conservation measures in 1999 did reduce the risk of atrazine exposure to both aquatic invertebrate and non-vascular species. For the sampling period 3, monthly atrazine concentrations were detected at levels greater than 2.3 µg/l 8.5% of time.

It appears that the atrazine label-use restrictions adopted by the product registrants in 1990, and agreed to by EPA, and the implementation of the watershed-wide Environmental Quality Incentives Program (EQIP) in 1999 have reduced the occurrence and magnitude of atrazine in Hoover Reservoir.

From a human health drinking water perspective, it appears the label-use restrictions were enough to reduce the risk of atrazine from exceeding drinking water MCL standards. The EQIP program provided additional assurance from potentially exceeding MCL standards in Hoover Reservoir.

Ecologically, the EQIP program does appear to have reduced the risk of occurrence and magnitude on non-vascular phytoplankton species in Hoover Reservoir.

References

Baker, D.B., K.A. Krieger, R.P. Richards, and J.W. Kramer. *Effects of Intensive Agricultural Land Use on Regional Water Quality in Northwestern Ohio.* In Perspectives on Nonpoint Source Pollution 1985, pp. 201-207.

Battaglin, W.A., E.M. Thurman, S.J. Kalkhoff, and S.D. Porter, 2003. *Herbicides and Transformation Products in Surface Waters of the Midwestern United States*. Journal of the American Water Resources Association (JAWRA) 39(4):743-756.

Brown, L. 1994. *Water Resource of Delaware County*. Ohio State University Extension. Columbus, Ohio.

Capel, P.D, and S.J. Larson, 2001. *Effect of Scale on the Behavior of Atrazine in Surface Waters*. Environmental Science & Technology 35: 648-657.

Clark, G.M., Goolsby, D.A., and Battaglin, W.A., 1999. *Seasonal and annual load of herbicides from the Mississippi River Basin to the Gulf of Mexico*. Environmental Science & Technology, v. 33, no. 7, p. 981-986.

EPA, 1995. *Watershed Protection: A Project Focus*. EPA-841-R-95-003. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA, 1997. *Techniques for Tracking, Evaluating, and Reporting the Implementation of Nonpoint Source Control Measures: Agriculture.* EPA-841-B-97-010. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

EPA. 2001. *Drinking Water Exposure Assessment for Atrazine and Various Chloro-triazine and Hydroxy-triazine degredates.* US Environmental Protection Agency, Office of Pesticide Programs, Environmental Fate and Effects Division (EFED). Washington, D.C.

EPA. 2002a. *Revised Human Health Risk Assessment: Atrazine.* US Environmental Protection Agency, Office of Pesticide Programs, Health Effects Division. Washington, DC.

EPA. 2002b. *Reregistration Eligibility Science Chapter for Atrazine: Environmental Fate and Effects Chapter.* US Environmental Protection Agency, Office of Pesticide Programs, Environmental Fate & Effects Division. Washington, DC.

EPA, 2003a. *Interim Reregistration Eligibility Decision for Atrazine: Case No. 0062.* U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Washington, DC.

US EPA, 2003b. *National Management Measures to Control Nonpoint Source Pollution from Agriculture.* EPA 841-B-03-004. US Environmental Protection Agency, Office of Water, Washington, DC.

Graziano, N., M McGuire, C. Adams, A. Roberson, H. Jiang, and N. Blute, 2006. *Using the ELISA method to track atrazine occurrence in a national monitoring program*. Journal of American Water Works Association 98:10 111-123 (October 2006).

Loux, M.M.; J.M. Stachler; W.G. Johnson; G.R.W.Nice; and T.T. Bauman, 2005. *Weed Control Guide for Ohio and Indiana*. Ohio State University Extension and Purdue University Cooperative Extension Service.

Malcolm Pirnie, 2003. *Quality Assurance Project Plan (QAPP).* Malcolm Pirnie, Inc. Columbus, OH.

Richards, R.P., and D.B. Baker. *Pesticide Concentration Patterns in Agricultural Drainage Networks in the Lake Erie Basin.* Environmental Toxicology and Chemistry, Vol. 12, pp. 13-26, 1993.

Thurman, E.M., D.A. Goolsby, M.T. Meyer, and D.W. Kolpin. *Herbicides in Surface Waters of the Midwestern United State: The Effect of Spring Flush.* Environmental Science & Technology, October 1991, pp. 1794-1796.

USGS, 2006. *The Quality of Our Nation's Waters: Pesticides in the Nation's Streams and Ground Water, 1992-2001*. Circular 1291. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.

Williams, W.M. and Miller, D. 1991. *Investigation of Atrazine in Hoover Reservoir. Columbus, Ohio*. Blasland & Bouck Engineers, P.C. Leesburg, VA.

ATTACHMENT D

NAPRA Model
TAC Meeting Minutes

A Methodology for Evaluating the Effectiveness of Watershed-Scale Non-Point Source Pollution Abatement Programs

Technical Advisory Committee
Meeting #3
NAPRA/ GLEAMS Review

Office of
Malcolm Pirnie, Inc.
Columbus, Ohio

May 23, 2006
10:00 am – 2:00 pm

AGENDA

10:00 Introductions

Overview of project objectives

Water Quality Analysis Findings

NAPRA/GLEAMS Modeling Overview
- Application
- Structure
- Data processing
- Example model output format

Model Parameterization

12:00 Lunch (Provided)

Model Output Analysis

2:00 End

A Methodology for Evaluating the Effectiveness of Watershed-Scale Non-Point Source Pollution Abatement Programs

Technical Advisory Committee
Meeting #3
NAPRA Model Review

Office of
Malcolm Pirnie, Inc.
Columbus, Ohio

May 23, 2006
10:00 am – 2:00 pm

Meeting Minutes

Attendees

Dr. Norm Fausey, USDA Agricultural Research Service
Dr. Kevin King, USDA Agricultural Research Service
Eric Hesketh, USDA NRCS National Water Climate Center, via conference call
Dr. Joel Allen, US EPA Office of Research and Development
Jill, Neal, US EPA Office of Research and Development
John Turk, Malcolm Pirnie
Rick Shamblen, Malcolm Pirnie

Representatives from USDA-ARS and NRCS, US EPA and Malcolm Pirnie met at the offices of the Malcolm Pirnie in Columbus, Ohio. The purpose of this third TAC meeting was to review the application and development of the NAPRA model and the parameters used to compile the model.

Dr. Mark Loux, Ohio State University Extension, Herbicide Specialist, provided comments prior to the TAC meeting and are documented in the Revised Parameterization Report.
Tom Edwards, USDA-NRCS District Conservationist, provided comments that concurred with recommendations by Dr. Fausey, during a later meeting at the Delaware County NRCS offices on June 8, 2006.

Background

The technical development and review of the NAPRA model has been an ongoing process with this project. Eric Hesketh of the USDA NRCS National Water Climate Center in Amherst, MA has provided significant technical assistance to fully implement the NAPRA model. He has provided the model, training, technology updates, and data processing for soils and climate data. However, locally defined agronomic and cultural practices are best defined by local experts of various areas of expertise. Malcolm Pirnie has been in contact with these experts to establish and initially parameterize the model. The purpose of this meeting was for TAC members review the draft model output data and preliminary analysis with the initial parameters selected. Malcolm Pirnie presented the context of how the model was applied such that members could better determine which parameters should be further investigated and changed for re-processing in the model.

Technical Review

Details of model parameters that were recommended for changes are presented in the attached revised parameterization report.

A sensitivity analysis was recommended by the TAC members for a few model parameters and is presented in the attached “Draft protocol for the NAPRA model sensitivity analysis”.

1.0 INTRODUCTION

1.1 Background

Hoover Reservoir is Central Ohio's largest source of drinking water and provides water to more than 500,000 people. The Upper Big Walnut Creek Watershed encompasses nearly 122,000 acres with an estimated 61,000 agricultural cropland acres (50%) and drain into Hoover Reservoir. The City of Columbus' watershed water quality monitoring program has detected elevated levels of the agricultural herbicide atrazine. Columbus uses powdered activated carbon (PAC) treatment technology to maintain herbicide levels within the federally mandated Safe Drinking Water Act (SDWA) standards. Complementing treatment technology, the City and the agricultural community have formed a collaborative partnership with the goal of reducing nonpoint source pollution runoff.

Since 1999, the USDA's Environmental Quality Incentives Program (EQIP) has provided more than $1 million for the implementation of best management practices (BMPs) in the watershed. Questions remain about the program's overall effectiveness at reducing atrazine levels in Hoover Reservoir. The goal of this project is to develop a methodology to evaluate and optimize the effectiveness of nonpoint source pollution abatement programs.

1.2 Project Objectives

To help accomplish the project goal, USDA's National Agricultural Pesticide Risk Analysis (NAPRA) was selected to assess environmental benefits from changes in pesticide and crop management practices funded by the EQIP program in the Upper Big Walnut Creek watershed. NAPRA was used to complete the following project objectives:

1) Simulate atrazine loads at watershed and field-scales during pre-EQIP conditions and without EQIP conditions, respectively.
2) Assess the risk for atrazine runoff at the watershed and field-scales under pre-EQIP and without EQIP conditions, respectively.
3) Simulate changes in atrazine loads at watershed and field-scales as a result of BMPs adopted during EQIP the implementation period.
4) Assess changes in risk for atrazine runoff at watershed and field-scale during the EQIP implementation period.
5) Examine relationships between simulated atrazine loss under EQIP conditions and the Hoover Reservoir mass flux empirical model.
6) Develop relationships between changes in risk for atrazine runoff and measured changes in atrazine concentrations in Hoover Reservoir.
7) Simulate reduction in atrazine loss at the field-scale and watershed-scale on the basis of identified optimal BMPs.

This document summarizes the project modeling process, how NAPRA was used to model an array of BMPs, types and sources of data used in the model, and model parameter assumptions.

2.0 MODELING APPROACH

USDA-NRCS National Water and Climate Center (NWCC) developed the National Agricultural Pesticide Risk Analysis (NAPRA) process to quantitatively evaluate and compare field-scale environmental risks associated with pesticide, crop and tillage practice management scenarios. NAPRA uses the GLEAMS model, developed by USDA Agricultural Research Service (ARS), to simulate loadings of water, sediment, pesticides, and plant nutrients to the edge-of-field and bottom-of-root-zone for complex climate-soil-management interactions (Knisel, Leonard, and Davis, 1994).

A three-tiered modeling approach was developed for this project. Modeling each soil group independently, as delineated by the USDA soil survey geographic (SSURGO) data, provide the first-tier model output data. Using GIS technology, results of Tier-one soil group modeling were then up-scaled into farm field-scale (Tier-two) and watershed-scale (Tier-three) levels. In summary:

- Tier 1: Soils Level
- Tier 2: Field-Scale
- Tier 3: Watershed-Scale

Twenty-seven best management practice (BMP) scenarios were modeled for five discrete spring application dates using fifty-years of locally measured daily climatological data for the forty-four soil groups. For each model scenario, NAPRA generates both annual and 4-day maximum water volume, pesticide mass and concentration movement to the edge of field and bottom of root zone for three loss pathways: soluble surface loss (SSL), adsorbed surface loss (ASL), and soluble leaching loss (SSL).

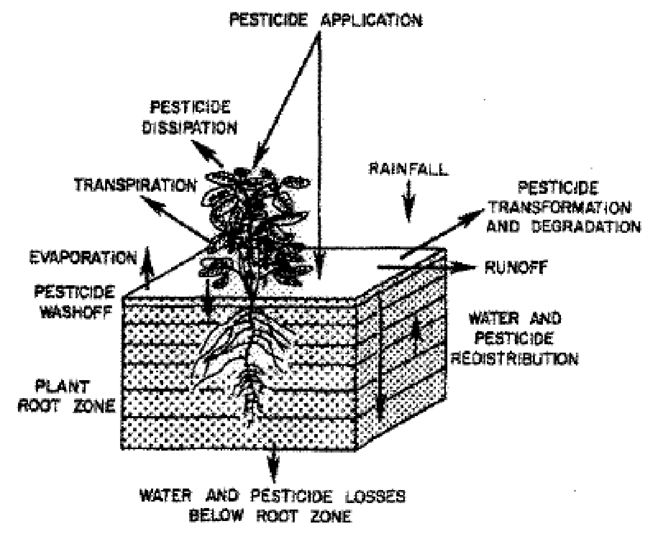

Fig. 1—The physical system and processes represented in GLEAMS.

More than 3.2 million Tier-one type model output data were generated. Resultant modeled data were integrated into subsequent tiers using GIS technology. Geospatial farm field boundaries underlain with SSURGO soil boundary data provide the framework for Tier-two field-scale analysis. Intersecting hydrologic unit area watershed boundaries with SSURGO and crop field boundaries provide the framework for Tier-three level analyses. Data management, spatial integration and analysis tools were created to manage NAPRA model output data in the post-processing section.

3.0 MODELING PROCESS

A five-step modeling process was followed and is briefly described below.

3.1 Data Acquisition

Existing and publicly accessible environmental data sets were acquired for the modeling process of this project. These data are more fully discussed in Section 5.0. An US EPA approved Quality Assurance Project Plan (QAPP) that summarizes the data types, sources and quality was previously developed and is available upon request (Malcolm Pirnie, 2003).

3.2 Pre-processing

NAPRA requires all model input data to be formatted in pre-defined *.dbf files Borland® software Visual dBase® 5.5 was purchased to edit and manage database files. Model parameters selected for this project are modeled in Section 6.0.

3.3 Scenario Modeling

NAPRA was used to evaluate the effect of atrazine runoff from a range of crop rotations, tillage methods, and pesticide application methods common to the project watershed. Twenty-seven best management practice (BMP) scenarios were modeled for five discrete spring atrazine application periods using fifty-years of locally measured daily climatological data. Thus, a total of 135 BMP scenario combinations were modeled for each of the forty-four soil groups.

3.4 Post-processing

MS® Excel® and ESRI® ArcGIS® software were used to manage the vast amount of data generated from the Tier 1 soil group level model simulations. MS® Excel® spreadsheets embedded with Visual Basic® macro programs were developed by Malcolm Pirnie for data management, analysis and integration with GIS software. GIS technology enable up-scaling of model results to Tiers 2 and 3.

3.5 Analysis of Results

Preliminary model results will be presented at the technical advisory committee meeting.

4.0 MODEL STRUCTURE

The NAPRA Process is summarized in Figure 1. The figure depicts the general relationships among the soils data and user-defined NAPRA database population system (NPLDPS) files with the GLEAMS model, and subsequent output data. Local land management scenarios, erosion factors, and climatological conditions are defined in the NPLDPS. NAPRA Client-Specific Reports were not produced for this project. Model output data located in the Pesticide Loss Probability Curve Generator file were used to up-scale to Tiers 2 and 3.

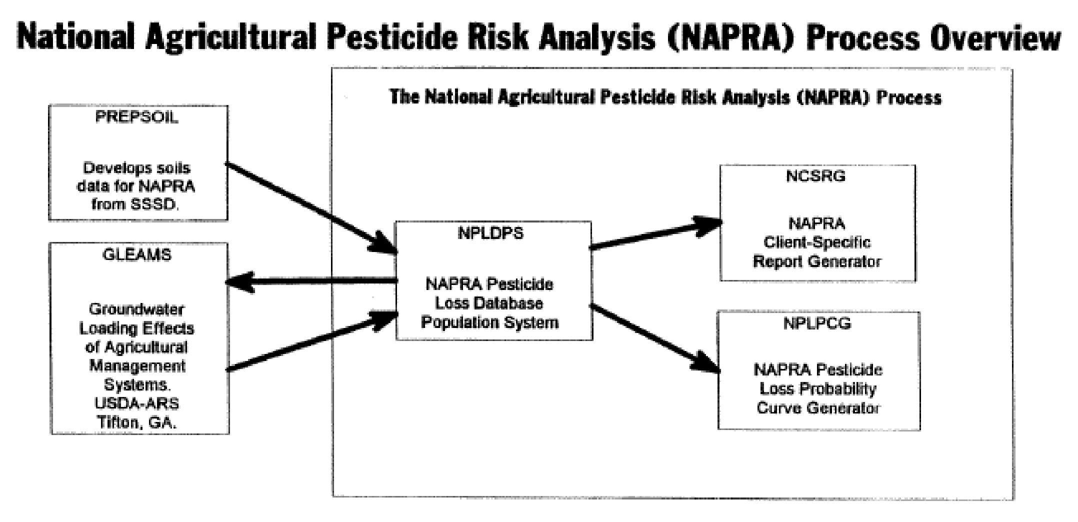

Figure 1: Overview of the NAPRA process.

Figure 2 depicts the five types of user-defined database files (left-hand column) used in the NAPRA Pesticide Loss Data Population System (NPLDPS). The corresponding section of this report is provided for each of the input data sets. Also presented is a list of the 11 sets of model output data generated from the GLEAMS model and NAPRA process. See also Table 21, Loss Types.

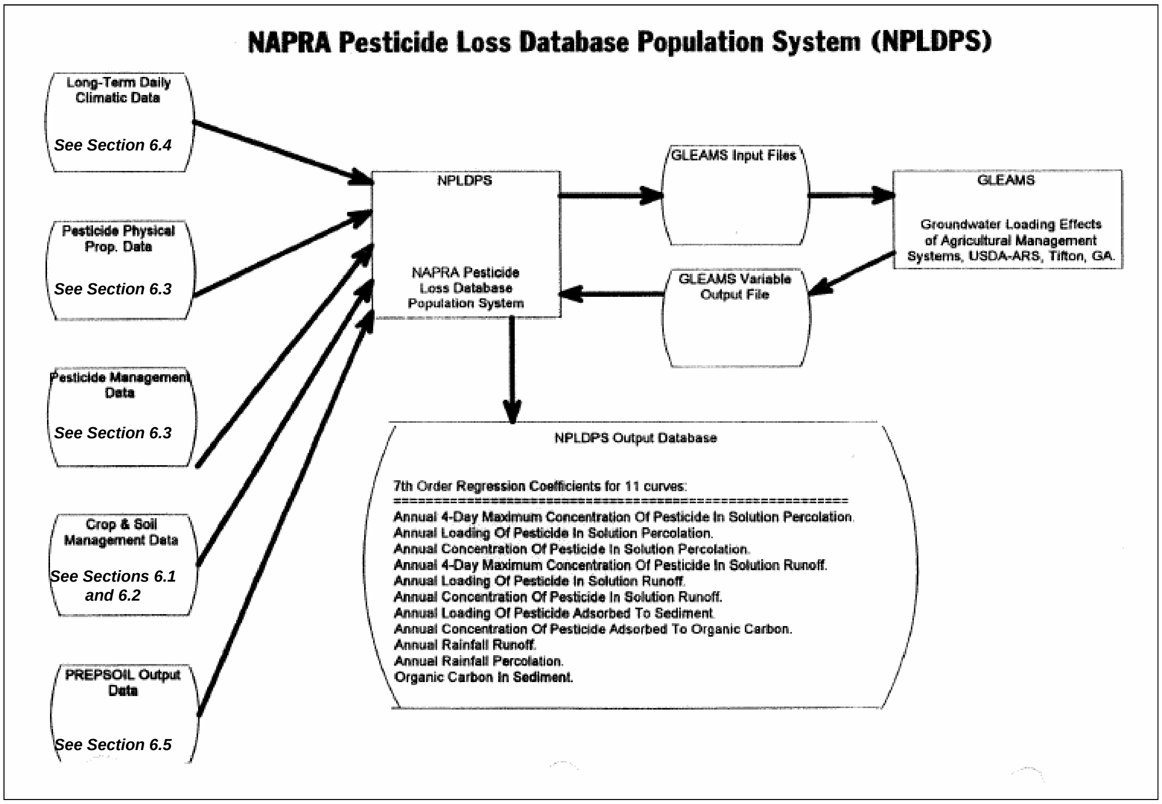

Figure 2: Overview of the NAPRA database and modeling processes.

5.0 DATA TYPES AND SOURCES

Data types and their sources used to populate the NAPRA input parameters are briefly discussed below. A project Quality Assurance Project Plan (QAPP) was published to more fully describe data types, sources, and quality (Malcolm Pirnie, 2003). A copy of the QAPP will be available at the upcoming TAC meeting and is available upon request.

5.1 Geospatial Data

Geospatial data were used to identify and define the domain for modeling soil groups, crop fields and watersheds. ESRI GIS software was used to manage, edit, and compile the geospatial digital data sets. Geospatial data were obtained from local, state and federal sources. USDA NRCS Geospatial Gateway was the primary source of data unless higher resolution locally developed data were available. The web-site address is http://datagateway.nrcs.usda.gov/

5.1.1 14-Digit Hydrologic Unit Data

Geospatial 11 and 14-digit hydrologic unit data for hydrologic unit code (HUC) number 0506001-130 was used to define the Tier-3 watershed-scale assessment. Hydrologic unit data was obtained via the internet from the Ohio USDA Natural Resources Conservation Service (NRCS). The web-site address is http://www.oh.nrcs.usda.gov/

5.1.2 Aerial Orthophoto Image Data

The Delaware (Ohio) Soil and Water Conservation District (SWCD) provided aerial orthophoto imagery used to define Tier-2 field-scale boundaries. The SWCD has created an orthophoto image mosaic of the project watershed area that was comprised of orthophotos from the Delaware County Auditor's Office and Ohio Department of Administrative Services (ODAS).

5.1.3 SSURGO Data

USDA NRCS soil survey geographic (SSURGO) data is a county-level 1:24,000 scale geospatial data set used to identify and define soils used in Tier-1 level modeling. SSURGO data was obtained from the USDA NRCS Geospatial Data Gateway for the following Ohio counties:

- Delaware County;
- Franklin County;
- Knox County;
- Licking County; and,
- Morrow County.

5.1.4 Crop Field Boundary Data

Agricultural crop field boundary data were obtained from the Delaware SWCD office. In 2002, the Delaware SWCD and the USDA Agricultural Research Service (ARS) at The Ohio State University used GIS technology to digitize all agricultural crop fields in the project watershed. Staff of the Delaware SWCD operate and maintain the geospatial digital agricultural crop fields of the project watershed. Note: see Section 5.1.5 Common Land Use Data.

5.1.5 Common Land Use Data

USDA Farm Service Agency (FSA) initiated development and has made publicly accessible the national common land use (CLU) geospatial data sets. CLU is the smallest land unit with a permanent contiguous boundary and land cover; in other words, a field (USDA-FSA, 2005). Currently, CLU data is publicly available at the USDA NRCS Geospatial Data Gateway for four of five counties in the watershed. Although this data set is preferable for a national methodology perspective, the locally digitized crop field boundary data (see Section 5.1.4) were used for this project for the following reasons:

- CLU data was not available for entire watershed;
- USDA-FSA denied a request for historical land use/ management data for all CLU crop field units in the project watershed; and,
- Field-scale land management data enrolled in the EQIP program were provided by the Delaware SWCD and is discussed in Section 5.2.

5.2 EQIP Program Crop Field Land Use/ Management Data

Land management data of those fields enrolled in the Environmental Quality Incentives Program (EQIP) was obtained from the SWCD field office. Staff of the Delaware SWCD maintains the EQIP crop field attribute database file. For the period 1999 through 2003, this file contains the annual type of crop planted, tillage practice used, herbicide application techniques, and other conservation practices adopted by the producer. The data is derived directly from the Delaware NRCS conservation plans.

5.3 Crop Practice Event Date Data

The Ohio weekly average percent crop planted, crop maturation and crop-harvest dates were obtained from the US Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS), and Ohio Department of Agriculture (ODA), Agricultural Statistics Service's Weekly Crop Progress reports. The USDA NASS and ODA manage and distribute Ohio weekly average agricultural crop development status reports. Weekly cumulative percent corn planted was used as a surrogate to estimate when atrazine was applied. Figure 3 depicts the spring season period when atrazine is applied in the project watershed.

5.4 Climate Data

Daily climatological data measured at the Centerburg, Ohio (Lat. 40 deg. 17 min.; Long. 82 deg. 39 min.) rain gauge station for the period 1953 to 2003 was obtained from the Midwestern Regional Climate Center (MRCC) at the University of Illinois, Champaign. MRCC is a cooperative program of the Illinois State Water Survey and the National Climatic Data Center (National Oceanic and Atmospheric Administration, US Department of Commerce), Regional Climate Centers, and State Climate Offices.

6.0 MODEL PARAMETERS

NAPRA requires twenty-eight (28) database type files that are summarized in Table 1-A and more fully discussed below. Unless otherwise noted, it was assumed that the GLEAMS default values were acceptable. Figure 4 depicts the relationships among the model parameter files, program executables and model output data. References are cited, will be provided at the TAC meeting, and available upon request.

6.1 Crop & Tillage Data

Model parameters in this section characterize crop type, planting dates, soil management, and crop tillage relationships. This information is used to select pre-calculated runoff curve number ratios.

6.1.1 Crop Codes - GLMSCROP.dbf

The Crop Codes database file (see Table 1) contains characteristics for 78 common crops. Crop Code (20) represents corn for grain and was selected because atrazine is applied only to corn in the project watershed. Note: C1 and C2 are coefficient and exponent values, respectively, and used to calculate optimum (demand) nitrogen content of the crop. GLEAMS model default parameters provided were used and include:

- Potential yield: 9,400 kg/ha (150 bu/acre)
- Dry matter ratio: 2.5
- C/N ratio: 80
- Ratio N/P: 5.9
- C1: 1.30
- C2: -0.264
- Crop height: 2.0 meters (6.6 feet)
- Root Depth: 61 cm (24 inches)

Reference:

Knisel, W.G. and Davis, F.M. 2000. *GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual*. Pages 146 – 154 and Table N-2: Crop characteristics in GLEAMS database, page 157.

6.1.1.1 Recommended Changes

- None. Eric Hesketh commented that none of these parameters are significantly sensitive in the GLEAMS model.

6.1.2 Crop Practice Dates – CROPDATE.dbf

The Crop Practice Dates database is a user defined file that contains crop planting, maturation and truncation dates (Table 2). Five separate crop practice event date sets were defined because of the annual variability when corn is planted. Figure 3 depicts the range of corn planting dates typical of the project watershed for the period 1987 through 2003. Subsequent maturation (killing frost) and harvest dates were estimated from data in the Ohio Department of Agriculture's weekly crop progress reports and USDA Soil Survey's of the county's in the project watershed.

	Planting	Maturation	Harvest
Event Date Set 1:	April 20	October 15	November 15
Event Date Set 2:	April 30	October 15	November 15
Event Date Set 3:	May 10	October 15	November 15
Event Date Set 4:	May 20	October 15	November 15
Event Date Set 5:	May 30	October 15	November 15

References:

OSU Extension. 1995. *Ohio Agronomy Guide, 13th Addition. Corn Production Bulletin 472*. Table 9-4: A timeline for corn growth and development. The Ohio State University Extension. Columbus, OH.

Ohio Department of Agriculture. 2003. *Ohio Weekly Crop Progress Reports*. Columbus, OH.

USDA. 2001. *Soil Survey of Delaware County, Ohio*. Table 2: Freeze Dates in Spring and Fall, page 147. Natural Resources Conservation Service, USDA.

6.1.2.1 Recommended Changes

- None.

6.1.3 Crop Practices - CROPPRAC.dbf

The Crop Practices database file couples data defined in the Crop Code, Runoff Curve Number Crop Category, and Leaf Area Index databases to estimate runoff and leaching coefficients (see Table 3). The crop rooting depth is defined in this file.

- Root Depth: 24 inches
- Perennial crop: False

References:

Hahn, T. Ellen. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 21.

USDA. 2001. *Soil Survey of Delaware County, Ohio. 2001*. Natural Resources Conservation Service, USDA. Soil Series and Their Morphology, pages 97 – 125.

6.1.3.1 Recommended Changes

- None.

6.1.4 Crop Tillage Relationships – DATEFACT.dbf

The DATEFACT.dbf file represents forty-five (45) date factor ID's comprised of nine (9) crop tillage and rotation scenario combinations for the five (5) defined event dates sets. The file links CROPDATE, CROPPRAC, SOIL-MAN, CDATE, SLR, PFACT, and SFACT database files with the soil group defined soil hydrologic condition, e.g. Good, Fair, or Poor.

A hydrologic condition of "poor" was selected for all forty-four soil groups to reflect soil compaction conditions.

References:

Hahn, T. Ellen. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 21.

6.1.4.1 Recommended Changes

- Norm Fausey suggested that the watershed soils were becoming less compacted over time and we should use "good" condition for all soils.

6.1.5 Leaf Area Indexes – LEAFAREA.dbf

The leaf area index corresponds to the amount of foliage present at each erosion factor date defined in the CDATE.dbf file (See Section 6.2.1). Input to the LEAFAREA.dbf file in only necessary when no GLEAMS Crop Codes 1 through 78 are available. The default leaf area index of **(-9)** was used and presented in Table 5.

References:

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 22.

Knisel, W.G. and Davis, F.M. 2000. *GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual.* Table H-7: Idealized leaf area index data for representative crops, Page 60.

6.1.5.1 Recommended Changes

- None.

6.1.6 Runoff Curve Number Crop Categories – RCNCRCAT.dbf

RCNCRCAT.dbf is a read-only file that contains ID numbers that define type of crop used in the CROPPRAC file. An RCN crop category code of **22** was used to represent row crop production (Table 6).

References:

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 22.

Knisel, W.G. and Davis, F.M. 2000. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual. Table H-4, page 47.

6.1.6.1 Recommended Changes

- None

6.1.7 Runoff Curve Number Ratio Table – RCN_RAT.dbf

RCN_RAT.dbf is a read-only file that contains runoff curve number ratios for an array of soil hydrologic groups, hydrologic conditions, soil management ID numbers and runoff curve number categories (Table 7). This information is linked to the model by the various ID numbers included in the database and is used in the hydrologic calculations within GLEAMS.

References:

Hahn, T.E. 1998. National Agricultural Pesticide Risk Analysis User Manual. USDA. Amherst, MA. Page 23.

Knisel, W.G. and Davis, F.M. 2000. *GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual*. Table H-4: Runoff curve numbers for hydrologic soil-cover complexes for antecedent moisture condition II (CN2), Page 47.

6.1.7.1 Recommended Changes

- None

6.1.8 Soil Management – SOILMAN.dbf

SOILMAN.dbf is a read-only file with soil management ID numbers corresponding to direction of tillage and amount of remaining residue (See Table 8).

A soil management code of **4** was used to represent straight row crop production for conventional (chisel) tillage scenarios. A soil management code of **5** was used to represent straight row crop production with residue cover for conservation tillage and no-till scenarios.

References:

Edwards, Tom. E-mail communications, November 6, 2002.

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 23.

Knisel, W.G. and Davis, F.M. 2000. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual.

6.1.8.1 Recommended Changes

- None

6.1.9 Water Management – WAT_MAN.dbf

WAT_MAN.dbf is a read-only file that defines the timing of irrigation and plant available water conditions before and after planting (Table 9). A parameter value of one (1) was used to represent that irrigation is not used for crop production in the project watershed.

References:

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 24.

Knisel, W.G. and Davis, F.M. 2000. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual.

6.1.9.1 Recommended Changes

- None

6.2 EROSION DATA

Parameters in the GLEAMS model that estimate soil erosion are based on land management events that occur during the planting and growing season. Parameters defined in this section define key event dates and soil management features used by the model to estimate soil losses.

6.2.1 Erosion Factor Dates – CDATE.dbf

The CDATE.dbf file contains up to ten erosion factor dates when significant changes occur to the soil surface structure. Key changes occur during planting, harvesting or mowing, tillage, changes in vegetative cover, freeze and thaw periods. Five separate CDATE ID numbers were created to correspond with the five Event Date Sets (See Section 6.1.2) to reflect the range of spring planting and herbicide application dates. These date sets and are presented in Table 10.

References:

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 24.

Knisel, W.G. and Davis, F.M. 2000. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual. Page 67.

6.2.1.1 Recommended Changes

- None

6.2.2 Practice Factors – PFACT.dbf

The PFACT.dbf file contains practice factors that represent the direction of tillage. Up and down slope tillage is common in the Big Walnut Creek Watershed and has a practice factor of 1 (Table 11).

References:

Edwards, Tom. Delaware County NRCS District Conservationist. E-mail communication, November 6, 2002.

Hahn, T.E., 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 25.

Wischmeier, W.H. and Smith, D.D. 1978. *Predicting Rainfall Erosion Losses: A Guide to Conservation Planning.* US Department of Agriculture, Agricultural Handbook 537. Page 40.

6.2.2.1 Recommended Changes

- None

6.2.3 Smoothness Factors - SFACT.dbf

The SFACT.dbf file contains smoothness factors that characterize resistance or lack of impedance to overland flow. The smoothness factor is related to the difference in heights between the top of the ridge to the bottom of the furrow, slope and tillage direction. A smoothness factor for each of the Erosion Factor Dates and tillage practice were estimated and are presented in Table 12.

References:

Hahn, T.E., 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA. Page 25.

Knisel, W.G. and Davis, F.M. 2000. *GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual*. Table E-3, Page 92.

6.2.3.1 Recommended Changes

- Dr. Fausey recommended that the SFACT values for each event date set need re-estimated. The current values are in the wrong columns.
- Eric Hesketh commented that these values are not too sensitive in the GLEAMS model.

6.2.4 Soil Loss Ratio - SLR.dbf

The SLR.dbf file contains soil loss ratios (formerly cover factor CFACT) for each period of time between the CDATES. The soil loss ratios indicate the potential for soil loss during each time period. SLR values used for each event date set are provided in Table 13, and assumption descriptions provided in Table 14.

References:

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 26.

Knisel, W.G. and Davis, F.M. 2000. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual. Table E-6, Pages 94 - 96.

Wischmeier, W.H. and Smith, D.D. 1978. *Predicting Rainfall Erosion Losses: A Guide to Conservation Planning.* US Department of Agriculture, Agricultural Handbook 537. Table 5: Table of soil loss from cropland, Page 22-23.

6.2.4.1 Recommended Changes

- None.

6.3 PESTICDE DATA

This section summarizes chemical attributes of atrazine and how it was applied in the watershed. Although other pesticides were used in the watershed, this project scope was limited to atrazine.

6.3.1 Active Ingredient Data - CHEMICAL.dbf

CHEMICAL.dbf is a read-only file with chemical attributes of commonly used agricultural pesticides. The chemical characteristics listed in the CHEMICAL database for atrazine (Chemical ID 27) are provided in Table 15.

- Chemical ID: 27
- CASRN: 1912-24-9
- Common Name: Atrazine
- Foliar Half-life : 5 days
- Percent Wash off: 0.450

<u>References</u>:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 27.

Knisel, W.G. and Davis, F.M. 2000. *GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual*. Table E-6, Pages 94 - 96.

6.3.1.1 Recommended Changes

- Mark Loux; None

6.3.2 Active Ingredient Data by Soil pH – SOIL_pH.dbf

SOIL_pH.dbf is a read-only file with the following chemical properties for atrazine and summarized in Table 16:

- Soil pH is defined by the soil group in Section 6.5.2
- K_{oc} is 100 ml/g
- Solubility is 33 ppm
- Soil half life is 60 days

<u>References</u>:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 27.

6.3.2.1 Recommended Changes

- Mark Loux; None

6.3.3 Application Codes – GAC_ID.dbf

GAC_ID.dbf is a read-only file that contains descriptions of the pesticide application methods. Atrazine application techniques modeled were surface application (GAC ID = 0) and soil incorporation (GAC ID = 1). See Table 17.

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA. Page 28.

6.3.3.1 Recommended Changes

- Mark Loux; None

6.3.4 Application Method – APP_METH.dbf

Three atrazine application methods common in the project watershed and funded by the EQIP program include pre-emergence (pre-plant) surface application, pre-plant soil incorporation, and post-emergence surface application. The APP_METH.dbf file defines three application methods for three tillage methods and three crop rotation scenarios. The file summarizes the following and found in Table 18:

- 27 application method scenarios;
- soil incorporation depths (cm); and,
- percent of pesticide intercepted by foliage and soil.

Soil incorporation depths were estimated at 7.5 cm (3 inches) for soil incorporation, and 1.0 cm (0.5 inches) for pre-emergence surface and pos-emergence surface applications.

The amount of foliar/residue interception versus soil application on a percentage basis. A 5% herbicide drift was assumed during surface applications, and 0% drift for soil incorporation.

6.3.4.1 Recommended Changes

- Mark Loux; change 0% drift for soil incorporation to 5% drift since atrazine is cultivated to depth after surface spray application.
- Eric Hesketh recommended changing soil incorporation depth to 5.0 cm (2 inches).

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 28.

Loux, Mark. E-mail communications. March 4, 2003

6.3.4.2 Recommended Changes

- Change 0% drift for soil incorporation to 5% drift (Mark Loux).
- Mark Loux; will review Table 18 and submit comments e-mail.

6.3.5 Application Timing Data – TIMING.dbf

The TIMING.dbf file defines five pesticide application dates which correspond with the five event date sets (at planting) for the three application methods. It was assumed that there is only one application of atrazine per year for each application method and event date set. The information contained in the TIMING.dbf is provided in Table 19.

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 29.

6.3.5.1 Recommended Changes

- Change atrazine post-application from 15 to 30 days following planting and pre-emergence application dates listed in Table 19 (Mark Loux).

6.3.6 Chemical Use Practice – CHEM_USE.dbf

The CHEM_USE.dbf file defines 135 atrazine application scenarios for three application methods, three tillage methods, three crop rotations, and 5 event date sets and is summarized in Table 20. An application rate of **1.12 kg/ha (1.0 lbs/ acre)** was modeled.

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA, Natural Resources Conservation Service. Amherst, MA. Page 29.

6.3.6.1 Recommended Changes

- None

6.3.7 Loss Types – CURVTYPE.dbf

CURVTYPE.dbf is a read-only file provided with the NAPRA program as one of the post-processing tools that describe the model loss pathways and requires no user-defined input. Table 21 provides a description of the each loss pathway and units.

6.3.7.1 Recommended Changes

- None

6.4 REGIONAL DATA

The regional data section compiles climatic data collected from local climate stations and used to estimate

6.4.1 Climate Data - Measured – CLIMATE.dbf

The CLIMATE.dbf file contains links to files with locally measured climate data from the Centerburg, Ohio rain gauge for the period 1953 through 2003 (Table 22):

- daily total precipitation (PRECIP);
- daily average temperatures (TAVG); and,
- mean monthly maximum/minimum temperatures (TMAX/TMIN).

References:

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA. Page 31.

Knisel, W.G. and Davis, F.M. 2000. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual. Page 32.

Midwestern Regional Climate Center. Precipitation and temperature data for the period 1953 through October 2003 at the Centerburg, Ohio rain gauge station. Champaign, Ill.

6.4.1.1 Recommended Changes

- Previously, the Midewestern Regional Climate Center provide locally measured climate data. Where missing data occurred, the Climate Center provided an estimate for daily rainfall and other parameters. The Climate Center has since removed the precipitation estimator and recommends users calculate daily rainfall from the average of adjacent climate stations.
- Eric Hesketh recommended obtaining daily climate data from two adjacent climate stations.

6.4.2 Climate Data – Generated – CLIGEN.dbf

The CLIGEN is a read-only database that consists of various climate gauging stations throughout the United States. A CLIGEN ID of 726, corresponds to the Fredericktown, Ohio climate station, was used to estimate the following climate daily data:

- solar radiation,
- wind movement, and,
- dew point temperature.

The Fredericktown climate station is the geographically closest station to the project watershed, see Table 23. The Priestly-Taylor method of simulating potential evapotranspiration was used to represent humid climate.

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA.

Knisel, W.G. and Davis, F.M. 2000. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual. Page 32.

6.4.2.1 Recommended Changes

- Change the potential evapotransporation calculation from the Priestly-Taylor method to Penman-Monteith method.

6.4.3 Regional Constants – CONSTANT.dbf

The CONSTANT.dbf file contains regional constants for all modeled scenarios (Table 24). This database contains effective root depth, drainage area, plant available water, specific surface area of clay (sscly), coefficient of pesticide uptakae by plants (cofup), Organic Matter (OM) ratio 1, OM ratio 2, OM ratio, 3, OM ratio 4, and OM ratio 5.

The following regional constants were used:

- ET model: Priestly-Taylor method
- Effective hydrologic root depth: 24”
- Field area: ten (10) acres
- Fraction of plant available water: 1.000 initializes the model where soil is saturated at the very beginning of the model on January 1.
- Specific surface area of clay: 100.0 100 m^2/cm^2 soil
- Coefficient of pesticide uptake by plants: 0.03
- For each soil group, the upper-most soil horizon organic matter content was used. GLEAMS calculates the four lower soil horizon organic matter based on the lower horizon’s OM ratio listed here:
    - Horizon 2 ratio: 0.330
    - Horizon 3 ratio: 0.200
    - Horizon 4 ratio: 0.100
    - Horizon 5 ratio: 0.050

<u>References</u>:

Hahn, T.E. 1998. National Agricultural Pesticide Risk Analysis User Manual. USDA. Amherst, MA. Page 31.

USDA, 1994. NAPRA CONSTANTS use in the NAPRA process. Amherst, MA, page 2.

6.4.3.1 Recommended Changes

- Change ET model to Penman-Monteith
- Change coefficient of uptake to plants from 0.03 to .30
- Change horizon depth ratios to:
    - Horizon 2 ratio: 0.330
    - Horizon 3 ratio: 0.11
    - Horizon 4 ratio: 0.03
    - Horizon 5 ratio: 0.01

6.5 SOILS DATA

County-level Soil Survey Geographic (SSURGO) Database soils data were used in lieu of the State Soil Survey Database (SSSD) because SSSD data are no longer used. SSURGO soils data, as were SSSD data, must be processed and formatted for use in NAPRA. PrepSoil is a UNIX-based program that compiles data from county-level SSURGO data sets and formats the data for NAPRA. PrepSoil creates the following:

1) Water Retention Values/ Curves for each soil

2) Component specific curve numbers based on soil-water holding capacity and soil hydrologic group (A,B,C, or D);

3) Cluster's soils using a multi-variate cluster analysis based on physical attributes

    i. Water holding capacity

    ii. Runoff curve numbers

    iii. Layer depth

    iv. Sand-filled clay percentage

Soils were not clustered for this project, but were instead grouped according to similarities across county boundaries. One-hundred four (104) MYSUM soil types were identified among the five counties in the project watershed using GIS software. Results of the PrepSoil program yielded 44 soil groups that became the basis of the Tier-1 modeling. Currently, only the NAPRA Team in Amherst, Massachusetts can process PrepSoil.

6.5.1 SSSD to Soil Group Cross-Reference – SOIL_MAP.dbf

The SOIL_MAP.dbf file contains output from the Prepsoil program. This file cross-references the SSURGO soils MapID number with the newly generated and NAPRA usable Soil Group_ID number. See Table 25.

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA. Page 52.

6.5.1.1 Recommended Changes

- None

6.5.2 Soil Groups – SOILGRUP.dbf

The SOILGRUP.dbf file contains the physical properties of each soil group processed through PrepSoil. The complete SOILGRUP database is provided in Table 26.

Data input requirements for regional constants data database include the following:

- Soil component name
- Surface texture class
- SSA ID
- Map unit symbol
- Hydrologic group
- K factor
- CONA
- Number of horizons
- Depth of each horizon
- Sand fraction of each horizon

<u>References</u>:
Hahn, T.E. 1998. National Agricultural Pesticide Risk Analysis User Manual. USDA. Amherst, MA. Page 52.

6.5.2.1 Recommended Changes

- None

6.5.3 Soil Water Retention Value – WRET_VAL.dbf

The WRET_VAL.dbf file is the resultant file generated in PrepSoil and presented in Table 27. The file contains the runoff curve numbers, horizon depths, porosity, field capacity, wilting point, and saturated hydraulic conductivity for the soils processed through PrepSoil.

Data input requirements for soil water retention data database include the following:

- Number of horizons
- OM for each horizon
- Field capacity for each horizon
- Porosity for each horizon
- Wilting point for each horizon
- Saturated conductivity for each horizon

- Runoff Curve Number

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA. Page 52.

6.5.3.1 Recommended Changes

- Eric Hesketh will re-process the soils files using Prep-Soil to where soils are assumed not to have subsurface drainage. A sensitivitiy test will be performed on the two major watershed soils (Bennington and Centerburg) to assess the affect of subsurface drainage on atrazine loss.

6.6 SCENARIOS

The SCENARIO.dbf file is one of two primary links between the model and the input database files.

6.6.1 Crop, Tillage, Soil & Climate Scenario – SCENARIO.dbf

The SCENARIO.dbf file combines scenarios linked by ID numbers chosen from the DATEFACT, SOILGRUP, CLIMATE, CONSTANT, and WATMAN database files. The SCENARIO.dbf file combines the three (3) crop rotation, three (3) tillage, and five (5) event date set scenarios (forty-five total) with climate data. Descriptions of the forty-five scenarios compiled in the SCENARIO database are provided in Table 28.

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA. Page 32.

6.6.1.1 Recommended Changes

- None

6.6.2 Scenario Combination for GLEAMS – RUN_COMB.dbf

The RUN_COMB.dbf file combines the ID numbers from the SCENARIO database with the CHEM_USE database information to provide all possible combinations of land management practices and pesticide applications. The soil group percent slope and slope length values are user defined in this file.

- A slope length of 100 feet was used for all scenario combinations.
- The percent slope values were estimated from area-weighted average slopes for individual soil groups.

References:
Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA. Page 32.

6.6.2.1 Recommended Changes

- None

7.0 REFERENCES

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA

Knisel, W.G., R.A. Leonard, and F.M. Davis. 1994. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems. (Version 2.10) USDA Agricultural Research Service, Tifton, GA.

Knisel, W.G. and Davis, F.M. 2000. *GLEAMS:* G*roundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual*.

Malcolm Pirnie, 2003. *Quality Assurance Project Plan (QAPP): Methodology for Evaluating the Effectiveness of Watershed-Scale Nonpoint Source Pollution Abatement Programs.* Columbus, Ohio.

Ohio Department of Agriculture. 2003. *Ohio Weekly Crop Progress Reports.* Columbus, OH.

OSU Extension. 1995. *Ohio Agronomy Guide, 13th Addition. Corn Production Bulletin 472. The Ohio State University Extension. Columbus, OH.*

USDA. 2001. Soil Survey of Delaware County, Ohio. Natural Resources Conservation Service, USDA.

Weischmeier, W.H. and Smith, D.D. 1978. *Predicting Rainfall Erosion Losses: A Guide to Conservation Planning.* Agricultural Handbook 537. Natural Resources Conservation Service, USDA.

NAPRA Modeling Report to support the Upper Big Walnut Creek Case Study, Application of the Methodology to Evaluate Effectiveness of Watershed-Scale Management Practices

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8/17/2007

FIGURES

TABLES

ATTACHMENTS

1.0 INTRODUCTION

1.1 Background

Malcolm Pirnie has developed a methodology that can be used to evaluate and optimize the performance of watershed-scale nonpoint source pollution abatement programs. The framework links the cause and effect relationship between landscape feature data and water quality data. By using a demonstration project, this document provides a methodology that utilizes risk-based analyses to quantify the cause and effect relationships that create nonpoint source pollution; select most appropriate management measures (BMPs) at the field-scale, and characterize effectiveness of watershed-scale nonpoint source pollution abatement programs.

Hoover Reservoir is Central Ohio's largest source of drinking water and provides water to more than 500,000 people. The Upper Big Walnut Creek Watershed (UBWCW), which drains into the Hoover Reservoir, encompasses nearly 122,000 acres (191 square miles) of which an estimated 61,000 acres (50%) are devoted to agricultural cropland. The City of Columbus' watershed water quality monitoring program has detected elevated levels of the agricultural herbicide atrazine in the reservoir. Columbus uses powdered activated carbon (PAC) as a treatment technology to maintain herbicide levels below the federally mandated Safe Drinking Water Act (SDWA) standards. In addition to the currently implemented treatment technology, the City and the agricultural community have formed a collaborative partnership with the goal of reducing non-point source pollution runoff.

In the mid 1990s The Ohio Farm Bureau engaged the Ohio Departments of Agriculture and Natural Resources, and US Department of Agriculture Natural Resources Conservation Service (USDA-NRCS) to engage stakeholders in a collaborative partnership. A local Work Group comprised of producers, conservation experts, program managers recommended specific BMPs that were eligible for federal incentive funding.

By 1997, the City of Columbus, agricultural community, and federal and state conservation agencies were formally organized as the Upper Big Walnut Creek Water Quality Partnership. Members of the partnership include both public and private partners and include:

- City of Columbus
- Ohio Environmental Protection Agency
- Ohio Department of Agriculture
- Ohio Department of Natural Resources, Division of Soil and Water Conservation
- Ohio State University Extension
- Ohio Farm Bureau Federation
- Ohio Professional Applicators for Responsible Regulation
- Soil and Water Conservation Districts

  - Delaware County
  - Knox County
  - Licking County
  - Morrow County
- Syngenta (formerly Ciba-Geigy)
- USDA: Farm Services Agency
- USDA: Forest Service
- USDA: Natural Resources Conservation Service
- US Geological Survey

The partnership formed a farmer-led Executive Committee that oversaw the development of the watershed management plan (Malcolm Pirnie, 1999). That group defined a set of BMPs for control of atrazine runoff and set costs per acre that would be subsidized through the Environmental Quality Incentives Program (EQIP) to implement those BMPs. The BMP screening and adoption in the EQIP program did not focus on methods to evaluate success but was driven solely by the financial objectives of the farmers. The methodology proposed in this report advocates a different approach to BMP screening and the demonstration project provides an example that can be used for comparison to BMPs selected for both ease of implementation and cost-effectiveness.

Each component of our framework was integrated into the project watershed and details of the modeling analyses are provided in the following sections. The evaluation methodology proposed in this report was used to define alternative arrays of BMPs and compare the effectiveness of those arrays to the results achieved from the application of EQIP programs.

Since 1999, EQIP has provided more than $1 million for the implementation of BMPs in the Upper Big Walnut Creek Watershed. Water quality data for Hoover Reservoir, collected both before and after BMP implementation, has indicated the program’s overall success at reducing atrazine levels in Hoover Reservoir. However, the effectiveness of the variety of implemented BMPs remains unknown. This report addresses the modeling aspects of the methodology to evaluate the effectiveness of non-point source pollution abatement programs such as EQIP and to understand the process for selecting BMPs in a manner to optimize the use of available funding.

1.2 Project Objectives

To help accomplish the project goal, USDA’s National Agricultural Pesticide Risk Analysis (NAPRA) model was selected to assess potential environmental benefits from changes in pesticide and crop management practices funded by the EQIP program in the UBWCW. The NAPRA model and various post-processing tools were used to complete the following project objectives:

1) Simulate atrazine loads at the soil group, farm field, and watershed-scales under pre-EQIP conditions.
2) Assess the risk for atrazine runoff at the soil group, farm field, and watershed-scales under pre-EQIP conditions.

3) Simulate changes in atrazine loads at the soil group, farm field, and watershed-scales as a result of BMPs adopted during the EQIP implementation period.
4) Assess changes in risk for atrazine runoff at the soil group, farm field, and watershed-scales during the EQIP implementation period.
5) Examine relationships between simulated atrazine loss under EQIP conditions and the Hoover Reservoir mass flux empirical model.
6) Develop relationships between changes in risk for atrazine runoff and measured changes in atrazine concentrations in Hoover Reservoir.
7) Simulate reduction in atrazine loss at the soil group, farm field, and watershed-scales on the basis of identified optimal BMPs.

This document summarizes the project modeling process, types and sources of data used in the model, how NAPRA was used to model an array of BMPs, model parameter assumptions, sensitivity analyses, results and conclusions.

2.0 MODEL DESCRIPTION

2.1 Overview of the Model

USDA-NRCS National Water and Climate Center (NWCC) developed the National Agricultural Pesticide Risk Analysis (NAPRA) process to quantitatively evaluate and compare field-scale environmental risks associated with pesticide, crop, and tillage practice scenarios. NAPRA uses the Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) model, developed by USDA Agricultural Research Service (ARS), to simulate loadings of water, sediment, pesticides, and plant nutrients to the edge-of-field and bottom-of-root-zone for complex climate-soil-management interactions (Knisel, Leonard, and Davis, 1994).

A three-tiered modeling approach was developed for this project. Modeling each soil group independently, as delineated by the USDA soil survey geographic (SSURGO) data, provide the first-tier model output data. Using spreadsheet-based post processing tools and GIS technology, results of the Tier-1 soil group modeling were then up-scaled into farm field-scale (Tier-2) and watershed-scale (Tier-3) levels. In summary model scenarios were represented as follows:

- Tier 1: Soils Level
- Tier 2: Field-Scale
- Tier 3: Watershed-Scale

The SSURGO soils data was evaluated for the multiple counties included in the project watershed and forty-four unique soil types were identified. Twenty-seven best management practice (BMP) scenarios were modeled for five discrete spring application dates. Each BMP scenario was modeled using fifty-years of locally measured daily climatologic data as a driving force for pesticide losses. For each model scenario, NAPRA generates both annual and four-day maximum water volume, pesticide mass and concentration movement to the edge of field and bottom of root zone for three loss pathways: soluble surface loss (SSL), adsorbed surface loss (ASL), and soluble leaching loss (SSL).

More than 3.2 million Tier-1 type model output data were generated. Resultant data were integrated into subsequent tiers using spreadsheet-based post processing tools and GIS technology. Geospatial farm field boundaries underlain with SSURGO soil boundary data provided the framework for Tier-2 field-scale analysis. Intersecting hydrologic unit area watershed boundaries with SSURGO and crop field boundaries provided the framework for Tier-3 level analyses. Data management, spatial integration and analysis tools were created to manage NAPRA model output data and are discussed further in the post-processing section.

2.2 Modeling Process

A five-step modeling process was followed and is briefly described below.

2.2.1 Data Acquisition

Existing and publicly accessible environmental data sets were acquired for the modeling process of this project. The data sets are more fully discussed in Section 3.0. A US EPA approved Quality Assurance Project Plan (QAPP) that summarizes the data types, sources and quality was previously developed and is available (Malcolm Pirnie, 2003).

2.2.2 Pre-processing

NAPRA requires all model input data to be formatted in pre-defined *.dbf files. Borland® software Visual dBase® 5.5 was used to edit and format the model database files. Model parameters selected for this project are discussed in Section 3.0.

2.2.3 Scenario Modeling

NAPRA was used to evaluate the atrazine losses from a range of crop rotations, tillage methods, and pesticide application methods used throughout the project watershed. Twenty-seven best management practice (BMP) scenarios were modeled for five discrete spring atrazine application periods using fifty-years of locally measured daily climatological data. Thus, a total of 135 BMP scenario combinations were modeled for each of the forty-four soil groups.

2.2.4 Post-processing

MS® Excel® and ESRI® ArcGIS® software were used to manage the vast amount of data generated from the Tier 1 soil group level model simulations. MS® Excel® spreadsheets embedded with Visual Basic® post processing code were developed by Malcolm Pirnie for data management, analysis and integration with GIS software. GIS technology enable up-scaling of the NAPRA model results to Tiers 2 and 3.

2.3 Model Structure

The NAPRA Process is summarized in Figures 1 and 2. Figure 1 shows the physical and chemical processes that are represented in the model and Figure 2 depicts the general relationships among the soils data and user-defined NAPRA database population system (NPLDPS) files with the GLEAMS model, and subsequent output data. Local land management scenarios, erosion factors, and climate conditions are defined in the NPLDPS. NAPRA Client-Specific Reports were not produced for this project. Instead, MS® Excel®-based post processing tools were used to create tailored pesticide loss analyses. The model output data located in the Pesticide Loss Probability Curve Generator file were up-scaled to Tiers 2 and 3.

Figure 3 depicts the five types of user-defined database files (left-hand column) used in the NPLDPS. The corresponding sections of this report provide information for each of the input data sets. Also presented is a list of the 11 sets of model output data generated from the GLEAMS model and NAPRA process.

2.4 Data Types and Sources

Data types and their sources used to populate the NAPRA input parameters are briefly discussed below. A project Quality Assurance Project Plan (QAPP) was published to more fully describe data types, sources, and quality (Malcolm Pirnie, 2003).

2.4.1 Geospatial Data

Geospatial data were used to identify and define the domain for modeling soil groups, crop fields and watersheds. ESRI® GIS software was used to manage, edit, and compile the geospatial digital data sets. Geospatial data were obtained from local, state and federal sources. USDA National Resource Conservation Service (NRCS) Geospatial Gateway was the primary source of data unless higher resolution locally developed data were available. The web-site address is http://datagateway.nrcs.usda.gov/

2.4.2 14-Digit Hydrologic Unit Data

Geospatial 11 and 14-digit hydrologic unit data for hydrologic unit code (HUC) number 0506001-130 was used to define the Tier-3 watershed-scale assessment. Hydrologic unit data was obtained via the internet from the Ohio USDA NRCS. The web-site address is http://www.oh.nrcs.usda.gov/

2.4.3 Aerial Orthophoto Image Data

The Delaware (Ohio) Soil and Water Conservation District (SWCD) provided aerial orthophoto imagery used to define Tier-2 field-scale boundaries. The SWCD has created an orthophoto image mosaic of the project watershed area that was comprised of orthophotos from the Delaware County Auditor's Office and Ohio Department of Administrative Services (ODAS).

2.4.4 SSURGO Data

USDA NRCS soil survey geographic (SSURGO) data is a county-level 1:24,000 scale geospatial data set used to identify and define soils used in Tier-1 level modeling. SSURGO data was obtained from the USDA NRCS Geospatial Data Gateway for the following Ohio counties:

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Delaware County;

Franklin County;

Knox County;

Licking County; and,

Morrow County.

2.4.5 Crop Field Boundary Data

Agricultural crop field boundary data were obtained from the Delaware SWCD office. In 2002, the Delaware SWCD and the USDA Agricultural Research Service (ARS) at The Ohio State University used GIS technology to digitize all agricultural crop fields in the project watershed. Staff of the Delaware SWCD operate and maintain the geospatial digital agricultural crop fields of the project watershed.

2.4.6 Common Land Use Data

USDA Farm Service Agency (FSA) initiated development and has made publicly accessible the national common land use (CLU) geospatial data sets. CLU is the smallest land unit with a permanent contiguous boundary and land cover (USDA-FSA, 2005). Currently, CLU data is publicly available at the USDA NRCS Geospatial Data Gateway for four of five counties in the watershed. Although this data set is preferable for a national methodology perspective, the locally digitized crop field boundary data were used for this project for the following reasons:

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CLU data was not available for the entire watershed;

USDA-FSA denied a request for historical land use/ management data for all CLU crop field units in the project watershed; and,

Field-scale land management data for farms enrolled in the EQIP program were provided by the Delaware SWCD.

2.4.7 EQIP Program Crop Field Land Use/ Management Data

Land management data of those fields enrolled in the Environmental Quality Incentives Program (EQIP) was obtained from the SWCD field office. Delaware SWCD staff maintains the EQIP crop field attribute database file. For the period 1999 through 2003, this file contains the annual type of crop planted, tillage practice used, herbicide application techniques, and other conservation practices adopted by the producer. The data is derived directly from the Delaware NRCS conservation plans.

2.4.8 Crop Practice Event Date Data

The Ohio weekly average percent crop planted, crop maturation and crop-harvest dates were obtained from the US Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS), and Ohio Department of Agriculture (ODA), Agricultural Statistics Service's Weekly Crop Progress reports. The USDA NASS and ODA manage and distribute Ohio weekly average agricultural crop development status reports. Weekly cumulative percent corn planted was used as a surrogate to estimate when atrazine was applied. Figure 4 depicts the spring season period when atrazine is applied in the project watershed.

2.4.9 Climate Data

Daily climatic data measured at the Centerburg, Ohio (Lat. 40 deg. 17 min.; Long. 82 deg. 39 min.) rain gauge station for the period 1953 to 2003 was obtained from the Midwestern Regional Climate Center (MRCC) at the University of Illinois, Champaign. MRCC is a cooperative program of the Illinois State Water Survey and the National Climatic Data Center (National Oceanic and Atmospheric Administration, US Department of Commerce), Regional Climate Centers, and State Climate Offices.

3.0 MODEL PARAMETERS

NAPRA requires twenty-eight (28) database-type files that are summarized in Table 1, and more fully discussed below. Unless otherwise noted, it was assumed that the GLEAMS default values were acceptable. Figure 5 depicts the relationships among the model parameter files, program executables, and model output data. Where appropriate, references for each of the data sources for the model parameters have been cited. Data tables for each of the model parameter input files are provided in Appendix A. Where input to the model database files is minimal, the input values are included in the discussion below in addition to the lists in Attachment A.

The proposed model variables were presented to the project technical advisory committee (TAC) on May 23, 2006 for peer review and comment. Based on comments from the TAC meeting, minor adjustments were made to the model parameters and the final model simulations were processed.

3.1 Crop & Tillage Data

Model parameters in this section characterize crop type, planting dates, soil management, and crop tillage relationships. This information is used to select pre-calculated runoff curve number ratios.

3.1.1 Crop Codes - GLMSCROP.dbf

The Crop Codes database file contains characteristics for 78 common crops. Crop Code (20) represents corn for grain and was selected because atrazine is applied only to corn in the project watershed. Note: C1 and C2 are coefficient and exponent values, respectively, and used to calculate optimum (demand) nitrogen content of the crop. Additional GLEAMS model default parameters were used and include:

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Potential yield: 9,400 kg/ha (150 bu/acre)

Dry matter ratio: 2.5

C/N ratio: 80

Ratio N/P: 5.9

C1: 1.30

C2: -0.264

Crop height: 2.0 meters (6.6 feet)

Root Depth: 61 cm (24 inches)

Reference: Knisel and Davis, 2000, p 146-154, 157.

3.1.2 Crop Practice Dates – CROPDATE.dbf

The Crop Practice Dates database is a user defined file that contains crop planting, maturation and truncation dates. Five separate crop practice event date sets were defined because of the annual variability when corn is planted. Figure 4 depicts the range of corn planting dates typical of the project watershed for the period 1987 through 2003. Subsequent maturation (killing frost) and harvest dates were estimated from data in the Ohio Department of Agriculture's weekly crop progress reports and USDA Soil Survey's of the county's in the project watershed.

	Planting	Maturation	Harvest
Event Date Set 1:	April 20	October 15	November 15
Event Date Set 2:	April 30	October 15	November 15
Event Date Set 3:	May 10	October 15	November 15
Event Date Set 4:	May 20	October 15	November 15
Event Date Set 5:	May 30	October 15	November 15

Reference: OSU Extension, 1995; Ohio Department of Agriculture, 2003; USDA, 2001 p 147.

3.1.3 Crop Practices - CROPPRAC.dbf

The Crop Practices database file couples data defined in the Crop Code, Runoff Curve Number Crop Category, and Leaf Area Index databases to estimate runoff and leaching coefficients. The crop rooting depth is defined in this file.

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Root Depth: 24 inches

Perennial crop: False

Reference: Hahn, 1998 p 21; USDA 2001, p 97 – 125.

3.1.4 Crop Tillage Relationships – DATEFACT.dbf

The DATEFACT.dbf file represents forty-five (45) date factor ID's comprised of nine (9) crop tillage and rotation scenario combinations for the five (5) defined event dates sets. The file links CROPDATE, CROPPRAC, SOIL-MAN, CDATE, SLR, PFACT, and SFACT database files with the soil group defined soil hydrologic condition, e.g. Good, Fair, or Poor.

A hydrologic condition of "poor" was selected for all forty-four soil groups to reflect soil compaction conditions.

Reference: Hahn, 1998, p 21.

3.1.5 Leaf Area Indexes – LEAFAREA.dbf

The leaf area index corresponds to the amount of foliage present at each erosion factor date defined in the CDATE.dbf file. Input to the LEAFAREA.dbf file in only necessary when no GLEAMS Crop Codes 1 through 78 are available. The default leaf area index of (-9) was used.

Reference: Hahn, 1998, p 22; Knisel and Davis, 2000, p 60.

3.1.6 Runoff Curve Number Crop Categories – RCNCRCAT.dbf

RCNCRCAT.dbf is a read-only file that contains ID numbers that define type of crop used in the CROPPRAC file. An RCN crop category code of 22 was used to represent straight row crop production.

Reference: Hahn, 1998, p 22; Knisel and Davis, 2000, p 47.

3.1.7 Runoff Curve Number Ratio Table – RCN_RAT.dbf

RCN_RAT.dbf is a read-only file that contains runoff curve number ratios for an array of soil hydrologic groups, hydrologic conditions, soil management ID numbers, and runoff curve number categories. This information is linked to the model by the various ID numbers included in the database and is used in the hydrologic calculations within GLEAMS.

Reference: Hahn, 1998, p 23; Knisel and Davis, 2000, p 47.

3.1.8 Soil Management – SOILMAN.dbf

SOILMAN.dbf is a read-only file with soil management ID numbers corresponding to direction of tillage and amount of remaining crop field residue.

A soil management code of 4 was used to represent straight row crop production for conventional (chisel) tillage scenarios. A soil management code of 5 was used to represent straight row crop production with residue cover for conservation tillage and no-till scenarios.

Reference: Edwards, 2002; Hahn, 1998, p 23; Knisel and Davis, 2000.

3.1.9 Water Management – WAT_MAN.dbf

WAT_MAN.dbf is a read-only file that defines the timing of irrigation and plant available water conditions before and after planting. A parameter value of one (1) was used to represent that irrigation is not used for crop production in the project watershed.

Reference: Hahn, 1998, p 24; Knisel and Davis, 2000.

3.2 Erosion Data

Parameters in the GLEAMS model that estimate soil erosion are based on land management events that occur during the planting and growing season. Parameters defined in this section define key event dates and soil management features used by the model to estimate soil losses.

3.2.1 Erosion Factor Dates – CDATE.dbf

The CDATE.dbf file contains up to ten erosion factor dates when significant changes occur to the soil surface structure. Key changes occur during planting, harvesting or mowing, tillage, changes in vegetative cover, freeze and thaw periods. Five separate CDATE ID numbers were created to correspond with the five Event Date Sets (See Section 6.1.2) to reflect the range of spring planting and herbicide application dates.

> Reference: Hahn, 1998, p 24; Knisel and Davis, 2000, p 67.

3.2.2 Practice Factors – PFACT.dbf

The PFACT.dbf file contains practice factors that represent the direction of tillage. Up and down slope tillage is common in the Big Walnut Creek Watershed and has a practice factor of one (1).

> Reference: Edwards, 2002; Hahn, 1998, p 25; Knisel and Davis, 2000; Wischmeier and Smith, 1979, p 40.

3.2.3 Smoothness Factors - SFACT.dbf

Smoothness factors characterize the resistance or impedance to overland flow. The factor is related to the difference in heights between the top of the ridge to the bottom of the furrow, the slope, and tillage direction. Smoothness factors are specified for dates during each year when key changes occur during planting, harvesting or mowing, tillage, stages of vegetative cover, freeze, and thaw periods. Each BMP scenario has a unique set of smoothness factors specific the different time periods within each growing season or model year. Smoothness factors are determined for each BMP scenario and date based on the BMP conditions and tabulated values of Manning's N.

> Reference: Hahn, 1998, p 25; Knisel and Davis, 2000, p 92.

3.2.4 Soil Loss Ratio - SLR.dbf

The SLR.dbf file contains soil loss ratios (formerly cover factor CFACT) for each period of time between the CDATES. Soil loss ratios indicate the potential for soil losses occurring during each year when key changes occur during planting, harvesting or mowing, tillage, stages of vegetative cover, freeze, and thaw periods. Each BMP scenario has a unique set of soil loss ratios specific the different time periods within each growing season or model year. Soil loss ratio values are calculated for each BMP and date based on the Revised Universal Soil Loss Equation (RUSLE).

> Reference: Edwards, 2002; Hahn, 1998, p 26; Knisel and Davis, 2000, p 94-96; Wischmeier and Smith, 1979, p 22-23.

3.3 Pesticide Data

This section summarizes chemical attributes of atrazine and how it was applied in the watershed. Although other pesticides were used in the watershed, this project scope was limited to atrazine.

3.3.1 Active Ingredient Data - CHEMICAL.dbf

CHEMICAL.dbf is a read-only file with chemical attributes of commonly used agricultural pesticides.

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Chemical ID: 27

CASRN: 1912-24-9

Common Name: Atrazine

Foliar Half-life : 5 days

Percent Wash off: 0.450

Reference: Hahn, 1998, p 27; Knisel and Davis, 2000, p 94-96.

3.3.2 Active Ingredient Data by Soil pH – SOIL_pH.dbf

SOIL_pH.dbf is a read-only file with the following chemical properties for atrazine.

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Soil pH is defined by the soil group in Section 6.5.2

K_{oc} is 100 ml/g

Solubility is 33 ppm

Soil half life is 60 days

Reference: Hahn, 1998, p 27.

3.3.3 Application Codes – GAC_ID.dbf

GAC_ID.dbf is a read-only file that contains descriptions of the pesticide application methods. Atrazine application techniques modeled were surface application (GAC ID = 0) and soil incorporation (GAC ID = 1).

Reference: Hahn, 1998, p 28.

3.3.4 Application Method – APP_METH.dbf

Three atrazine application methods common in the project watershed and funded by the EQIP program include pre-emergence (pre-plant) surface application, pre-plant soil incorporation, and post-emergence surface application. The APP_METH.dbf file defines three application methods for three tillage methods and three crop rotation scenarios. The file summarizes:

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27 application method scenarios;

Soil incorporation depths (cm); and,

Percent of pesticide intercepted by foliage and soil.

Soil incorporation depths were estimated at 7.5 cm (3 inches) for soil incorporation, and 1.0 cm (0.5 inches) for pre-emergence surface and pos-emergence surface applications. The amount of foliar/residue interception versus soil application on a percentage basis. A 5% herbicide drift was assumed during surface applications, and 0% drift for soil incorporation.

Reference: Hahn, 1998, p 28; Loux, 2003.

3.3.5 Application Timing Data – TIMING.dbf

The TIMING.dbf file defines five pesticide application dates which correspond with the five event date sets (at planting) for the three application methods. It was assumed that there is only one application of atrazine per year for each application method and event date set.

Reference: Hahn, 1998, p 29.

3.3.6 Chemical Use Practice – CHEM_USE.dbf

The CHEM_USE.dbf file defines 135 atrazine application scenarios for three application methods, three tillage methods, three crop rotations, and 5 event date sets. An application rate of 1.12 kg/ha (1.0 lbs/ acre) was modeled.

Reference: Hahn, 1998, p 29.

3.3.7 Loss Types – CURVTYPE.dbf

CURVTYPE.dbf is a read-only file provided with the NAPRA program as one of the post-processing tools that describe the model loss pathways and requires no user-defined input.

3.4 Regional Data

The regional data section compiles climatic data collected from local climate stations and used to estimate

3.4.1 Climate Data - Measured – CLIMATE.dbf

The CLIMATE.dbf file contains links to files with locally measured climate data from the Centerburg, Ohio rain gauge for the period 1953 through 2003:

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Daily total precipitation (PRECIP);

Daily average temperatures (TAVG); and,

Mean monthly maximum/minimum temperatures (TMAX/TMIN).

Reference: Hahn, 1998, p 31; Knisel and Davis, 2000, p 32; MRCC, 2006.

3.4.2 Climate Data – Generated – CLIGEN.dbf

The CLIGEN is a read-only database that consists of various climate gauging stations throughout the United States. A CLIGEN ID of 726, corresponds to the Fredericktown, Ohio climate station, was used to estimate the following climate daily data:

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Solar radiation,

Wind movement, and,

Dew point temperature.

The Fredericktown climate station is the geographically closest station to the project watershed. The Priestly-Taylor method of simulating potential evapotranspiration (ET) was used to represent humid climate.

Reference: Hahn, 1998; Knisel and Davis, 2000, p 32

3.4.3 Regional Constants – CONSTANT.dbf

The CONSTANT.dbf file contains regional constants for all modeled scenarios. This database contains effective root depth, drainage area, plant available water, specific surface area of clay (sscly), coefficient of pesticide uptakae by plants (cofup), Organic Matter (OM) ratio 1, OM ratio 2, OM ratio, 3, OM ratio 4, and OM ratio 5.

The following regional constants were used:

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ET model: Priestly-Taylor method

Effective hydrologic root depth: 24”

Field area: ten (10) acres

Fraction of plant available water: 1.000 initializes the model where soil is saturated at the very beginning of the model on January 1.

Specific surface area of clay: 100.0 m^2/cm^2 soil

Coefficient of pesticide uptake by plants: 1.0

For each soil group, the upper-most soil horizon organic matter (OM) content was used. GLEAMS calculates the four lower soil horizon organic matter based on the lower horizon’s OM ratio listed below:

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Horizon 2 ratio: 0.330

Horizon 3 ratio: 0.109

Horizon 4 ratio: 0.036

Horizon 5 ratio: 0.012

Reference: Hahn, 1998, p 31; USDA, 1994, p 2.

3.5 Soils Data

County-level Soil Survey Geographic (SSURGO) Database soils data were used in lieu of the State Soil Survey Database (SSSD) because SSSD data are no longer used. SSURGO soils data, as were SSSD data, must be processed and formatted for use in NAPRA. PrepSoil is a UNIX-based program that compiles data from county-level SSURGO data sets and formats the data for NAPRA. PrepSoil creates the following:

- Water Retention Values/ Curves for each soil
- Component specific curve numbers based on soil-water holding capacity and soil hydrologic group (A,B,C, or D);
- Cluster's soils using a multi-variate cluster analysis based on physical attributes
- Water holding capacity
- Runoff curve numbers
- Layer depth
- Sand-filled clay percentage

Soils were not clustered for this project, but were instead grouped according to similarities across county boundaries. One-hundred four (104) MYSUM soil types were identified among the five counties in the project watershed using GIS software. Results of the PrepSoil program yielded 44 soil groups that became the basis of the Tier-1 modeling. Currently, only the NAPRA Team in Amherst, Massachusetts can process PrepSoil.

3.5.1 SSSD to Soil Group Cross-Reference – SOIL_MAP.dbf

The SOIL_MAP.dbf file contains output from the Prepsoil program. This file cross-references the SSURGO soils MapID number with the newly generated and NAPRA usable Soil Group_ID number.

Reference: Hahn, 1998, p 52.

3.5.2 Soil Groups – SOILGRUP.dbf

The SOILGRUP.dbf file contains the physical properties of each soil group processed through PrepSoil.

Data input requirements for regional constants data database include the following:

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Soil component name

Surface texture class

SSA ID

Map unit symbol

Hydrologic group

K factor

CONA

Number of horizons

Depth of each horizon

Sand fraction of each horizon

Reference: Hahn, 1998, p 52.

3.5.3 Soil Water Retention Value – WRET_VAL.dbf

The WRET_VAL.dbf file is the resultant file generated in PrepSoil. The file contains the runoff curve numbers, horizon depths, porosity, field capacity, wilting point, and saturated hydraulic conductivity for the soils processed through PrepSoil.

Data input requirements for soil water retention data database include the following:

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Number of horizons

OM for each horizon

Field capacity for each horizon

Porosity for each horizon

Wilting point for each horizon

Saturated conductivity for each horizon

Runoff Curve Number

Reference: Hahn, 1998, p 52.

3.6 Scenarios

The SCENARIO.dbf file is one of two primary links between the model and the input database files.

3.6.1 Crop, Tillage, Soil & Climate Scenario – SCENARIO.dbf

The SCENARIO.dbf file combines scenarios linked by ID numbers chosen from the DATEFACT, SOILGRUP, CLIMATE, CONSTANT, and WATMAN database files. The

SCENARIO.dbf file combines the three (3) crop rotation, three (3) tillage, and five (5) event date set scenarios (forty-five total) with climate data.

Reference: Hahn, 1998, p 32.

3.6.2 Scenario Combination for GLEAMS – RUN_COMB.dbf

The RUN_COMB.dbf file combines the ID numbers from the SCENARIO database with the CHEM_USE database information to provide all possible combinations of land management practices and pesticide applications. The soil group percent slope and slope length values are user defined in this file.

A slope length of 100 feet was used for all scenario combinations.

The percent slope values were estimated from area-weighted average slopes for individual soil groups.

Reference: Hahn, 1998, p 22.

4.0 SENSITIVITY ANALYSES

Obtaining appropriate model input and verifying the accuracy of the model output are critical components of any modeling process. This section presents the protocol used to perform a limited quantification of the uncertainty in the NAPRA model results caused by uncertainty in estimates of the selected model input parameters as used to model the soils in the project watershed. Model output was evaluated in terms of contaminant loss by the soluble surface loss (SSL), soluble leaching loss (SLL), and adsorbed surface loss (ASL) pathways, as well as the total of all loss pathways.

The NAPRA model was selected for this project to model an array of agricultural BMPs for all of the soil types present in the UBWCW. Field-measured input data have not been documented for the various soil types in the project watershed and available published soil survey information was found to be adequate for the purposes of this project. However, the lack of field measured data for hydrologic, sediment, and contaminant outputs from the soil types in the UBWCW eliminates the possibility of calibrating the NAPRA model to watershed-specific output information. Input parameters used in the NAPRA model were selected from published information, general documentation of the project watershed agricultural practices, and input from local watershed and agricultural experts. When model parameters were found to have a range of values within the UBWCW the average of the values were used to form the base parameters for the model.

The NAPRA model utilizes the GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) model, an extension of the CREAMS (Chemical, Runoff, and Erosion from Agricultural Management Systems) model of environmental fate water quality as the core processor for contaminant migration (Hahn, 1998). The modeling process for this project included the development of 27 BMP scenarios modeled for 44 different soil groups with fifty years of climatic data as the time variable input for the NAPRA program. To simplify the amount of data generated during the sensitivity analyses, only two soil groups were considered. The two soil groups selected for the sensitivity analysis, the Bennington soil group (SG 8) and the Centerburg soil group (SG 20) comprise over 60-percent of the total farm field area of the UBWCW and are fundamentally different in compositions.

The sensitivity analyses were performed for parameters with limited data, if broad-ranging values exist in the project watershed, and for parameters with documentation of parameter sensitivities for NAPRA and GLEAMS. The sensitivity of the model to changes in the following parameters was documented within the ranges of values typical to the project watershed. Results of the sensitivity tests are tabulated in Appendix B and briefly summarized in the following sections.

4.1 Crop and Tillage Data

Crop and tillage data characterize the crop type, planting and/or soil restructuring dates, soil management, crop-tillage relationships, and other crop management features. The NAPRA model uses this information to estimate runoff curve numbers and curve number ratios. Most crop and tillage data are general to specific crops and BMP scenarios therefore little variability in these parameters exists within the model with the exception of the soil hydrologic condition.

4.1.1 Soil Hydrologic Condition

The soil hydrologic condition characterizes a soil's degree of compaction and is defined as either good or poor. This factor is field specific dependent on how the producer manages the fields. Because this factor is unknown for each farm field, both conditions will be analyzed to understand the benefits of good soil management. A soil hydrologic condition of poor was used for the base value in the modeling process.

Soil Group 8: Changing the soil hydrologic condition from poor to good increased losses from the SSL pathway and decreased losses from the SLL and ASL pathways; this resulted in an overall loss reduction of approximately 30%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in hydrologic condition with an increase in losses of approximately 88%. The ASL and SLL pathways decreased by approximately 72% and 59%, respectively.

Soil Group 20: Changing the soil hydrologic condition from poor to good decreased losses from the SSL pathway and ASL pathways and increased losses from the SLL pathway; this resulted in an overall gain in losses of less than 2%. The SSL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in hydrologic condition with a decrease in losses of approximately 11%. The ASL pathway decreased by approximately 10% the SLL pathway increased by approximately 3%.

4.2 Erosion Data

Parameters used by the NAPRA model to estimate soil erosion are based on land management events that occur during the planting and growing season. Each parameter may have specific values or range of values that apply to specific time periods within each growing season or model year.

4.2.1 Smoothness Factors

Smoothness factors characterize the resistance or impedance to overland flow. Although values for the smoothness factors have broad ranges, existing documentation of the NARPA/GLEAMS model indicated that the model is not sensitive to changes in the smoothness factors. To test the model's sensitivity to changes in smoothness factor values the baseline values were divided in half and processed through the model.

Soil Group 8: Decreasing the smoothness factors by one half increased losses from the SSL and ASL pathways and decreased losses from the SLL pathway; this resulted in an overall gain in atrazine losses of approximately 10%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in smoothness factors with an increase in losses of approximately 306%. The SLL pathways decreased by approximately 71% while the ASL pathway increased by approximately 6%.

Soil Group 20: Decreasing the smoothness factors by one half increased losses from the SSL and ASL pathways and decreased losses from the SLL pathway; this resulted in an overall decrease in atrazine losses of approximately less than 1%. The ASL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in smoothness factors with an increase in losses of approximately 319%. The SSL pathway increased by approximately 109%, while the SLL pathway decreased by approximately 12%.

4.2.2 Soil Loss Ratios

Soil loss ratios indicate the potential for soil losses occurring during each year when key changes occur during planting, harvesting or mowing, tillage, stages of vegetative cover, freeze, and thaw periods. Although SLRs can have wide-ranging values, existing documentation of the NARPA/GLEAMS model indicated that the model is not sensitive to changes in the soil loss ratios. To test the model's sensitivity to changes in SLR values the baseline values were decreased by one half.

Soil Group 8: Decreasing the soil loss ratio values by one half increased losses from the SSL pathway and decreased losses from the SLL and ASL pathways; this resulted in an overall gain in atrazine losses of approximately 12%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in soil loss ratios with an increase in losses of approximately 308%. The SLL and ASL pathways decreased by approximately 67% and 64%, respectively.

Soil Group 20: Decreasing the soil loss ratio values by one half increased losses from the SSL and ASL pathways and decreased losses from the SLL pathway; this resulted in an overall decrease in atrazine losses of approximately 4%. The SSL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in soil loss ratios with an increase in losses of approximately 109%. The ASL pathway increased by approximately 52%, while the ASL pathway decreased by approximately 7%.

4.2.3 Percent Organic Matter

Percent organic matter (OM) varies by soil group, within a soil group, and by how the soil is managed with cultivation, crop rotation, and residue management practices. The organic matter content also contributes to the binding properties of the soils and agricultural chemicals. To test the model's sensitivity to changes in OM the base values were doubled.

Soil Group 8: Doubling the percent organic matter increased losses from the SSL and ASL pathways and decreased losses from the SLL pathways; this resulted in an overall decrease in atrazine losses of approximately 13%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in organic matter with an increase in losses of approximately 314%. The SLL pathway decreased by 96%, while the ASL pathway increased by 11%.

Soil Group 20: Doubling the percent organic matter increased losses from the SSL and ASL pathways and decreased losses from the SLL pathways; this resulted in an overall decrease in atrazine losses of approximately 33%. The ASL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in organic matter with an increase in losses of approximately 524%. The SSL pathway increased by 198%, while the SLL pathway decreased by 54%.

4.3 Pesticide data

Although other pesticides are used in the UBWCW, the scope of this project is limited to the analysis of the effect of atrazine applications. Most pesticide data used in the

NAPRA model are constants that describe the different BMP scenarios; therefore little variability in these parameters exists within the model with the exception of the application method.

4.3.1 Application Method

Three atrazine application methods are common in the project watershed including: pre-emergence surface application, pre-plant soil incorporation, and post emergence surface application. The soil incorporation depth and percent soil and foliar interception were evaluated.

Soil Incorporation Depth

Soil Group 8: Doubling the soil incorporation depth increased losses from the SSL pathway and decreased losses from the SLL and ASL pathways; this resulted in an overall increase in atrazine losses of approximately 7%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in soil incorporation depth with an increase in losses of approximately 286%. The SLL and ASL pathways decreased by 69%, and 46%, respectively.

Soil Group 20: Doubling the soil incorporation depth decreased losses from the SSL and ASL pathways and increased losses from the SLL pathway; this resulted in an overall increase in atrazine losses of approximately 117%. The SLL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in soil incorporation depth with an increase in losses of approximately 217%. The SSL and ASL pathways increased by 6% and 79%, respectively.

Percent Foliar Interception versus Percent Soil Interception

For atrazine application, the total amount of atrazine applied is initially decreased in the model by a percent drift factor. The percent drift specified in the model was 2% for all application methods. The percent foliar interception specifies the amount of product that is partitioned to degrade and transport through plant tissue. The percent soil interception is the amount of product that is portioned to direct application on the soil surface. The sum of the percent drift, percent foliar interception, and percent soil interception must equal 100%. To test the model’s sensitivity to the interception fractions, the percent foliar interception values were double, thereby decreasing the percent soil interception by on half.

Soil Group 8: Doubling the percent foliar interception increased losses from the SSL pathway and decreased losses from the SLL and ASL pathways; this resulted in an overall decrease in atrazine losses of approximately 10%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in percent foliar interception with an increase in losses of approximately 241%. The SLL and ASL pathways decreased by 69%, and 46%, respectively.

Soil Group 20: Doubling the percent foliar interception increased losses from the SSL and ASL pathways and decreased losses from the SLL pathway; this resulted in an overall increase in atrazine losses of approximately 1%. The ASL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in the percent foliar interception with an increase in losses of approximately 104%. The SSL pathway increased by approximately 95%, while the SLL pathway decreased by approximately 8%.

4.4 Climate and Regional Constants

The climate and regional constant data used in the NAPRA model includes climate data collected from local climate stations and regional agricultural and soil constants.

4.4.1 Climate – CLIMATE.dbf

The NAPRA/GLEAMS model is most sensitive to changes in climatic conditions. Fifty years of climate data were used for the NAPRA modeling process, which provides a reasonable distribution of climatic conditions. Model output is in the terms of concentration and/or mass for each year on a four-day maximum (storm event based) and annual basis. A consistent climate data set was used throughout the sensitivity analysis and modeling process. The results of the all the sensitivity analyses were evaluated through the fifty-year distribution of model output.

4.4.2 Percent Slope

The percent slope in the project watershed is highly variable. Soil surveys use a percent slope range to partially define soils. The average percent slope for each soil group was used for modeling the watershed. A sensitivity test of the percent slope was performed to estimate the effect of slope change compared to atrazine loss.

Soil Group 8: Doubling the percent slope increased losses from the SSL and ASL pathways and decreased losses from the SLL pathway; this resulted in an overall decrease in atrazine losses of approximately 10%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in percent slope with an increase in losses of approximately 305%. The ASL pathway increased by 26%, while the SLL pathway decreased by approximately 71%.

Soil Group 20: Doubling the percent slope increased losses from the SSL and ASL pathways and decreased losses from the SLL pathway; this resulted in an overall decrease in atrazine losses of less than 1%. The ASL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in the percent slope with an increase in losses of approximately 462%. The SSL pathway increased by approximately 109%, while the SLL pathway decreased by approximately 12%.

4.4.3 Effective Rooting Depth

Effective rooting depth is used to proportion the hydrologic fluxes into runoff and infiltration. The smaller the effective rooting depth, the more water is proportioned to runoff. The base value for effective rooting depth used in the NAPRA model is 24 inches and a value of 36 inches was used to test for model sensitivity.

Soil Group 8: Increasing the effective rooting depth increased losses from the SSL pathway and decreased losses from the SLL and ASL pathways; this resulted in an overall increase in atrazine losses of approximately 16%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in the effective rooting depth with an increase in losses of approximately 429%. The SLL and ASL pathways decreased by approximately 94% and 29%, respectively.

Soil Group 20: Increasing the effective rooting depth increased losses from the SSL and ASL pathways and decreased losses from the SLL pathway; this resulted in an overall decrease in atrazine losses of approximately 33%. The ASL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in the effective rooting depth with an increase in losses of approximately 195%. The SSL pathway increased by approximately 189%, while the SLL pathway decreased by approximately 57%.

4.4.4 Coefficient of Pesticide Uptake by Plants

The coefficient of pesticide uptake by plants is used to determine whether pesticide uptake by a crop is to be considered, and the extent to which it is considered. The base value for the coefficient of pesticide uptake used in the NAPRA model is 0.03. Any fraction to two decimal places can be used in the model with zero representing no uptake, and 1 allowing GLEAMS to fully consider uptake. The base value for the coefficient of pesticide uptake used in the NAPRA model is 1.0. To test the model's sensitivity to changes in the coefficient of pesticide uptake, a value of 0.5 was also modeled.

Soil Group 8: Increasing the coefficient of pesticide uptake by plants increased losses from the SSL pathway and decreased losses from the SLL and ASL pathways; this resulted in an overall increase in atrazine losses of approximately 16%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in the effective rooting depth with an increase in losses of approximately 322%. The SLL and ASL pathways decreased by approximately 64% and 44%, respectively.

Soil Group 20: Increasing the coefficient of pesticide uptake by plants increased losses from all of the pathways and resulted in an overall decrease in atrazine losses of approximately 24%. The ASL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in the coefficient of pesticide uptake with an increase in losses of approximately 127%. The SSL pathway increased by approximately 123%, while the SLL pathway decreased by approximately 14%.

4.4.5 Evapotranspiration Method

The Priestly-Taylor (PT) method of estimating evapotranspiration was specified in the NAPRA model. The PT method is documented for use in humid climates. The NAPRA model is also able to process evapotranspiration using the Pennmen-Monteith (PM) method. The PM method is typically used for estimated evapotranspiration in arid regions.

Soil Group 8: Changing the evapotranspiration method from PT to PM increased losses from the SSL and SLL pathways and decreased losses from the ASL pathway; this resulted in an overall increase in atrazine losses of approximately 102%. The SSL pathway for soil group 8 exhibited the greatest amount of sensitivity to the change in the evapotranspiration method with an increase in losses of approximately 430%. The SLL pathway increased by approximately 7%, while the ASL pathway decreased by approximately 36%.

Soil Group 20: Changing the evapotranspiration method from PT to PM increased losses from all loss pathways; this resulted in an overall increase in atrazine losses of approximately 133%. The SSL pathway for soil group 20 exhibited the greatest amount of sensitivity to the change in the evapotranspiration method with an increase in losses of approximately 181%. The SLL and ASL pathways increased by approximately 131% and 178%, respectively.

4.5 Sensitivity Test Summary

Sensitivity tests provide critical insight to model processes. In the context of the NAPRA model and the parameter tests discussed above; the tests provide a method to asses the applicability of the model output to conditions that deviate from the specified input parameters. The sensitivity test results in terms of percent change in atrazine losses indicate that, at the soil group scale, variations in the soil physical properties play a critical role in atrazine losses. Soil groups 8 and 20 are unique to each other in terms of physical properties such as particle size fractions, slope, and organic material. When comparing individual soil types the variability of physical properties can compound the model sensitivity to changes in parameter values both in the magnitude of the change from all loss pathways as well as significant differences from the individual loss pathways (SSL, SLL, and ASL). However, at much larger scales, such as the distribution of soils in a watershed, the variability of the soil properties may force model output toward an average trend or normal distribution.

The continual practice of specific BMPs can change the physical properties of soils over time. For example, changing from conventional tillage to a no till system will add organic material to a soil and can even change the soil hydrologic condition. In addition to providing insight to conditions where soil or BMP parameters may differ than those modeled in this project, the sensitivity tests outlined above can also serve as guidelines to the potential results of changing BMPs over time.

5.0 POST-PROCESSING AND OPTIMIZATION

The ultimate goal of the optimization phase of this project was to identify the most effective BMPs for reducing atrazine losses from the farm fields in the watershed, and to develop a framework for selecting the most cost-effective distribution of BMPs that produces a target atrazine load reduction in Hoover Reservoir.

The optimization phase of the project consists of four tasks:

- Evaluate BMP effectiveness;
- Model BMP performance and determine BMP efficiencies;
- Develop cost-effectiveness matrix;
- Evaluate environmental and economic benefits.

The optimization process was based on evaluating and modeling data pertaining to the effectiveness of agricultural BMPs and conservation programs. This section outlines how BMP effectiveness was evaluated and modeled to provide optimized information for selecting the conditions for a watershed-scale non-point source pollution abatement program.

Three levels of detail are incorporated into this assessment. First, the UBWCW contains a variety of soil types which are differentiated by inherent and unique physical and chemical characteristics. These soil properties control contaminant transport through the soil profile. Second, each farm field may consist of one or more soil types each having a different optimal BMP. Therefore, the optimal BMP for Soil A may be the worst BMP for Soil B; however farming practices typically remain consistent within a field. The optimal BMP for a field is a function of the proportions of unique soil types in a field, and the magnitude of contrasting physical characteristics. Finally, there is a cost-benefit and risk-benefit relationship to the proportion of farm fields that should participate in programs such as EQIP by using optimal BMPs to produce a relevant and appropriate reduction of contaminant loads in the watershed.

Post-processing of NAPRA model output data began at the soil group level (Tier 1) and was incrementally up-scaled to farm fields (Tier 2), and the watershed (Tier 3). The up-scaled results were then compared to reservoir atrazine concentrations to connect the soil level atrazine losses to downstream water quality. To draw measurable conclusions from the NAPRA modeling effort baseline conditions were first developed for both the BMP scenarios and reservoir water quality.

5.1 Development of Baseline Conditions

Baseline conditions were determined from readily-available information including monthly water quality samples, lists of all farm fields within the watershed, the soil types present in each of the fields, documentation of agricultural management practices in the watershed, and a database of EQIP enrollment details.

5.1.1 Baseline Best Management Practices

Baseline conditions were developed to represent the most widely practiced BMPs in the watershed. The baseline BMPs are characteristic of the practices that occurred in the watershed farmland prior to the EQIP period or in fields that did not enroll in the program. The baseline conditions were modeled using the NAPRA program and the results served as reference to evaluate other potential BMPs used in the watershed.

Enrollment details from the EQIP provided information on the number of enrolled farm fields, their level of participation in the program, and their management practices prior to enrollment. The pre-program management practices of the EQIP-enrolled fields were compared to supporting documentation of typical BMPs used in the UBWCW. The most common management practices served as the baseline conditions for modeling all of the fields in the watershed. This assumed that the sample of farm fields enrolled in the EQIP program was managed with similar practices as the non-enrollment fields prior to or without aid of the program.

The baseline set of BMPs in the project watershed consists of the following:

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Crop rotation: Corn after soybeans

Tillage method: Conventional tillage, chisel plow

Pesticide application method: Pre-emergence surface application

To provide a quantitative measure of comparison, the atrazine losses in terms of mass per unit area were determined for the BMPs at each scale of the assessment. The NAPRA model baseline scenarios were used to draw BMP comparisons at the soil group and farm field scales, and model results were up-scaled to the watershed area using Monte Carlo simulations to estimate the reservoir loads. At the watershed scale the, the distribution of BMPs was known for only the proportion of the watershed enrolled in EQIP. To determine the outcome of various levels of BMP enrollment it was necessary in incorporate a randomized distribution of BMPs throughout the watershed. This ensured that the variability of the results from BMP implementation would not be selective to specific soil types. Input to the NAPRA program included soil characteristics, BMP controls, and contaminant flux data, with 50 years of climatic information serving as the time variable input to determine contaminant losses from the soil profile. These methods are discussed in greater detail in the preceding sections.

5.1.2 Baseline Reservoir Conditions

Three historical time periods of the water quality record for Hoover Reservoir were reviewed to evaluate the cause and effect relationships between atrazine reservoir concentrations and historical use of the product. The historical time periods include:

1985 to 1993 – The atrazine manufacturer’s label recommended a maximum application of 4 pounds per acre per year

1993 to 1999 – The atrazine manufacturer’s label recommended a decrease in use to maximum application of 2.5 pounds per acre per year.

1999 to 2005 – The EQIP implementation.

The Hoover Reservoir baseline conditions were established from water quality data collected after the manufacturer's label recommended application rate reduction and prior to the EQIP period.

5.1.3 Development of a Target Load Reduction

Atrazine control measures (the introduction of PAC to the water treatment process) are implemented when monthly water quality samples exceed 2.0 ug/L. The frequency of reservoir concentrations exceeding the treatment threshold was evaluated to estimate a relevant and appropriate atrazine load reduction for the reservoir.

The following steps summarize the process used to calculate the target load reduction.

Step 1 To estimate the actual load present in the reservoir on a monthly basis monthly atrazine sample data and corresponding reservoir volumes were used.

Step 2 A theoretical load was then calculated from the monthly reservoir volumes and a constant concentration of 2.0 ug/L for each month in the period.

Step 3 The difference between the actual atrazine reservoir load (step 1) and the theoretical atrazine reservoir load (step 2) was calculated for each month in the record.

Step 4 For each year, the peak month load differential (actual load minus the theoretical load) was determined.

Step 5 The average of the peak month load differential was calculated for the baseline period of record.

The target load reduction was then set as the average peak month load differential between the actual load and the theoretical load and used as an optimization goal. Additional load reduction values were also generated to estimate a variety of reservoir atrazine loading return intervals for developing management strategies.

$$LR_{t\arg et} = \frac{1}{n}\sum_{i=1}^{n}\left|\left(\left(C_{reservoir} * V_{reservoir}\right) - \left(C_{treatment} * V_{reservoir}\right)\right)\right\|_{year}^{\max month}$$

Where:

LR_{target} is the target load reduction

n is the number of years in the period of record

$C_{reservoir}$ is the measured atrazine concentration in the reservoir

$C_{treatment}$ is the treatment triggering atrazine concentration (2 ug/L)

$V_{reservoir}$ is volume of the reservoir

Watershed loads were also estimated from the soil group-scale NAPRA model output by using Monte Carlo simulations to randomly distribute the model data throughout the watershed. The methods randomly distributed the application of atrazine and the use of various BMPs throughout the watershed farm fields based on the average proportion of the watershed that plants corn each year. Because the NAPRA model only produces edge of field and bottom of root zone losses and does not incorporate fate and transport through the watershed, the magnitude of the model results will be greater than the actual reservoir loads because the dynamics of the flow routing processes, such as deposition and degradation, are not accounted for in the model.

5.2 Post-Processing Tools

As previously discussed, the evaluation of BMPs in the project watershed was completed in a three-tiered process. Modeling each soil group independently, as delineated by the USDA soil survey geographic (SSURGO) data, provide the first-tier model output data. Using spreadsheet-based post processing tools and GIS technology, results of the Tier-1 soil group modeling were then up-scaled into farm field-scale (Tier-2) and watershed-scale (Tier-3) levels.

Data generated from the NAPRA model is in list-format text files that serve as input to NAPRA's internal Client-Specific Report Generator. Because of the volume and variety of data generated through the NAPRA modeling process for this project, the Client-Specific Report Generator function of NAPRA was not used. Instead, spreadsheet-based post processing tools were developed in Visual Basic® for use with MS Excel® software, which enable customizable functionality and graphing capabilities.

Three spreadsheet-based post-processing tools were developed including:

- Probability Distribution Generator,
- Efficiency Ratio Calculator, and;
- Up-scaling Modules.

5.2.1 Probability Distribution Generator

The Probability Distribution Generator was developed to reorganize the list-format text output files from the NAPRA program and process the data into a rank and percentile structure. This tool generated probability distributions for each soil type and BMP combination, grouped by loss pathway. The probability distribution generator provided a statistical method for evaluating the most effective BMP in terms of the reduction in atrazine losses. Additionally, the rank and order of potential atrazine losses was also used to graphically display the effective probability of each BMP on a soil type and loss pathway basis.

5.2.2 Efficiency Ratio Calculator

The Efficiency Ratio (ER) Calculator was developed to reorganize the list-format text output files from the NAPRA program and calculate ERs based on contaminant losses from the individual loss pathways and from the total of all pathways. This tool also generated graphical displays of the efficiency ratios for comparison and analysis purposes.

Because the NAPRA model simulated 50 years of climatic data, the model output was analyzed using the resulting probability distributions. In cropping years with very low magnitude and infrequent storm events, the model-predicted that the edge of field atrazine losses are typically very low or non existent for all BMPs. BMP efficiency is only evident when larger magnitude storm events occur, or when frequent lower magnitude storm events occur consecutively before soil drying occurs. Model-predicted atrazine losses were therefore assessed by the geometric mean, upper quartile, and maximum values. When comparing atrazine loss data with values lower than the mean, inter-BMP performance and efficiency is difficult to discern.

To draw comparisons between BMPs at the soil group scale, efficiency ratios were calculated for each BMP and soil type. The efficiency ratios $(ER_{SG,BMP})$ can be expressed as the ratio of mass of atrazine lost per unit area soil to the mass of atrazine applied per unit area soil, dependent upon the BMP (one value for each BMP for each soil type, 27 BMP-based values per soil type) where the subscript SG and BMP denote the soil group and BMP, respectively. The most efficient BMP for a soil group is then defined as the BMP with the best $ER_{SG,BMP}$.

Although each soil and field has an optimal BMP in terms of atrazine losses, it is important to quantify the sensitivity to BMP use, or the magnitude of the benefit of implementing the BMPs. For example, managing soil group A with its optimal BMP may produce a reduction in atrazine losses of 0.15 lbs/acre, while managing soil group B with its optimal BMP may produce a reduction in atrazine losses of 0.35 lbs/ac. Therefore, if the same area of each soil type is optimally managed there is a greater benefit associated with managing soil group B. The range of ERs can be mapped throughout the watershed to show areas that could be targeted with specific BMPs to optimally reduce atrazine losses. The general form of the ER equation is provided below.

$$ER_{SG,BMP} = \frac{M_{SG,BMP}}{M_{applied}}$$

The efficiency ratios were defined for the total atrazine losses for each BMP and soil type combination, however, the benefit of many BMPs is more evident when analyzed on the basis of different loss pathways. For example, tilling a sandy soil will decrease surface runoff losses, but will greatly increase the leaching loss potential for the soil and may increase the total contaminant loss. For the purpose of this project, it was assumed that an overall decrease in atrazine losses was the primary concern; therefore the total of all loss pathways was considered for primary analyses. It should be noted however, that under specific circumstances, there are occasions when managing for only one loss pathway may be the best method for a field.

5.2.3 The Up-scaling Process

The Up-scaling Process was used to evaluate the performance of the EQIP program based on the NAPRA model output. EQIP enrollment details were linked to GIS data for the participating farm fields for each year of the program. The Tier-1 level model output, in terms of mass per area contaminant losses, was then combined for all soil groups in the field assuming two cropping practice scenarios. The first scenario assumed that all fields enrolled in the program continued to use the baseline BMPs, while the second scenario specified the use of the BMPs that were practiced during each year of EQIP. The overall benefit of the program is the net reduction in atrazine losses to the watershed provided by implementing the new BMPs.

5.2.4 Optimization Methodology

A field may be composed of one or multiple soil types; however, farming practices do not typically change within a field. To determine the BMP that best prevents atrazine losses for each farm field, the proportion of each field composed of individual soil types was first determined from GIS analyses. Output from the NAPRA program, in terms of mass per area contaminant losses, was then up-scaled to the proportions of soils in a field. The Up-scaling Process was developed to combine GIS and NAPRA model data. BMP combinations were applied to entire fields, including the variety of soil types for each, and the total of the atrazine losses from an entire field were calculated. Field-scale atrazine losses based on the use of each BMP were statistically compared to identify the optimal BMP for each farm field in the project watershed.

Historical BMP data was only available for farm fields that enrolled in the EQIP program; however, atrazine loading determined using Hoover Reservoir water quality data provides a basis to evaluate the output from control actions for the entire watershed. To optimize the effectiveness of non-point source pollution abatement programs, such as EQIP, it is important to determine the level of effort that would be required to reduce contaminant loading to an acceptable level. The level of effort can be described in terms of both environmental benefits and the reduction of water treatment costs as compared to costs for sours control BMPs.

A two-step Monte Carlo approach was used to determine the percent participation from farmers (in terms of cropland acres enrolled in the program) that would be required to reduce atrazine loading to Hoover Reservoir by relevant amounts. By using a Monte Carlo approach, multiple simulations of the watershed and BMP scenarios were produced and statistical trends and thresholds were evaluated throughout the process. This method is dependant upon two user-defined variables:

The percent of the watershed devoted to corn production (typically associated with atrazine application) in an average year (step one); and,

The percent of those fields that plant corn and use the optimal BMP combination versus the baseline BMP combination (step two).

Each simulation randomly distributed the user defined variables to farm fields throughout the watershed. Additional simulations were generated by looping through the processes until a normal distribution of output (watershed mass load) was generated and negligible changes in general statistical measures occurred with the addition of new realizations. Each of the following sub-sections details the steps used to accomplish the watershed-scale optimization.

Monte Carlo Step 1

Atrazine in the project watershed is typically only applied to fields when corn is grown. Published documentation of farm field planting in the watershed was used to determine the proportions of fields that grow corn in an average year. The first step of each simulation developed an indicator file to show each farm field, the area of the field as a total and divided by soil type, and a corresponding random number within the interval from 0 to 1. The random numbers were then used to rank the fields in order and a running total of the area and percent of the watershed was calculated. A percentage of the watershed was then specified to plant corn (and apply atrazine) as identified by the running total of the watershed percentage. For example, if 35% of the watershed was specified to plant corn, then the fields with area values that represent 35% or less of the running total of the area were used to establish the distribution of fields devoted to corn production.

Monte Carlo Step 2

Only a fraction of the fields used for corn production are enrolled in the EQIP program. The second user-defined variable was the proportion of fields that planted corn and used the optimal BMP (percent enrollment). In later simulation sets, the percent enrollment was varied to determine an enrollment threshold that would meet the target load reduction for Hoover Reservoir. The percent enrollment variable was distributed similarly to the approach used for assigning fields to plant corn. A random number within the interval from 0 to 1 was applied to each field that was assigned to plant corn in the previous step of the simulation. The random numbers (and corresponding fields) from step two were then ranked in order and a running total of the area and percentage of the total area planting corn was calculated. The percent of the fields selected to use optimal BMPs was specified and the remaining fields were assigned the baseline BMPs. For example, if the program enrollment was 25%, then the fields with area values that represent 25% or less of the running total of the area planting corn would be used to establish the distribution of optimal BMPs. A trial and error process was used to evaluate the range of potential percent enrollment values until the resulting atrazine loss values equaled the target load reduction for the reservoir.

6.0 RESULTS AND CONCLUSIONS

6.1 NAPRA Soil Group Level Results and BMP Ranking

To assess BMP performance at the soil group scale, the Tier 1 output from the NAPRA model was post-processed and BMP rankings were established. Efficiency ratios for the BMPs were also determined and compared to the incentive amount provided for implementation.

6.1.1 Soil Group Proportions

The proportions of the farmed area of the project watershed represented by each soil type are provided in Table 2 along with the cumulative percent area. As shown in the table over 95% of the farmed area is represented by soil groups 8, 114, 21, 18, 20, 30, and 6, with all other soil groups comprising less than 1% each of the total area.

6.1.2 Timing of Application

The timing of atrazine application has a large effect on the amount of product lost from the field. Five event date sets were processes for each BMP representing the variability in the periods of the cropping cycle. Because the NAPRA model simulated 50 years of climatic data, the model output was analyzed in the form of the probability distributions. To represent the potential variability in planting periods and the risk of atrazine losses as a result of crop practice timing the NAPRA output from the five event date sets were combined to form probability distributions containing 250 Tier 1 data points. All subsequent analyses of the model output data were based on the probability distributions of the combined event date set data.

6.1.3 BMP Ranking

In cropping years with very low magnitude and infrequent storm events, the model-predicted edge of field and bottom of root zone atrazine losses are typically very low or non existent for all BMPs. For these lower mass output years, the performance of all modeled BMPs is good and little atrazine loss occurs. Under very temperate climate conditions the NAPRA model predicts that little or no atrazine is lost from most of the soil types common to the project watershed.

The assessment of the model-predicted probability distributions of atrazine losses was based on the following statistical measures:

Mean,

Geometric Mean,

First (lower) Quartile,

Third (upper) Quartile,

Variance, and;

Standard Deviation.

The results indicate that when comparing atrazine loss data values that are lower than the mean, inter-BMP performance and efficiency is difficult to discern and at lower loss values (infrequent, low magnitude storms) performance and efficiency is nearly equal for all BMPs. It is only during high atrazine loss years (wetter conditions) that BMP efficiencies are most evident.

A summary of the BMP rankings for most-prevalent soil groups (8, 114, 21, 18, 20, 30 and 6) is provided as Table 3 Matrices of the BMP rankings for all soils are provided in Attachment C as Tables 1-X[1] through 3-X. Table 1-X lists the BPM rankings based on the total of all loss pathways while Tables 2-X and 3-X provide the BMP rankings based on the soluble surface loss, soluble leaching loss pathways, respectively. These tables present the atrazine loss data based on various univariate statistical measures that provide insight to the model-predicted probability distributions. Atrazine losses from the adsorbed surface loss pathway were negligible for all soils. The ASL pathway was therefore excluded from further individual analyses, but is inherently included in all analyses of data for the total of all loss pathways.

Model results processed through the Probability Distribution Generator are also provided in Appendix C. BMP performance is graphically displayed for the total of all loss pathways in Figure 1-X, while the SSL and SLL pathways are included as Figure 2-X and Figure 3-X, respectively.

6.1.4 BMP Efficiency and Cost Comparison

To compare efficiencies, each potential BMP combination from the NAPRA model output was post-processed with the Efficiency Ratio Calculator. Results from the Efficiency Ratio Calculator are tabulated in Attachment C. Table 4-X provides the efficiency ratios for soil groups and BMP combinations based on the total of all loss pathways. Tables 5-X and 6-X provide the efficiency ratios based on the soluble surface loss and soluble leaching loss pathways, respectively. The efficiency ratios are presented with respect to the amount of atrazine applied (mass ratio) and also as the percent efficiency over the baseline BMP.

BMP efficiency is only evident when larger magnitude storm events occur, or when frequent lower magnitude storm events occur consecutively before soil drying occurs. It is during these high mass-loss years that BMP performance is most evident, and BMP efficiencies trend away from unity. This relationship is also evident in Figures 1-X, 2-X and 3-X.

Funding provided for BMP implementation was determined from EQIP enrollment details and compared to the BMP efficiencies by soil type. A summary of the BMP efficiency ratios and cost-effectiveness is provided as Table 4a for the soils that compose the greater proportion of the farmed watershed area. Table 4b contains the BMP efficiency ratios and cost effectiveness for all soil groups within the farmed area of the watershed. The tabulated data was calculated from the upper quartile data. In other words, each

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[1] –X represents the soil group number, for example Table 6-21 represents Table 6, containing data for soil group 21, a Pewamo Soil.

BMP will be more efficient than the presented values 75% of the time. The table provides the following information:

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Grams per hectare reduction as compared to the baseline BMP

The percent difference in the efficiency ratio as compared to the baseline BMP

The grams atrazine reduced per dollar implementation cost

The results indicate that for some soils an 80% or more reduction in total atrazine losses can be achieved by implementing the most effective BMP.

The results presented in Table 3 indicate that BMP cost effectiveness is dependant on the soil group. Soil groups 23 and 113 achieve over 4.2 grams and 3.7 grams reductions per dollar incentive cost, respectively, while the average cost-effectiveness for all of the modeled BMPs is approximately 1.7 grams reduced per dollar incentive cost.

6.2 EQIP Evaluation

To evaluate the performance of the EQIP in the project watershed, EQIP enrollment details for participating farm fields were linked to the NAPRA model output. The results indicate that the program decreased the amount of atrazine leaving the participating farm fields by a total of 1,942 pounds between 1999 and 2005. Details for each of these years are presented in the discussion below. Up-scaled NAPRA model output is displayed for each of the EQIP years in Figures 6 through 10 in terms of pounds of atrazine prevented from leaving one acre of the field, with negative values indicate that more atrazine left the field as a result of the EQIP-implemented BMPs. To asses the cost-effectiveness of the program, the BMP incentive costs were tabulated for the enrolled fields and compared to the resulting annual load reduction values. The BMP implementation costs and annual loading values are provided in Table 4 and in the discussion below.

6.2.1 1999

In 1999 approximately 1,792 cropland acres were enrolled in the EQIP. All farm fields enrolled in the program in 1999 received incentives for atrazine buy-down (to use a product other than atrazine), which based on an application rate of one pound per acre (1.12 kg/ha), provided a decrease in the total amount of atrazine applied in the watershed of 1,792 pounds. The up-scaled results of the NAPRA model indicate that approximately 138 pounds of atrazine were prevented from leaving the farm fields (Figure 6).

Farms enrolled in EQIP for atrazine buy-down received $15 per acre, for a total EQIP implementation cost of approximately $26,885 for the 1999 calendar year. In terms of the watershed load reduction, the efficiency of EQIP during 1999 resulted in a cost of approximately $195 per pound load reduction.

6.2.2 2000

In 2000 approximately 4,855 cropland acres were enrolled in the EQIP. Of that amount approximately 3,690 acres received incentives for atrazine buy-down, which provided a decrease in the total amount of atrazine applied in the watershed, of 3,690 pounds. Based on the up-scaled results of the NAPRA model, approximately 209 pounds of atrazine were prevented from leaving the farm fields as a result of atrazine buy-down. Approximately 1,165 acres were provided incentives to use various other BMPs, which resulted in an atrazine loss reduction of approximately 13 additional pounds, for a total EQIP atrazine loss reduction of 266 pounds (Figure 7).

Based on the dollars per acre enrollment incentives provided to farmers for EQIP BMP implementation, the program cost was approximately $67,000 for the 2000 calendar year. In terms of the watershed load reduction, the efficiency of EQIP during 2000 resulted in a cost of approximately $302 per pound load reduction.

6.2.3 2001

In 2001 approximately 7,919 cropland acres were enrolled in the EQIP. Of those acres enrolled approximately 6,596 acres received incentives for atrazine buy-down, which provided a decrease in the total amount of atrazine applied in the watershed, of 6,596 pounds. Based on the up-scaled results of the NAPRA model, approximately 676 pounds of atrazine were prevented from leaving the farm fields as a result of atrazine buy-down. Approximately 1,323 acres were provided incentives to use various other BMPs, which resulted in an additional atrazine loss reduction of 35 pounds, for a total EQIP atrazine loss reduction of 710 pounds (Figure 8).

Based on the dollars per acre enrollment incentives provided to farmers for EQIP BMP implementation, the total cost during the 2001 calendar year was approximately $112,435. In terms of the watershed load reduction, the efficiency of EQIP during 2001 resulted in a cost of approximately $158 per pound load reduction.

6.2.4 2002

In 2002 approximately 9,017 cropland acres were enrolled in the EQIP. Of those acres enrolled approximately 7,667 acres received incentives for atrazine buy-down, which provided a decrease in the total amount of atrazine applied in the watershed, of 7,667 pounds. Based on the up-scaled results of the NAPRA model, approximately 440 pounds of atrazine were prevented from leaving the farm fields as a result of atrazine buy-down. Approximately 1,350 acres were provided incentives to use various other BMPs. The implementation of other BMPs resulted in an increase in atrazine losses of approximately 6 pounds, for a total EQIP atrazine loss reduction of 433 pounds (Figure 9). Farm fields from which an increase in atrazine losses occurred are shown in red on Figure 9.

Based on the dollars per acre enrollment incentives provided to farmers for EQIP BMP implementation, the total cost during the 2002 calendar year was approximately

$128,941. In terms of the watershed load reduction, the efficiency of EQIP during 2002 resulted in a cost of approximately $298 per pound load reduction.

6.2.5 2003

In 2003 approximately 10,374 cropland acres were enrolled in the EQIP. Of that amount approximately 9,046 acres received incentives for atrazine buy-down, which provided a decrease in the total amount of atrazine applied in the watershed, of 9,046 pounds. Based on the up-scaled results of the NAPRA model, approximately 404 pounds of atrazine were prevented from leaving the farm fields as a result of atrazine buy-down. Approximately 1,328 acres were provided incentives to use various other BMPs. The implementation of other BMPs resulted in an increase in atrazine losses of approximately 7 pounds, for a total EQIP atrazine loss reduction of approximately 498 pounds (Figure 10). Farm fields from which an increase in atrazine losses occurred are shown in red on Figure 10.

Based on the dollars per acre enrollment incentives provided to farmers for EQIP BMP implementation, the total cost during the 2003 calendar year was approximately $149,440. In terms of the watershed load reduction, the efficiency of EQIP during 2003 resulted in a cost of approximately $375 per pound load reduction.

6.3 Target Load Reduction

Atrazine concentrations in Hoover Reservoir are a function of the atrazine mass lost from the farm field areas of the watershed and the hydrologic flux of the reservoir. Monthly water quality samples from the reservoir serve only as a snapshot of the true atrazine loading dynamics. To use monthly water quality samples as an indicator of the reservoir load the following assumptions were made:

- Water quality sample concentration is a function of the atrazine load in the reservoir and the reservoir volume.
- Full mixing occurs in the reservoir and the sampled atrazine concentration is uniform throughout the reservoir.
- The volume of water and mass of atrazine in the reservoir is from the project watershed only.

Figure 11 presents the variability of monthly reservoir volumes and atrazine concentrations recorded during the baseline period of record. The concentration and volume data provide a wide range of load values, however the trend of the load values typically coincides with the concentrations as presented in Figure 12. Tables 5 through 9 provide the reservoir volume, sampled atrazine concentration, and load data used to establish the target load reduction. These tables are briefly summarized below.

- Table 5 presents the monthly atrazine concentrations from Hoover Reservoir. Sampling was performed by the City of Columbus at a consistent sample collection site.

- Table 6 presents the monthly volume of Hoover Reservoir based on water levels collected by the City of Columbus.
- Table 7 presents the atrazine load in Hoover Reservoir calculated from the monthly concentration and volume data.
- Table 8 presents the theoretical atrazine load present in Hoover Reservoir (lbs) assuming true reservoir volume and uniform concentration at the treatment-triggering threshold of 2.0 ug/L.
- Table 9 presents the load reduction requirements to keep monthly atrazine loads below treatment triggering loads. Months where no load reduction is required are shown as negative numbers.

Prior to the manufacturer's reduction in the recommended application rate reduction (1987 to 1993), the maximum snapshot atrazine load in Hoover Reservoir was 1,905 lbs with a treatment-triggering load at the corresponding reservoir volume of 320 lbs. The resulting load reduction requirement was 1,585 lbs. By decreasing the manufacturer's recommended label rate (the baseline period of record) the maximum snapshot atrazine load in Hoover Reservoir dropped to 1,130 lbs with a treatment-triggering load at the corresponding reservoir volume of 347 lbs. The resulting load reduction requirement decreased to 783 lbs, which was established as the target load reduction for the optimization process.

Climatic conditions provide the primary driving force for atrazine losses from agricultural fields. Many factors, including wind speed, solar radiation, and temperature play key roles in the wetting and drying of soils, however, precipitation is the predominant cause. To estimate the effect of the difference in the precipitation conditions between the three periods of the atrazine loading record of Hoover Reservoir an analysis of variance (ANOVA) was performed. The ANOVA was performed on the natural log transform of daily precipitation values for all days in each of the three individual periods. The ANOVA results, provided in Table 10, indicate that all three periods have statistically similar precipitation conditions.

6.4 Optimization

6.4.1 Monte Carlo Modeling

A two step Monte Carlo method was used for the optimization process using a combination of GIS data and the Up-scaling Process. The first step established the percent of the farmed watershed specified to plant corn and use atrazine.

Figure 13 presents the historical cropping practices for Ohio. For more than 50 years the percentage of acreage that has planted corn has remained consistent at 35%. It was assumed that the farming practices for the project watershed are consistent with the state-wide statistics presented in Figure 13. Additionally, to estimate the atrazine loss potential as a function of increased corn production, 50% was also used in the Monte Carlo process as the percent of the farmed watershed that planted corn.

The second step of the process estimated the watershed-based atrazine load based on the NAPRA model output. As previously discussed, the NAPRA model output is in the form of probability distributions based on 50 years of climatic data. The results from two Monte Carlo scenarios, based on 35% and 50% of the farmed watershed planting corn, are displayed graphically in Figures 14a, 14b, 15a, and 15b. Figure 14a and 15a provide a potential outcome from 35% and 50% of the farmed area planting corn and using the baseline BMP. Figures 14b and 15b provide the potential outcome from 35% and 50% of the farmed area planting corn and using the optimal BMP for each field. The results from these scenarios are also presented in Table 11.

Table 11 presents the Monte Carlo model output assuming that all fields that planted corn used the optimal BMPs for the field. Results in Table 11 are provided from Monte Carlo simulations that utilized the geometric mean, upper quartile, and maximum values from the NAPRA model probability distributions. Based on the historical corn production ratio (35%), the results indicate that under average climatic conditions an annual load reduction of 492 lbs may be achieved under 100% optimal farming practices. Under more severe climatic conditions, represented by lower probability of occurrence from the NAPRA model probability distribution data, a 1,969-pound reduction may be achieved.

7.0 REFERENCES

Edwards, Tom. E-mail communications, November 6, 2002.

Hahn, T.E. 1998. *National Agricultural Pesticide Risk Analysis User Manual*. USDA. Amherst, MA

Knisel, W.G., R.A. Leonard, and F.M. Davis. 1994. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems. (Version 2.10) USDA Agricultural Research Service, Tifton, GA.

Knisel, W.G. and Davis, F.M. 2000. *GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual*.

Laux, Mark, 2003. E-mail communication. March 4, 2003

Malcolm Pirnie, 2003. *Quality Assurance Project Plan (QAPP): Methodology for Evaluating the Effectiveness of Watershed-Scale Nonpoint Source Pollution Abatement Programs.* Columbus, Ohio.

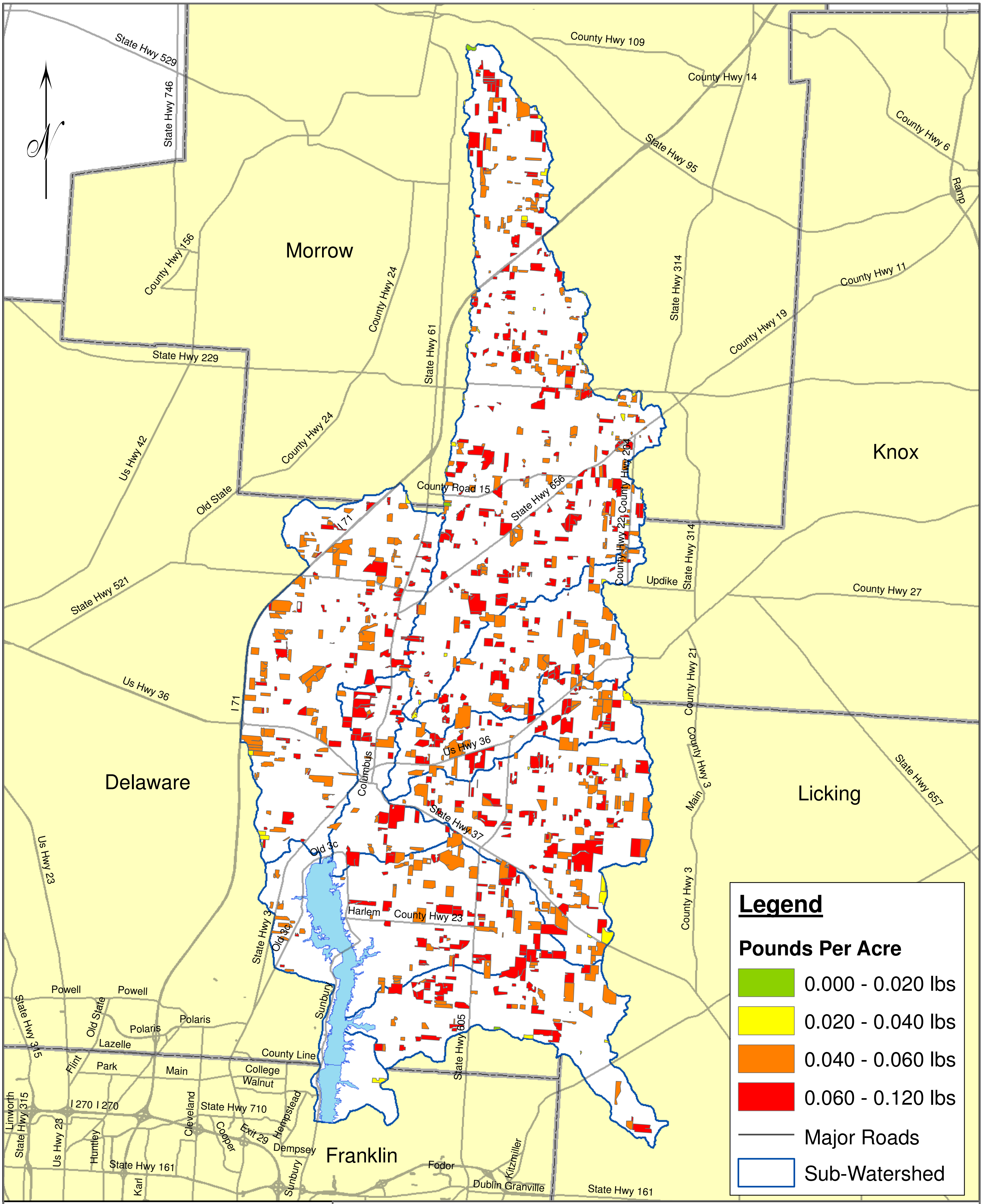
MRCC, 2006. Midwestern Regional Climate Center. Precipitation and temperature data for the period 1953 through October 2003 at the Centerburg, Ohio rain gauge station. Champaign, Ill.

Ohio Department of Agriculture. 2003. *Ohio Weekly Crop Progress Reports.* Columbus, OH.

OSU Extension. 1995. *Ohio Agronomy Guide, 13th Addition. Corn Production Bulletin 472. The Ohio State University Extension. Columbus, OH.*

USDA. 2001. Soil Survey of Delaware County, Ohio. Natural Resources Conservation Service, USDA.

Weischmeier, W.H. and Smith, D.D. 1978. *Predicting Rainfall Erosion Losses: A Guide to Conservation Planning.* Agricultural Handbook 537. Natural Resources Conservation Service, USDA.



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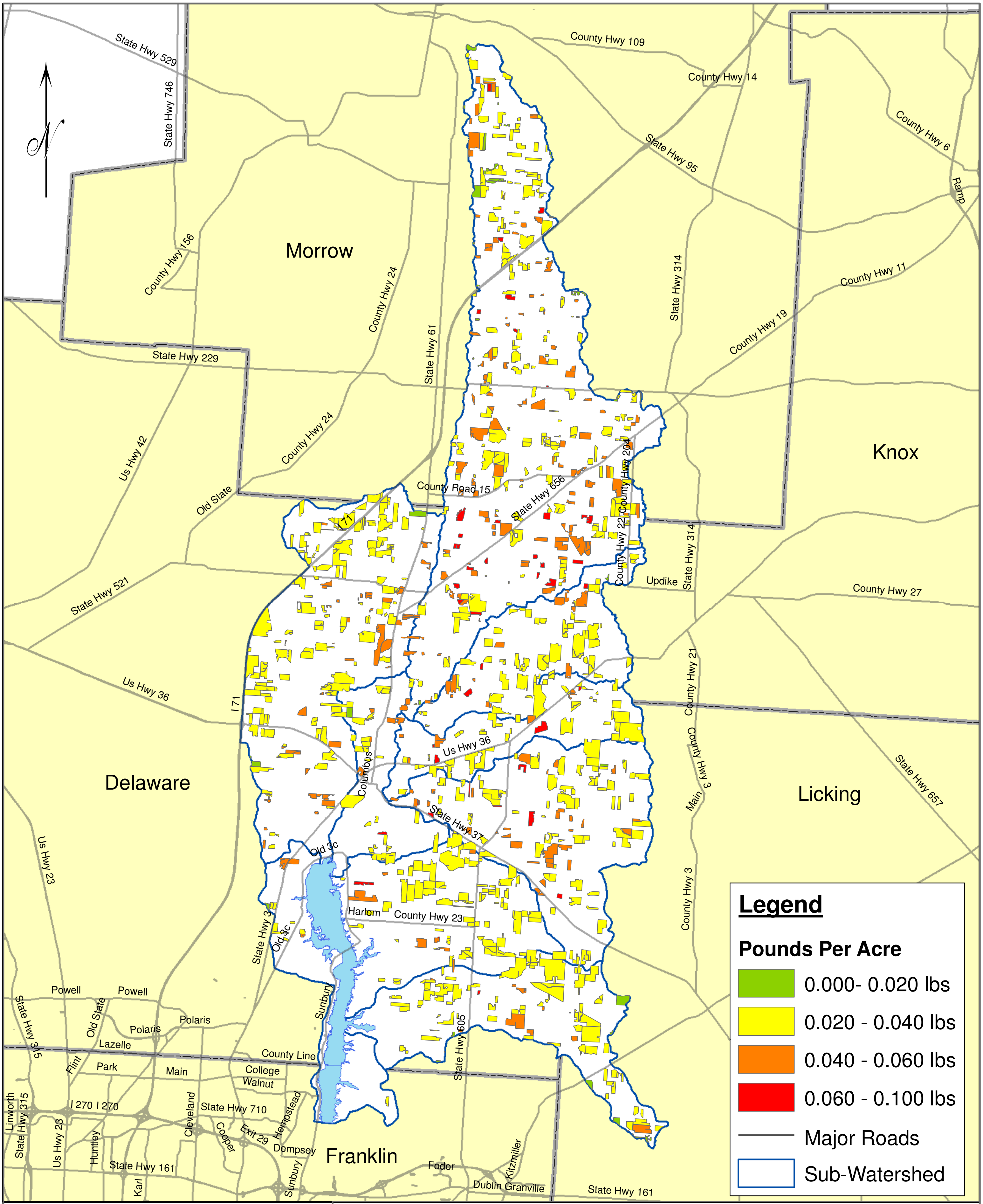
Monte Carlo

USEPA/ORSANCO BMP Evaluation Methodology

June 2007

0 1 2 4 Miles

FIGURE 14a



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0 1 2 4
Miles

FIGURE 14b

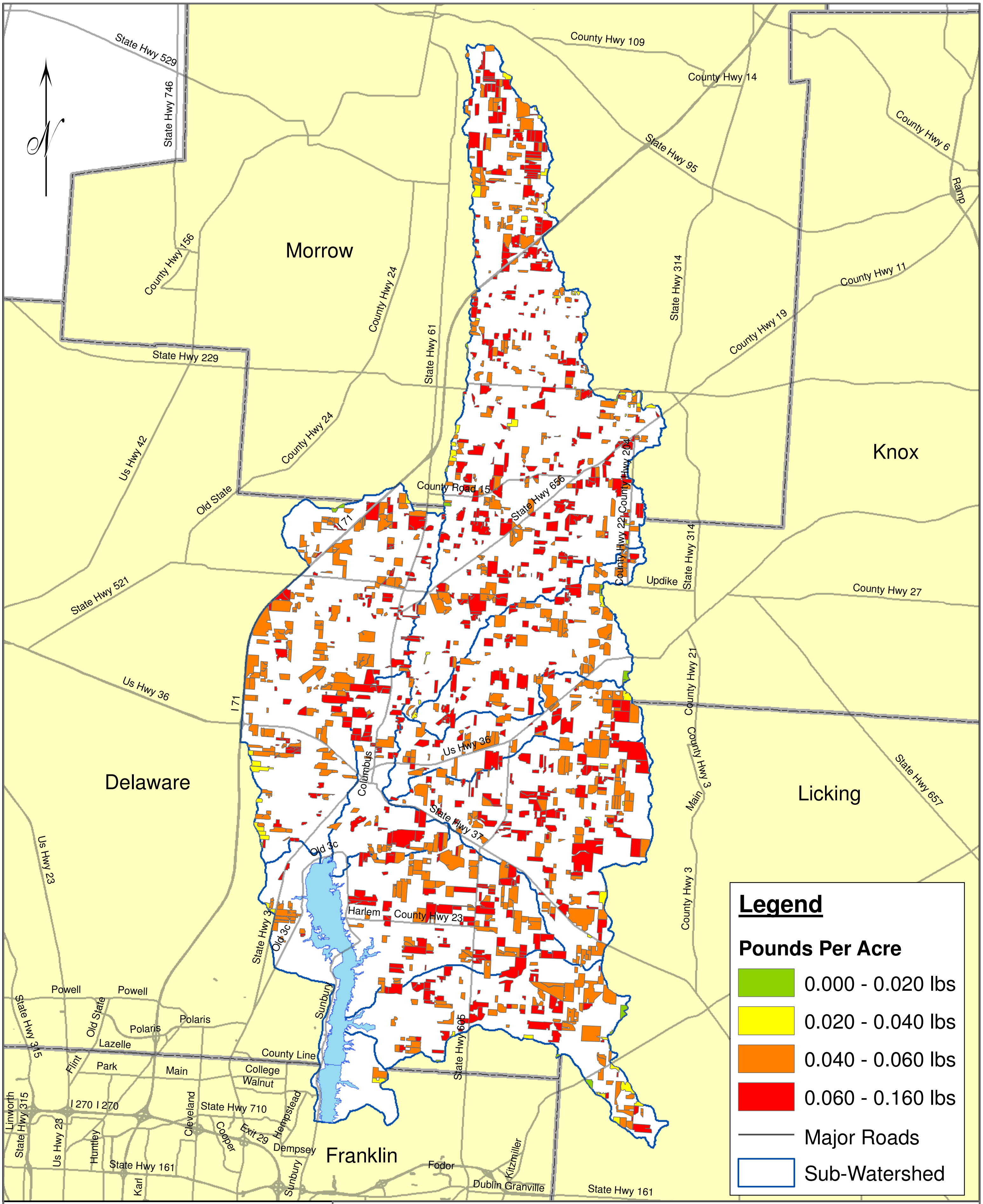

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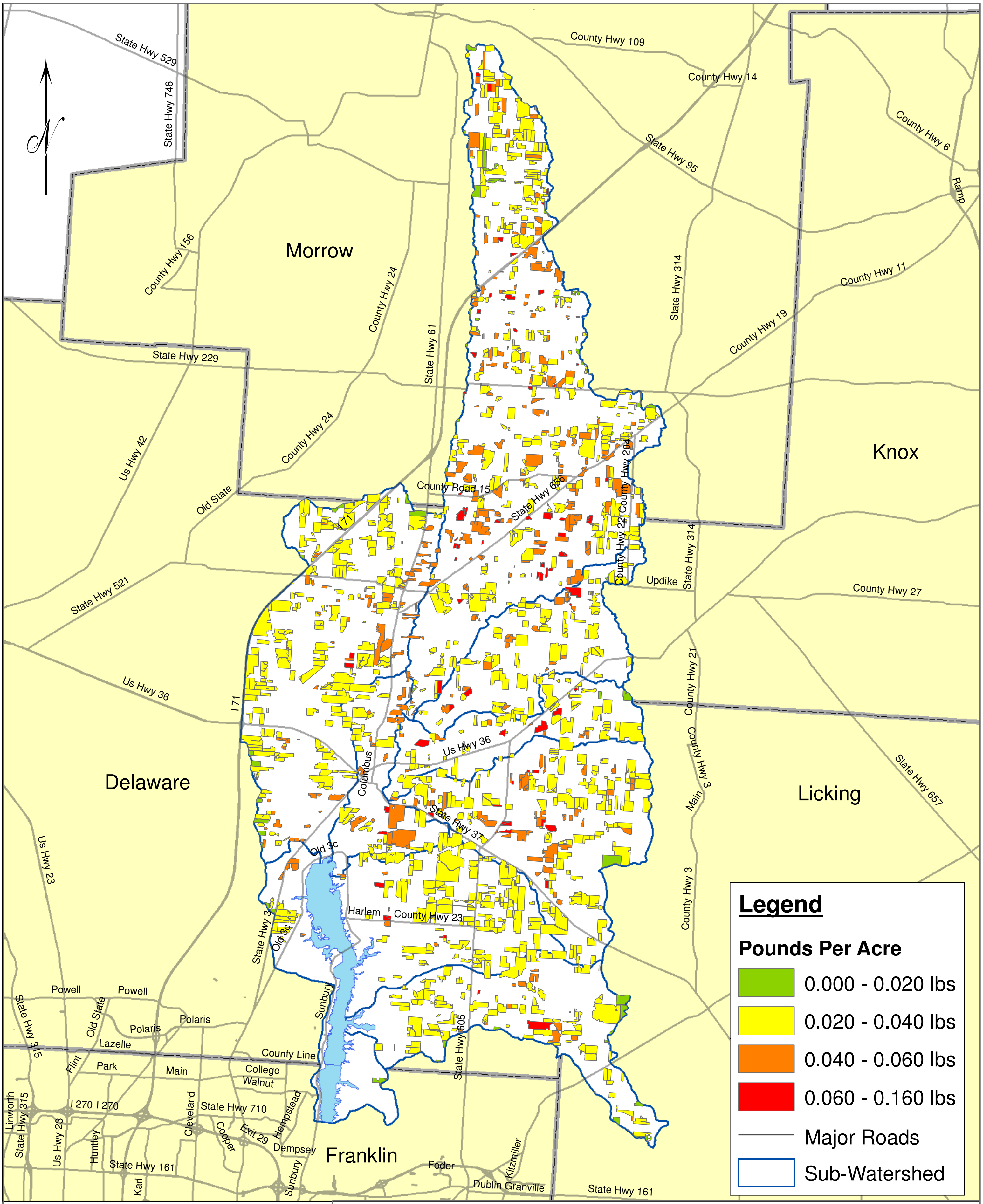
FIGURE 15a



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0 1 2 4 Miles

FIGURE 15b

Table 1:
List of NAPRA Parameter Database Files

Database File	Data	Type	Input Required
GLMSCROP.DBF	Crop Codes, GLEAMS 2.10.01	Primary	crop yield, dry matter ratio, C/N ratio, N/P ratio, C1, C2, crop height, root depth
CROPDATE.DBF	Crop Practice Dates	Primary	planting month and day, maturity month and day, crop truncation month and day
LEAFAREA.DBF	Leaf Area Indexes	Primary	None
RCNCRCAT.DBF	Runoff Curve Number Crop Categories	Read-only	None
SOILMAN.DBF	Soil Management	Read-only	None
RCN_RAT.DBF	Runoff Curve Number Ratio Table	Read-only	None
CROPPRAC.DBF	Crop Practices	Secondary	root depth
WAT_MAN.DBF	Water Management	Primary	None
CDATE.DBF	Erosion Factor Dates	Primary	month and day for each "event date"
PFACT.DBF	P Factors	Primary	practice factor for each "event date"
SFACT.DBF	Smoothness Factors	Primary	smoothness factor for each "event date"
SLR.DBF	Soil Loss Ratios	Primary	soil loss ratio for each "event date"
CHEMICAL.DBF	Active Ingredient Data	Primary	half-life of chemical, % washoff
SOIL_PH.DBF	Active Ingredient Data by Soil pH	Secondary	soil pH, solubility, Koc, half-life
GAC_ID.DBF	Application Codes, GLEAMS 2.10.01	Read-only	None
APP_METH.DBF	Application Method	Primary	CHEMIG_DEP, depth of incorporation, fraction intercepted by crop and residue, soil fraction
TIMING.DBF	Application Timing Data	Primary	month and day of first application, number of applications, days until next
CHEM_USE.DBF	Chemical Use Pratice	Secondary	kg/ha of active ingredient
CURVTYPE.DBF	Loss Types	Read-only	None
CLIGEN.DBF	Climate Data - Generated (CLIGEN)	Read-only	None
CLIMATE.DBF	Climate Data - Measured (Actual)	Primary	files containing daily precip. data, ave. daily temp. data, mean monthly max. temp. data, mean monthly min. temp. data, and mean monthly solar radiation data
CONSTANT.DBF	Regional Constants	Primary	ET model, effective hydraulic root depth, field area, fraction of plant available water, specific surface area of clay, coefficient of pesticide uptake by plants, ratio of OM for horizon #X over OM for horizon #1
SOIL_MAP.DBF	SSSD to Soil Group Cross-Reference	Primary	soil component name, surface texture class, ssa id, map unit symbol,
SOILGRUP.DBF	Soil Groups	Primary	soil component name, surface texture class, ssa id, map unit symbol, hydrologic group, K factor, CONA, number of horizons, depth of each horizon, clay fraction of each horizon, silt fraction of each horizon, and sand fraction of each horizon
WRET_VAL.DBF	Soil Water Retention Values	Primary	number of horizons, OM for each horizon, field capacity for each horizon, porosity for each horizon, wilting point for each horizon, saturated conductivity for each horizon, Runoff Curve Number
DATEFACT.DBF	Crop/Tillage Relationship	Secondary	hydrologic condition
SCENARIO.DBF	Crop, Tillage, Soil & Climate Scenario	Secondary	None
RUN_COMB.DBF	Scenario Combinations for GLEAMS	Secondary	field slope, slope length

Table 2: Cropland Soil Group Summary

Soil Group ID	Soil Name	Surface Texture	Map Unit Symbol	Total Cropland Acres	Percent of Total Area	Cummulative Percent
8	Bennington	SIL	BeA	24,682.73	42.39%	42.39%
114	Pewamo	SICL	Pc	12,664.06	21.75%	64.14%
21	Centerburg	SIL	CdB	8,167.59	14.03%	78.17%
18	Cardington	SIL	CaB	4,298.10	7.38%	85.55%
20	Centerburg	SIL	CeB	4,178.49	7.18%	92.72%
30	Condit	SIL	Cr	773.66	1.33%	94.05%
6	Amanda	SIL	AdD2	758.40	1.30%	95.36%
113	Pewamo	SICL	Pc	329.85	0.57%	95.92%
98	Millgrove	SIL	MfA	276.18	0.47%	96.40%
140	Sloan	SIL	LsA	272.93	0.47%	96.86%
132	Shoals	SIL	Sh	266.02	0.46%	97.32%
143	Smothers	SIL	SsA	263.44	0.45%	97.77%
43	Gallman	SIL	GaB	212.90	0.37%	98.14%
29	Condit	SIL	Cn	201.66	0.35%	98.49%
72	Lobdell	SIL	LoA	124.55	0.21%	98.70%
61	Jimtown	SIL	JmA	113.76	0.20%	98.90%
139	Sloan	SIL	LsA	111.57	0.19%	99.09%
92	Milford	SICL	Mf	103.01	0.18%	99.26%
73	Loudonville	SIL	LvB	89.43	0.15%	99.42%
142	Sloan	SIL	RsA	62.34	0.11%	99.52%
133	Sleeth	SIL	SlA	55.48	0.10%	99.62%
76	Luray	SICL	Ly	44.91	0.08%	99.70%
0	Brownsville	CN-SIL	BrC	37.87	0.07%	99.76%
41	Gallman	L	GaC2	26.60	0.05%	99.81%
101	Mitiwanga	SIL	MrB	22.05	0.04%	99.85%
85	Mentor	SIL	McD2	22.03	0.04%	99.88%
42	Gallman	SIL	GcB	19.72	0.03%	99.92%
141	Sloan	SIL	RsA	8.30	0.01%	99.93%
57	Holly	SIL	Ho	6.93	0.01%	99.94%
107	Ockley	SIL	OcB	5.00	0.01%	99.95%
38	Fitchville	SIL	Ee	4.02	0.01%	99.96%
111	Pewamo	SICL	Pm	3.43	0.01%	99.96%
39	Fox	GR-L	ElA	3.41	0.01%	99.97%
33	Crane	SIL	CpA	2.96	0.01%	99.98%
131	Shoals	SIL	SgA	2.90	0.00%	99.98%
137	Sloan	SICL	So	2.83	0.00%	99.99%
13	Miamian	SICL	MlB2	2.18	0.00%	99.99%
13	Bogart	SIL	BoA	2.18	0.00%	99.99%
105	Ockley	SIL	OcA	2.03	0.00%	100.00%
149	Tioga	L	Tg	1.47	0.00%	100.00%
23	Chili	L	ChA	0.49	0.00%	100.00%

Table 3: Efficiency Ratios and Cost Effectiveness Matrix

	6	6	6	8	8	8	13	13	13	18	18	18
BMP	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	40	61%	0.91	31	58%	0.69	41	55%	0.93	37	50%	0.82
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	40	60%	0.49	30	57%	0.37	41	54%	0.50	36	49%	0.44
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	40	60%	0.89	30	57%	0.68	41	54%	0.92	36	49%	0.81
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	18	27%	0.40	26	49%	0.58	41	54%	0.92	13	18%	0.29
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	31	46%	0.69	27	51%	0.60	41	54%	0.91	28	39%	0.64
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	13	19%	0.29	24	45%	0.53	38	50%	0.85	7	9%	0.15
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	13	19%	0.16	23	45%	0.29	38	50%	0.46	6	9%	0.08
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	34	51%	1.71	26	49%	1.30	32	43%	1.64	27	36%	1.35
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	33	50%	0.58	26	49%	0.45	32	42%	0.57	25	35%	0.45
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	33	49%	1.67	26	49%	1.29	32	42%	1.63	25	35%	1.28
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	26	40%	0.59	25	48%	0.57	37	49%	0.84	24	32%	0.53
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	26	39%	0.32	25	48%	0.31	37	49%	0.46	24	32%	0.29
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	20	31%	1.04	21	40%	1.07	32	42%	1.60	16	22%	0.80
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15	22%	0.74	17	33%	0.87	28	37%	1.41	9	12%	0.44
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	15	22%	0.26	17	33%	0.30	28	37%	0.49	9	12%	0.15
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	-5	-7%	0.00	15	28%	0.60	32	42%	1.30	0	0%	0.00
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	-29	-43%	0.00	5	9%	0.20	26	34%	1.05	-21	-29%	0.00
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	-41	-61%	0.00	5	9%	0.08	26	34%	0.42	-41	-56%	0.00
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	16	24%	0.65	11	22%	0.46	18	23%	0.71	18	24%	0.71
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	3	5%	0.12	3	6%	0.13	12	16%	0.50	3	5%	0.14
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	-4	-5%	0.00	3	6%	0.05	12	16%	0.20	-1	-2%	0.00
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0	0%	0.00	0	0%	0.00	0	0%	0.00	0	0%	0.00
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	-18	-27%	0.00	-11	-21%	0.00	-8	-11%	0.00	-19	-26%	0.00
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	-28	-42%	-0.76	-11	-21%	0.00	-8	-11%	0.00	-27	-37%	0.00

Table 3: Efficiency Ratios and Cost Effectiveness Matrix

BMP	**20** reduction	**20** ER	**20** g/$	**21** reduction	**21** ER	**21** g/$	**23** reduction	**23** ER	**23** g/$	**29** reduction	**29** ER	**29** g/$	**30** reduction
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	38	36%	0.85	45	56%	1.02	92	72%	2.08	45	63%	1.01	46
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	38	36%	0.46	45	56%	0.55	92	72%	1.13	45	63%	0.55	46
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	38	36%	0.85	45	56%	1.02	92	72%	2.06	45	63%	1.01	46
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	-10	-10%	0.00	11	13%	0.24	46	36%	1.04	45	63%	1.01	43
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	25	23%	0.56	31	38%	0.69	70	55%	1.57	42	59%	0.95	42
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	-23	-22%	0.00	4	5%	0.09	38	30%	0.86	43	60%	0.96	40
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	-23	-22%	0.00	4	5%	0.05	38	30%	0.47	43	60%	0.52	40
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	23	21%	1.15	36	45%	1.84	84	66%	4.27	39	55%	1.99	40
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	22	20%	0.38	36	44%	0.63	84	66%	1.48	39	55%	0.69	40
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22	20%	1.10	36	44%	1.81	84	66%	4.25	39	55%	1.99	40
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	16	15%	0.37	26	33%	0.59	63	49%	1.42	40	56%	0.89	39
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	16	15%	0.20	26	33%	0.32	63	49%	0.77	40	56%	0.48	39
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2	2%	0.09	18	22%	0.91	54	42%	2.74	36	50%	1.80	35
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	-10	-10%	0.00	10	13%	0.52	46	36%	2.32	32	45%	1.62	30
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	-10	-10%	0.00	10	13%	0.18	46	36%	0.81	32	45%	0.56	30
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	-15	-14%	0.00	-9	-11%	0.00	-11	-9%	0.00	29	41%	1.18	28
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	-51	-48%	0.00	-39	-49%	0.00	-44	-35%	0.00	22	31%	0.89	19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	-72	-68%	0.00	-39	-49%	0.00	-50	-39%	0.00	22	31%	0.35	19
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	24	23%	0.98	19	24%	0.78	29	23%	1.19	16	23%	0.66	16
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	8	8%	0.32	3	3%	0.11	12	10%	0.50	11	15%	0.45	9
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1	1%	0.01	3	3%	0.04	11	9%	0.18	11	15%	0.18	9
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0	0%	0.00	0	0%	0.00	0	0%	0.00	0	0%	0.00	0
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	-28	-27%	0.00	-25	-31%	0.00	-30	-24%	0.00	-8	-12%	0.00	-11
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	-46	-43%	0.00	-25	-31%	0.00	-34	-26%	0.00	-8	-12%	0.00	-11

Table 3: Efficiency Ratios and Cost Effectiveness Matrix

	30	30	33	33	33	38	38	38	39	39	39	41	41
BMP	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction	ER
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	62%	1.03	11	25%	0.26	25	43%	0.56	43	62%	0.96	50	59%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	62%	0.56	11	24%	0.14	25	43%	0.30	42	61%	0.52	50	58%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	62%	1.02	11	24%	0.25	25	43%	0.56	42	61%	0.94	50	58%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	59%	0.97	-9	-20%	0.00	15	25%	0.33	13	18%	0.28	38	44%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	57%	0.94	6	13%	0.14	23	40%	0.53	28	40%	0.63	33	38%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	55%	0.91	-14	-31%	0.00	10	18%	0.23	7	10%	0.16	38	45%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	55%	0.50	-14	-31%	0.00	10	18%	0.13	7	10%	0.09	38	44%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	54%	2.02	3	6%	0.15	16	28%	0.82	37	53%	1.87	-42	-50%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	54%	0.70	2	5%	0.04	15	27%	0.27	36	52%	0.64	-42	-50%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	54%	2.02	2	5%	0.12	15	27%	0.78	36	52%	1.82	-13	-15%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	53%	0.88	1	3%	0.03	20	35%	0.45	23	34%	0.52	27	32%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	53%	0.48	1	3%	0.02	20	35%	0.25	23	34%	0.28	27	32%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	47%	1.76	-5	-10%	0.00	14	24%	0.69	17	25%	0.88	17	20%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	41%	1.54	-11	-23%	0.00	9	16%	0.46	11	15%	0.53	11	13%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	41%	0.54	-11	-23%	0.00	9	16%	0.16	10	15%	0.18	11	13%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	38%	1.13	-3	-7%	0.00	15	25%	0.59	-11	-16%	0.00	13	15%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	26%	0.77	-18	-39%	0.00	2	3%	0.07	-36	-52%	0.00	5	6%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	26%	0.31	-18	-39%	0.00	2	3%	0.03	-36	-52%	0.00	5	6%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	22%	0.64	9	20%	0.37	12	20%	0.47	16	24%	0.66	21	24%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	12%	0.37	-1	-2%	0.00	2	4%	0.10	0	0%	0.00	4	4%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	12%	0.15	-1	-2%	0.00	2	4%	0.04	0	0%	0.00	4	4%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0%	0.00	0	0%	0.00	0	0%	0.00	0	0%	0.00	0	0%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	-15%	0.00	-14	-31%	0.00	-13	-23%	0.00	-23	-34%	0.00	-24	-28%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	-15%	0.00	-14	-31%	0.00	-13	-23%	0.00	-23	-34%	0.00	-24	-28%

Table 3: Efficiency Ratios and Cost Effectiveness Matrix

	41	42	42	42	43	43	43	57	57	57	61	61	61
BMP	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.12	48	67%	1.08	50	65%	1.12	44	67%	0.99	21	42%	0.47
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.61	48	66%	0.59	49	64%	0.60	44	67%	0.54	21	41%	0.25
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.12	48	66%	1.07	49	64%	1.11	44	67%	0.98	20	41%	0.46
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.85	18	25%	0.41	40	52%	0.91	30	47%	0.68	5	11%	0.12
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.74	34	47%	0.76	34	44%	0.76	34	52%	0.77	16	32%	0.36
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.86	12	17%	0.28	41	53%	0.91	27	41%	0.60	-1	-2%	0.00
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.46	12	17%	0.15	40	52%	0.49	27	41%	0.33	-1	-2%	0.00
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.00	43	60%	2.17	-39	-51%	0.00	41	62%	2.06	14	28%	0.71
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.00	42	59%	0.74	-39	-51%	0.00	40	61%	0.70	14	28%	0.24
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.00	42	59%	2.14	-12	-15%	0.00	40	61%	2.02	14	28%	0.70
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.62	29	41%	0.66	28	37%	0.63	31	48%	0.71	12	24%	0.27
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.34	29	41%	0.36	28	37%	0.35	31	48%	0.38	12	24%	0.15
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.87	24	33%	1.22	22	29%	1.12	27	42%	1.37	8	16%	0.39
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.57	18	25%	0.90	15	19%	0.74	23	35%	1.15	2	5%	0.12
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.20	18	25%	0.31	15	19%	0.26	23	35%	0.40	2	5%	0.04
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.51	-9	-12%	0.00	16	21%	0.65	11	18%	0.46	3	7%	0.14
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.22	-32	-44%	0.00	10	13%	0.41	-5	-8%	0.00	-12	-24%	0.00
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.09	-51	-71%	0.00	10	13%	0.16	-5	-8%	0.00	-12	-24%	0.00
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.84	18	24%	0.71	19	25%	0.77	14	22%	0.58	10	19%	0.39
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.15	4	6%	0.17	2	3%	0.09	2	4%	0.10	1	2%	0.03
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.06	-9	-13%	0.00	2	3%	0.03	2	4%	0.04	1	2%	0.01
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.00	0	0%	0.00	0	0%	0.00	0	0%	0.00	0	0%	0.00
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.00	-20	-28%	0.00	-24	-31%	0.00	-14	-22%	0.00	-14	-27%	0.00
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.00	-38	-52%	0.00	-24	-31%	0.00	-14	-22%	0.00	-14	-27%	0.00

Table 3: Efficiency Ratios and Cost Effectiveness Matrix

	72	**72**	**72**	**73**	**73**	**73**	**76**	**76**	**76**	**85**	**85**	**85**	**92**
BMP	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	56	62%	1.26	38	63%	0.85	33	62%	0.73	50	58%	1.13	11
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	59	65%	0.73	38	62%	0.46	33	62%	0.40	50	58%	0.61	11
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	59	65%	1.33	38	62%	0.85	33	62%	0.73	50	58%	1.13	11
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	17	19%	0.39	19	31%	0.42	44	84%	0.99	13	15%	0.28	12
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	40	44%	0.91	29	48%	0.65	37	70%	0.82	33	38%	0.74	11
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2	2%	0.03	13	21%	0.29	44	83%	0.98	5	6%	0.12	12
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	14	16%	0.18	13	21%	0.16	44	83%	0.53	5	6%	0.07	12
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	46	50%	2.30	32	53%	1.62	28	53%	1.39	42	49%	2.12	9
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	51	56%	0.90	32	52%	0.56	27	53%	0.48	41	47%	0.72	9
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	51	56%	2.58	32	52%	1.60	27	52%	1.39	41	47%	2.06	9
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	31	34%	0.70	25	41%	0.56	36	69%	0.81	28	32%	0.63	10
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	37	41%	0.46	25	41%	0.30	36	69%	0.44	28	32%	0.34	10
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	27	30%	1.38	20	33%	1.01	33	64%	1.69	17	20%	0.88	9
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	22	24%	1.11	15	25%	0.76	33	63%	1.66	11	13%	0.57	9
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	21	24%	0.38	15	25%	0.26	33	63%	0.58	11	13%	0.19	9
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	-16	-18%	0.00	-5	-9%	0.00	30	56%	1.20	-13	-15%	0.00	10
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	-37	-40%	0.00	-27	-44%	0.00	29	55%	1.16	-42	-48%	0.00	9
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	-38	-42%	0.00	-38	-63%	0.00	34	65%	0.55	-42	-48%	0.00	9
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	20	22%	0.81	14	23%	0.56	11	20%	0.43	21	25%	0.86	3
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	16	17%	0.63	1	2%	0.04	4	9%	0.18	4	5%	0.17	2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8	9%	0.13	-5	-8%	0.00	21	41%	0.34	4	5%	0.07	2
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0	0%	0.00	0	0%	0.00	0	0%	0.00	0	0%	0.00	0
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	-26	-28%	0.00	-18	-30%	0.00	-6	-12%	0.00	-24	-27%	0.00	-1
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	-26	-28%	0.00	-28	-45%	0.00	15	29%	0.41	-24	-27%	0.00	-1

Table 3: Efficiency Ratios and Cost Effectiveness Matrix

	92	92	98	98	98	101	101	101	105	105	105	107
BMP	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	56%	0.26	50	68%	1.13	28	53%	0.63	50	71%	1.13	52
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	53%	0.13	50	67%	0.61	27	52%	0.34	50	71%	0.61	52
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	53%	0.24	50	67%	1.12	27	52%	0.62	50	71%	1.12	52
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	60%	0.27	64	86%	1.44	16	30%	0.36	21	30%	0.48	16
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	54%	0.25	56	75%	1.26	23	43%	0.51	37	52%	0.82	36
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	57%	0.26	64	86%	1.43	12	23%	0.28	16	23%	0.36	10
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	57%	0.14	64	86%	0.78	12	23%	0.15	16	23%	0.20	10
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	43%	0.44	44	60%	2.23	23	43%	1.15	46	65%	2.32	45
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	43%	0.15	44	59%	0.77	22	42%	0.38	45	64%	0.80	45
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	43%	0.44	44	59%	2.20	22	42%	1.10	45	64%	2.29	45
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	50%	0.23	55	74%	1.24	20	38%	0.44	32	45%	0.72	30
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	50%	0.13	55	74%	0.68	20	38%	0.24	32	45%	0.39	30
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	44%	0.46	53	71%	2.66	15	29%	0.77	28	40%	1.42	23
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	42%	0.43	51	69%	2.60	11	21%	0.56	22	31%	1.12	15
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	42%	0.15	51	69%	0.90	11	21%	0.19	22	31%	0.39	15
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	49%	0.40	39	53%	1.58	4	8%	0.17	-10	-14%	0.00	-11
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	43%	0.35	37	50%	1.50	-8	-16%	0.00	-33	-47%	0.00	-39
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	43%	0.14	43	58%	0.70	-12	-22%	0.00	-49	-69%	0.00	-57
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	13%	0.11	17	23%	0.69	10	20%	0.41	18	26%	0.73	19
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	8%	0.06	10	13%	0.40	0	0%	0.00	6	8%	0.24	4
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8%	0.03	28	37%	0.45	3	6%	0.05	-6	-9%	0.00	-9
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0%	0.00	0	0%	0.00	0	0%	0.00	0	0%	0.00	0
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	-6%	0.00	-8	-11%	0.00	-14	-27%	0.00	-19	-28%	0.00	-23
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	-7%	0.00	15	20%	0.39	-11	-21%	0.00	-34	-49%	0.00	-42

Table 3: Efficiency Ratios and Cost Effectiveness Matrix

	107	107	111	111	111	113	113	113	114	114	114	131
BMP	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction	ER	g/$	reduction
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	63%	1.18	19	57%	0.44	70	64%	1.58	57	71%	1.29	29
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	63%	0.64	19	57%	0.24	70	64%	0.86	56	70%	0.69	29
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	63%	1.17	19	57%	0.43	70	64%	1.57	56	70%	1.27	29
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	19%	0.36	28	82%	0.63	96	88%	2.16	60	74%	1.34	28
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	43%	0.81	24	70%	0.53	80	73%	1.79	50	63%	1.13	27
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	12%	0.23	28	81%	0.62	96	87%	2.15	58	73%	1.31	25
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	12%	0.13	28	81%	0.34	96	87%	1.17	58	73%	0.71	25
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	55%	2.29	16	48%	0.82	62	56%	3.12	52	65%	2.63	24
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	54%	0.79	16	48%	0.28	62	56%	1.08	52	65%	0.91	24
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	54%	2.28	16	47%	0.82	62	56%	3.11	52	65%	2.63	24
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	37%	0.68	24	69%	0.53	79	72%	1.78	49	61%	1.10	25
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	37%	0.37	24	69%	0.29	79	72%	0.97	49	61%	0.60	25
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	28%	1.18	21	62%	1.07	75	68%	3.77	45	56%	2.26	21
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	18%	0.75	21	61%	1.06	74	67%	3.72	42	53%	2.14	17
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	18%	0.26	21	61%	0.37	73	67%	1.29	42	53%	0.74	17
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	-13%	0.00	12	34%	0.47	62	56%	2.49	43	54%	1.74	16
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	-47%	0.00	9	25%	0.35	60	55%	2.44	40	50%	1.63	7
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	-69%	0.00	9	25%	0.14	60	55%	0.97	40	50%	0.65	6
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	23%	0.78	6	18%	0.24	22	20%	0.90	17	21%	0.67	10
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	5%	0.18	2	7%	0.10	20	18%	0.79	14	18%	0.57	1
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	-11%	0.00	2	7%	0.04	19	18%	0.31	14	18%	0.23	11
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0%	0.00	0	0%	0.00	0	0%	0.00	0	0%	0.00	0
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	-27%	0.00	-4	-13%	0.00	-6	-6%	0.00	-4	-5%	0.00	-14
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	-51%	0.00	-4	-13%	0.00	-6	-6%	0.00	-4	-5%	0.00	-1

Table 5: Sampled Concentration (ug/L)of Atrazine in Hoover Reservoir on a Monthly Basis

Month	**Year ->**																
	1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Jan	0.44	**1.59**		4.84	0.72	0.79	1.03	**2.14**	0.58	1.07	1.93	**1.87**	1.57	0.86	0.58	0.35	0.59
Feb	0.61	0.64	1.27	7.45	0.29	0.89	0.56	0.55	0.50	1.08	1.06	1.32	1.38	0.14	0.68	0.36	0.66
Mar	0.39	0.25	1.81	2.77	0.33	0.94	0.49	1.47	0.43	0.70	0.78	1.58	**2.02**	0.11	0.40	0.33	0.33
Apr	0.28	0.31	0.19	1.46	0.31	1.24	0.22	0.41	0.37	0.39	0.51	1.44	1.66	0.10	0.39	0.31	0.39
May	0.22	0.63	1.12	0.56	0.49	0.82	0.87	0.32	0.32	1.10	0.43	1.30	0.55	0.90	0.47	0.17	0.34
Jun	**3.92**	0.29	4.92	10.25	**0.90**	0.69	1.13	0.57	3.63	0.92	1.35	1.24	0.73	0.82	2.30	0.69	**2.57**
Jul	1.61	0.50	5.57	**11.89**	0.36	0.99	2.47	0.23	**6.52**	3.11	**5.93**	1.68	0.12	**4.81**	**2.67**	1.89	2.24
Aug	2.12	0.43	**9.52**	9.90	0.51	**2.22**	1.95	0.61	4.35	3.47	5.24	1.53	0.10	3.55	1.21	1.77	1.27
Sep	2.94	0.46	7.27	7.11	0.51	1.68	2.06	0.78	3.10	3.66	5.11	0.90	0.18	2.69	0.85	**2.10**	1.45
Oct	3.89	0.67	8.97	5.38	0.60	1.57	**2.86**	0.62	2.61	3.45	2.89	1.47	0.10	1.40	1.24	1.97	0.54
Nov	2.76	0.33	8.96	4.62	0.75	1.38	2.77	1.02	3.73	1.75	1.36	1.15	0.32	1.09	0.47	1.55	0.43
Dec	3.19	0.79	6.52	4.56	0.79	1.30	2.37	0.53	2.75	**4.11**	1.54	1.86	0.57	0.56	0.42	0.58	0.36
Maximum	**3.92**	**1.59**	**9.52**	**11.89**	**0.90**	**2.22**	**2.86**	**2.14**	**6.52**	**4.11**	**5.93**	**1.87**	**2.02**	**4.81**	**2.67**	**2.10**	**2.57**

Table 6: Hoover Reservoir Volumes (Billion Gallons)

Month	**Year ->**																
	1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Jan	16.80	5.18	20.35	11.78	**20.85**	9.35	**21.01**	17.64	8.49	16.70	18.75	16.18	12.56	12.69	18.20	18.57	15.86
Feb	16.01	12.67	20.04	15.73	19.39	9.73	20.70	20.53	16.70	20.52	20.70	18.79	18.85	15.24	18.75	19.79	15.33
Mar	15.73	17.30	21.04	20.55	19.05	9.81	20.96	20.77	**20.83**	20.84	**20.88**	21.08	**20.91**	20.31	20.14	20.34	17.81
Apr	20.18	**20.76**	20.91	19.74	19.52	12.79	20.84	**20.86**	20.20	20.84	20.53	20.90	20.06	**20.97**	19.52	**21.20**	**21.21**
May	18.56	19.47	21.48	**20.68**	20.60	15.26	20.81	20.37	20.61	**21.14**	20.47	**21.66**	20.28	20.56	19.81	20.70	20.44
Jun	**20.85**	16.69	**21.50**	20.39	17.86	14.58	19.27	18.92	20.77	20.70	20.54	19.50	17.05	20.81	**21.29**	20.93	20.92
Jul	18.12	13.84	21.18	19.20	14.91	13.76	20.83	17.05	20.76	19.53	19.64	21.03	15.11	18.21	19.09	19.25	19.77
Aug	15.41	13.25	18.81	20.37	13.05	20.65	19.33	15.62	20.46	17.27	18.14	19.07	13.65	15.69	15.09	15.85	19.77
Sep	12.47	12.31	16.27	17.12	11.45	19.67	16.22	13.32	18.53	14.77	18.41	16.22	11.35	13.23	14.82	12.91	19.77
Oct	9.33	12.10	14.19	18.20	9.90	18.30	14.07	11.06	16.67	13.40	15.72	12.75	10.12	13.25	13.56	12.69	19.77
Nov	7.12	11.13	12.35	18.25	9.29	16.55	12.06	8.79	15.34	10.73	13.32	11.47	9.68	13.37	13.30	11.98	19.77
Dec	5.76	15.31	11.25	19.28	9.26	**20.78**	18.08	6.87	16.57	12.60	13.21	11.29	8.95	14.08	14.94	12.41	19.77
Maximum	**20.85**	**20.76**	**21.50**	**20.68**	**20.85**	**20.78**	**21.01**	**20.86**	**20.83**	**21.14**	**20.88**	**21.66**	**20.91**	**20.97**	**21.29**	**21.20**	**21.21**
Average	**14.69**	**14.17**	**18.28**	**18.44**	**15.43**	**15.10**	**18.68**	**15.98**	**17.99**	**17.42**	**18.36**	**17.49**	**14.88**	**16.54**	**17.38**	**17.22**	**19.18**

Table 7: Monthly Snapshots of Atrazine Load (lbs) Present In Hoover Reservoir

Month	**Year ->**						**Baseline Period of Record (1993 - 1999)**										
	1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Jan	62	69	175	476	125	62	181	**315**	41	149	302	253	165	91	88	54	78
Feb	81	68	212	978	47	72	97	94	70	185	183	207	217	18	106	59	84
Mar	51	36	318	475	52	77	86	255	75	122	136	278	**353**	19	67	56	49
Apr	47	54	33	241	51	132	38	71	62	68	87	251	278	18	64	55	69
May	34	**102**	201	97	84	104	151	54	55	194	73	235	93	154	78	29	58
Jun	**682**	40	883	1,744	**134**	84	182	90	629	159	231	202	104	142	409	121	**449**
Jul	243	58	985	**1,905**	45	114	**429**	33	**1,130**	**507**	**972**	**295**	15	**731**	**425**	**304**	436
Aug	273	48	**1,495**	1,683	56	**382**	315	80	743	500	793	243	11	341	152	234	210
Sep	306	47	987	1,016	49	276	279	87	479	451	785	122	17	192	105	226	239
Oct	303	68	1,063	817	50	240	336	57	363	386	379	156	8	155	140	209	89
Nov	164	31	924	704	58	191	279	75	478	157	151	110	26	122	52	55	71
Dec	153	101	612	734	61	225	357	30	380	432	170	175	43	66	52	60	59
Maximum	**682**	**102**	**1,495**	**1,905**	**134**	**382**	**429**	**315**	**1,130**	**507**	**972**	**295**	**353**	**731**	**425**	**304**	**449**

Table 8: Theoretical Treatment-Triggering Atrazine Load (lbs) in Hoover Reservoir assuming uniform concentration of 2 ug/L

Month	**Year ->**																
	1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Jan	280	86	340	197	**348**	156	**351**	294	142	279	313	270	210	212	304	310	265
Feb	267	211	334	263	324	162	346	343	279	343	346	314	315	254	313	330	256
Mar	262	289	351	343	318	164	350	347	**348**	348	**348**	352	**349**	339	336	340	297
Apr	337	**347**	349	330	326	213	348	**348**	337	348	343	349	335	**350**	326	**354**	**354**
May	310	325	358	**345**	344	255	347	340	344	**353**	342	**362**	338	343	331	346	341
Jun	**348**	279	**359**	340	298	243	322	316	347	346	343	326	285	347	**355**	349	349
Jul	302	231	354	320	249	230	348	285	347	326	328	351	252	304	319	321	330
Aug	257	221	314	340	218	345	323	261	341	288	303	318	228	262	252	264	330
Sep	208	205	272	286	191	328	271	222	309	247	307	271	189	221	247	216	330
Oct	156	202	237	304	165	305	235	185	278	224	262	213	169	221	226	212	330
Nov	119	186	206	305	155	276	201	147	256	179	222	191	162	223	222	200	330
Dec	96	256	188	322	155	**347**	302	115	277	210	221	188	149	235	249	207	330
Maximum	**348**	**347**	**359**	**345**	**348**	**347**	**351**	**348**	**348**	**353**	**348**	**362**	**349**	**350**	**355**	**354**	**354**

Table 9: Load reduction requirements to keep monthly atrazine loads (lbs) below treatment triggering loads. Months where no load reduction required are shown as negative numbers.

Month	**Year ->**																
	1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Jan	-219	**-18**	-165	279	-223	-94	-170	**21**	-101	-130	-11	-18	-45	-121	-216	-256	-187
Feb	-186	-144	-122	716	-277	-90	-249	-248	-209	-158	-162	-107	-98	-237	-207	-271	-171
Mar	-211	-253	-33	132	-265	-87	-264	-92	-273	-226	-213	-74	**3**	-320	-269	-283	-248
Apr	-290	-293	-316	-89	-275	-81	-310	-277	-275	-280	-255	-98	-57	-333	-262	-299	-285
May	-276	-223	-158	-249	-260	-150	-196	-286	-289	-159	-268	-127	-245	-189	-253	-316	-283
Jun	**334**	-238	524	1,404	-164	-159	-140	-226	283	-187	-111	-124	-181	-205	53	-229	100
Jul	-59	-173	631	**1,585**	-204	-116	82	-252	**783**	181	**644**	-56	-237	**427**	**107**	-18	**106**
Aug	15	-174	**1,181**	1,343	-162	**38**	-8	-181	401	212	491	-75	-216	79	-99	-30	-120
Sep	98	-158	716	730	-142	-53	8	-136	170	205	478	-149	-172	-29	-142	**11**	-91
Oct	147	-134	826	513	-116	-66	**101**	-127	85	162	117	-56	-160	-66	-86	-3	-241
Nov	45	-155	717	399	-97	-86	77	-72	221	-22	-71	-81	-136	-102	-170	-145	-259
Dec	57	-155	424	412	**-94**	-121	56	-84	104	**222**	-51	**-13**	-107	-169	-197	-147	-271
Maximum	**334**	**-18**	**1,181**	**1,585**	**-94**	**38**	**101**	**21**	**783**	**222**	**644**	**-13**	**3**	**427**	**107**	**11**	**106**

Table 10 Precipitation ANOVA Results

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Period 1	2894	334.71	0.115657	0.090314
Period 2	2155	255.88	0.118738	0.085202
Period 3	1797	200.75	0.111714	0.087742

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.048364	2	0.024182	0.274701	0.759808	2.997044
Within Groups	602.3874	6843	0.08803			
Total	602.4358	6845				

Table 11: Monte Carlo Model Results

Mass of Atrazine Lost From the Edge of Farm Field to the Watershed (lbs)	Baseline Conditions	100% Optimal Conditions	Reduction (lbs)	Percent Reduction
Geometric Mean	811	320	491	61%
Upper Quartile	1,211	502	710	59%
Maximum	3,725	1,757	1,969	53%

Figure 1: The physical and chemical processes represented

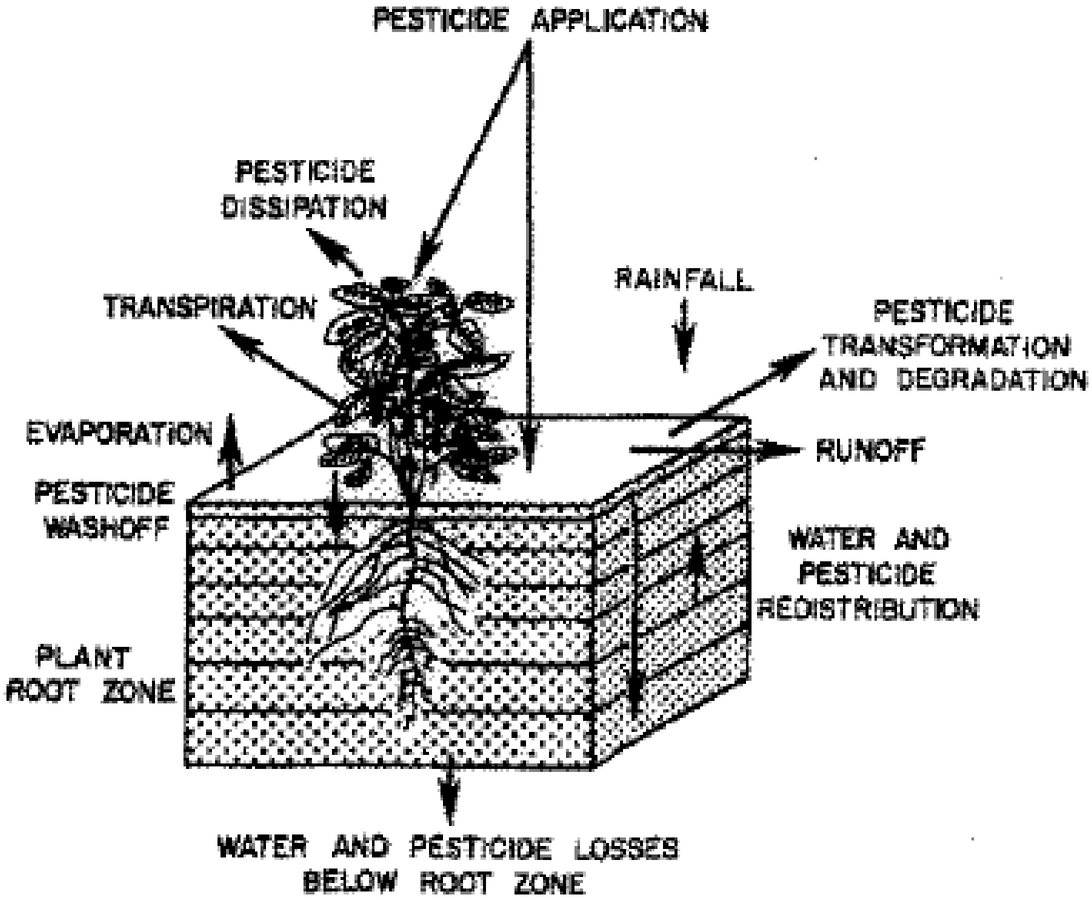


Figure 2: Overview of the NAPRA process

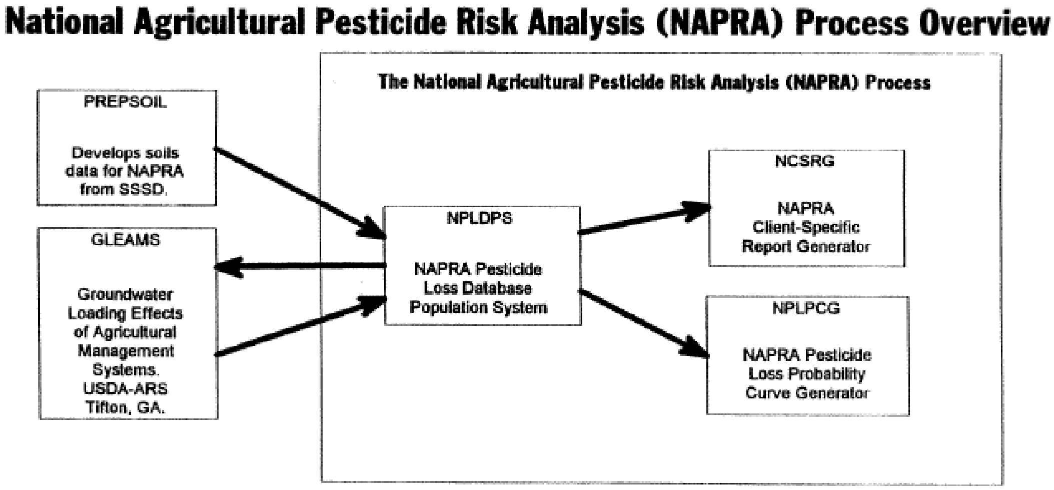


Figure 3: Overview of the NAPRA database and modeling structure

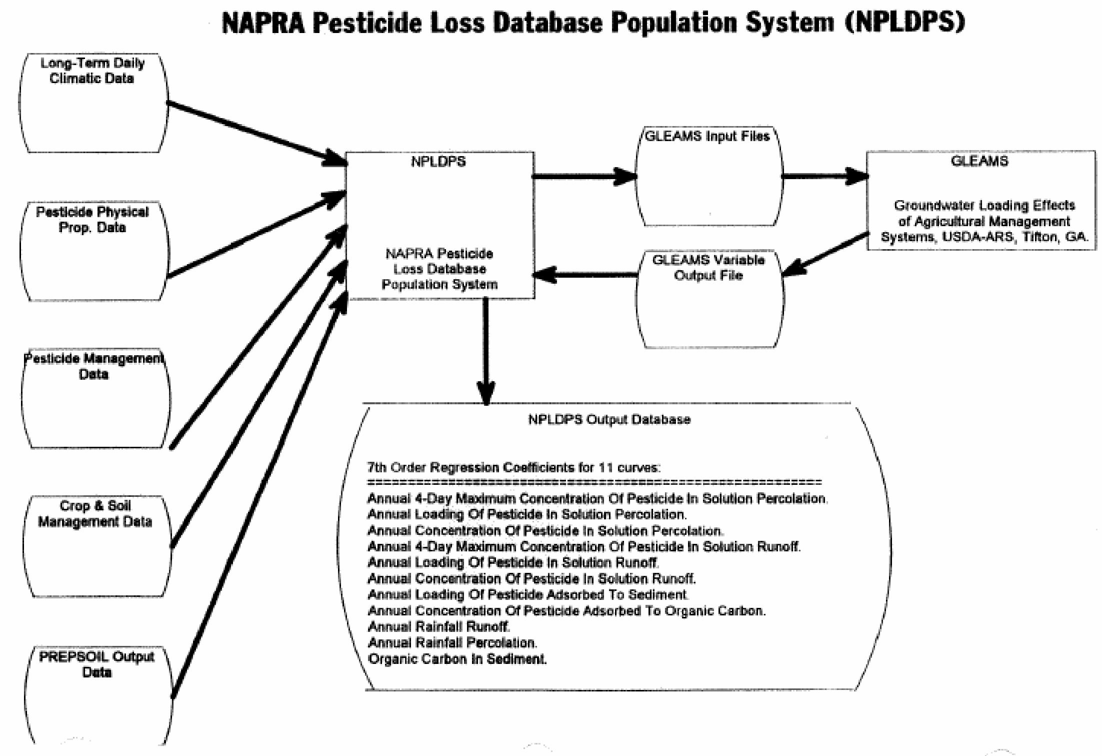


FIGURE 4:
Critical Period
Weekly Cummulative Percent Corn Planted Curve
April - June

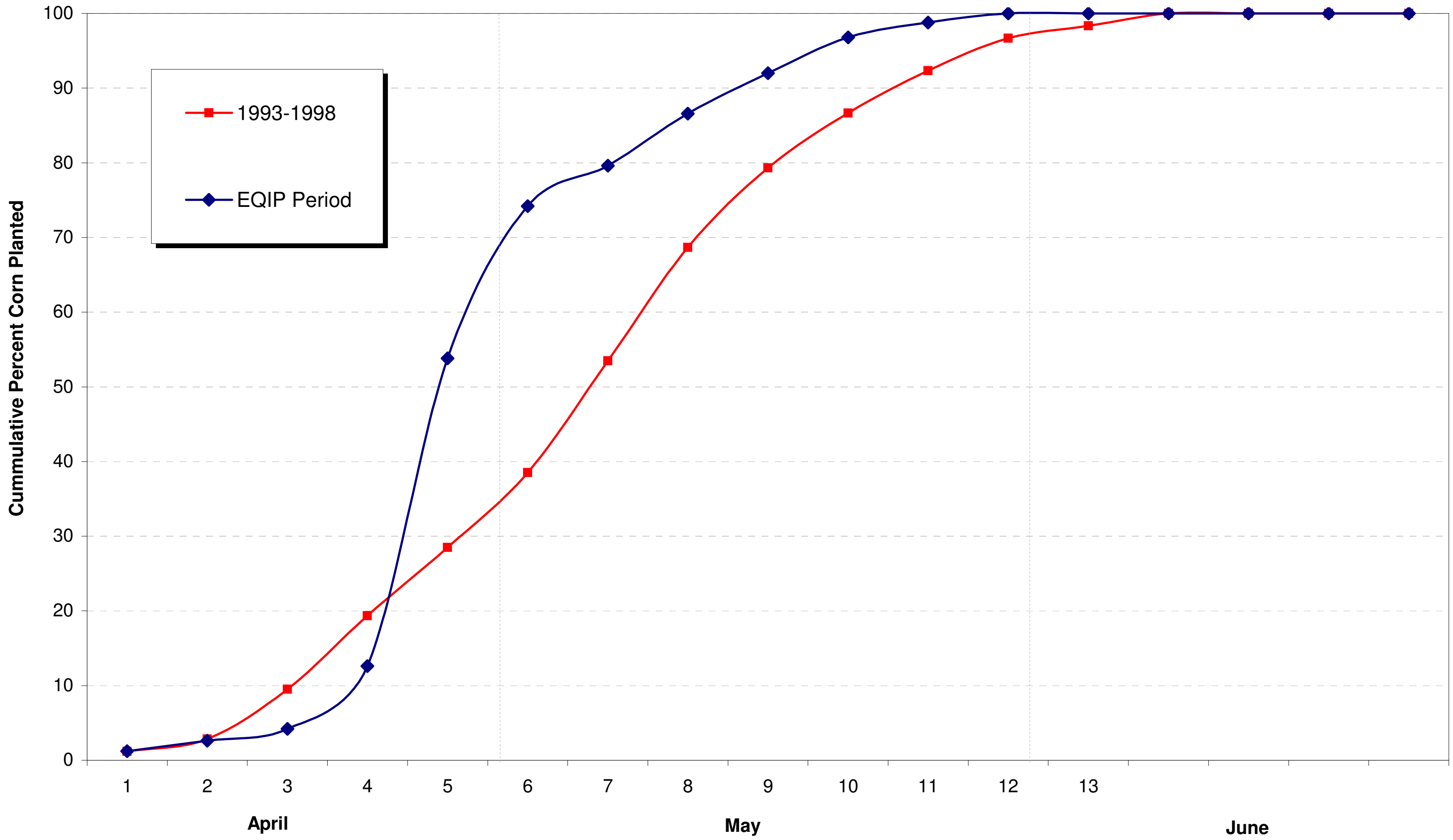
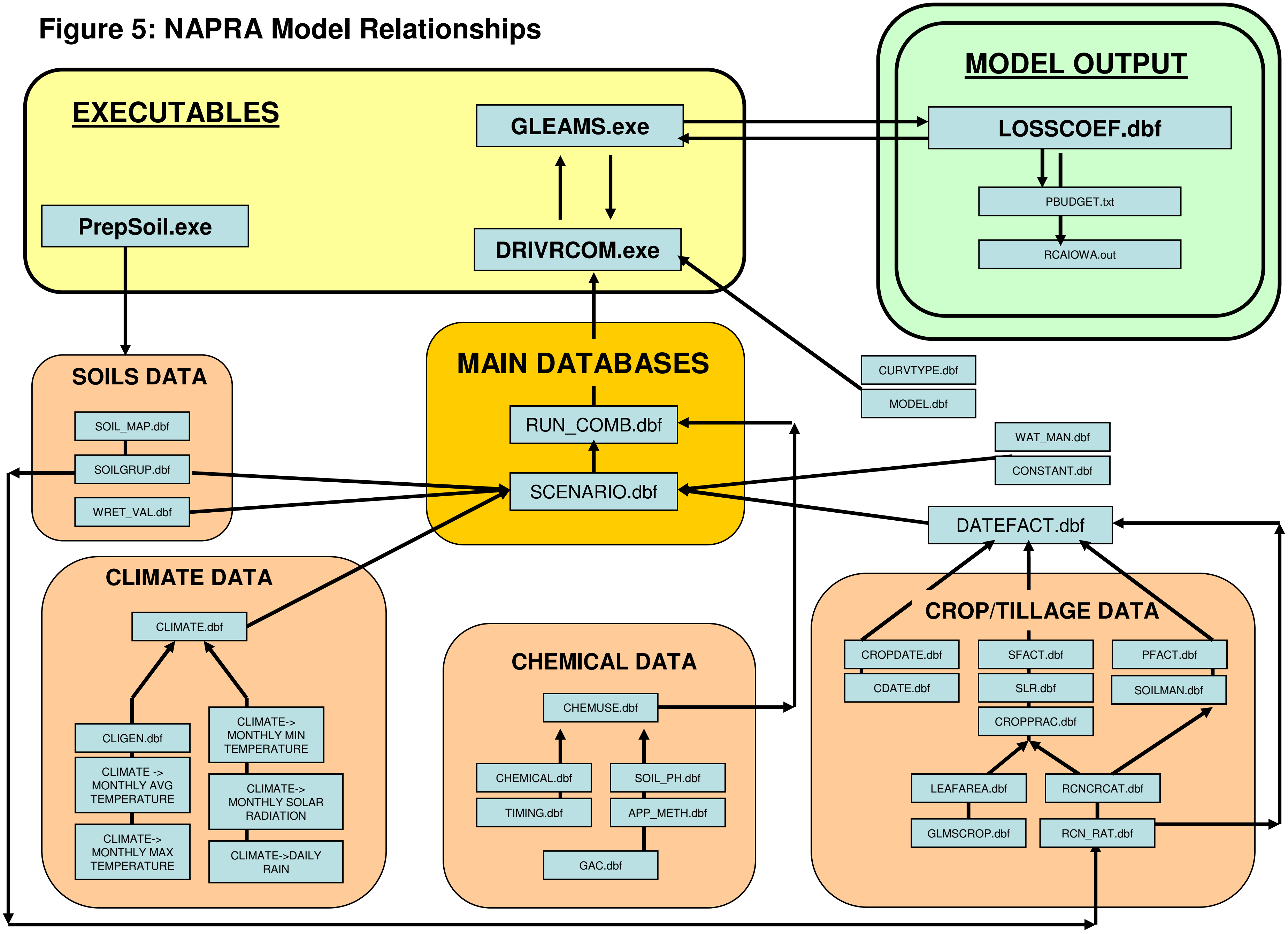
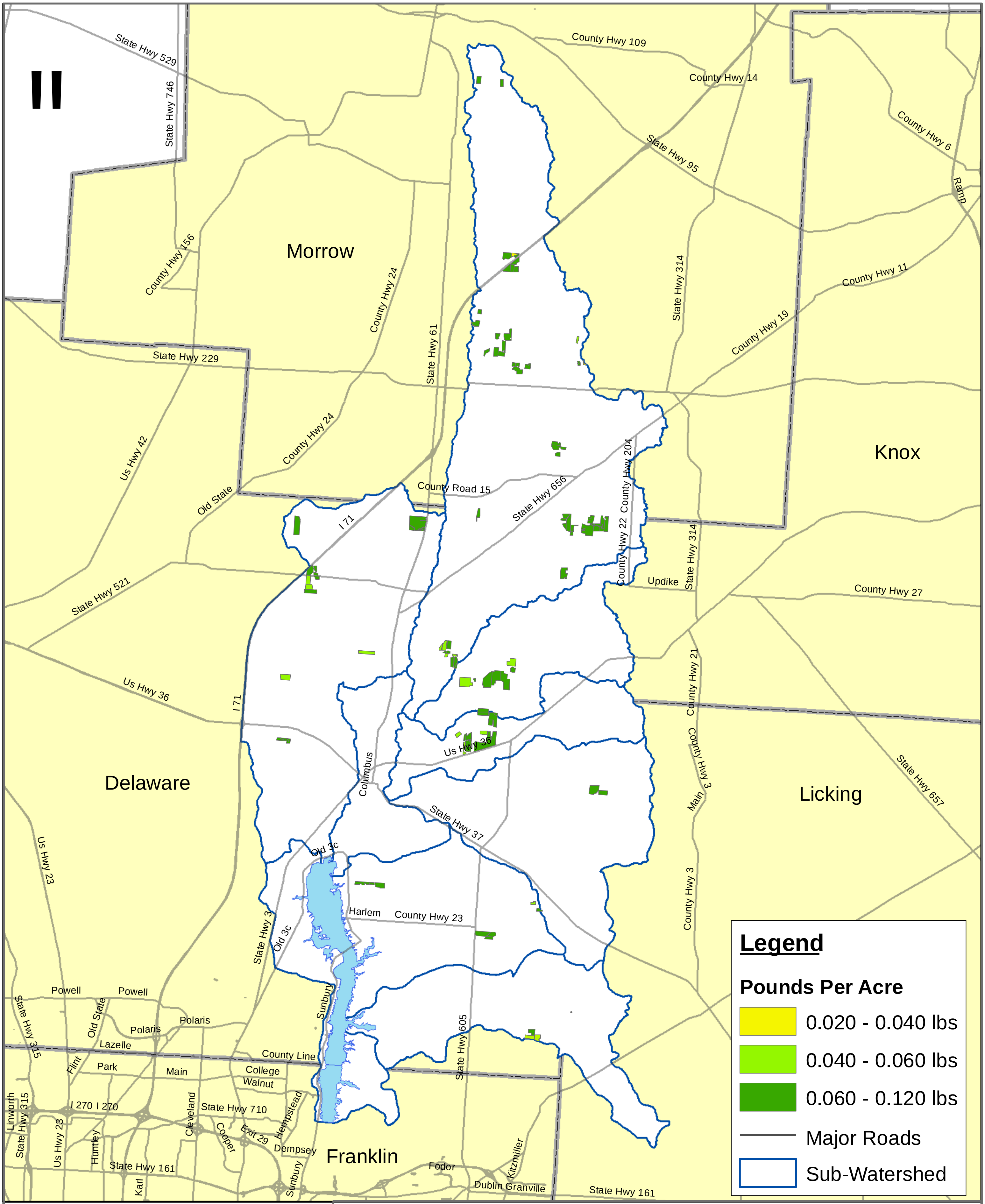


Figure 5: NAPRA Model Relationships





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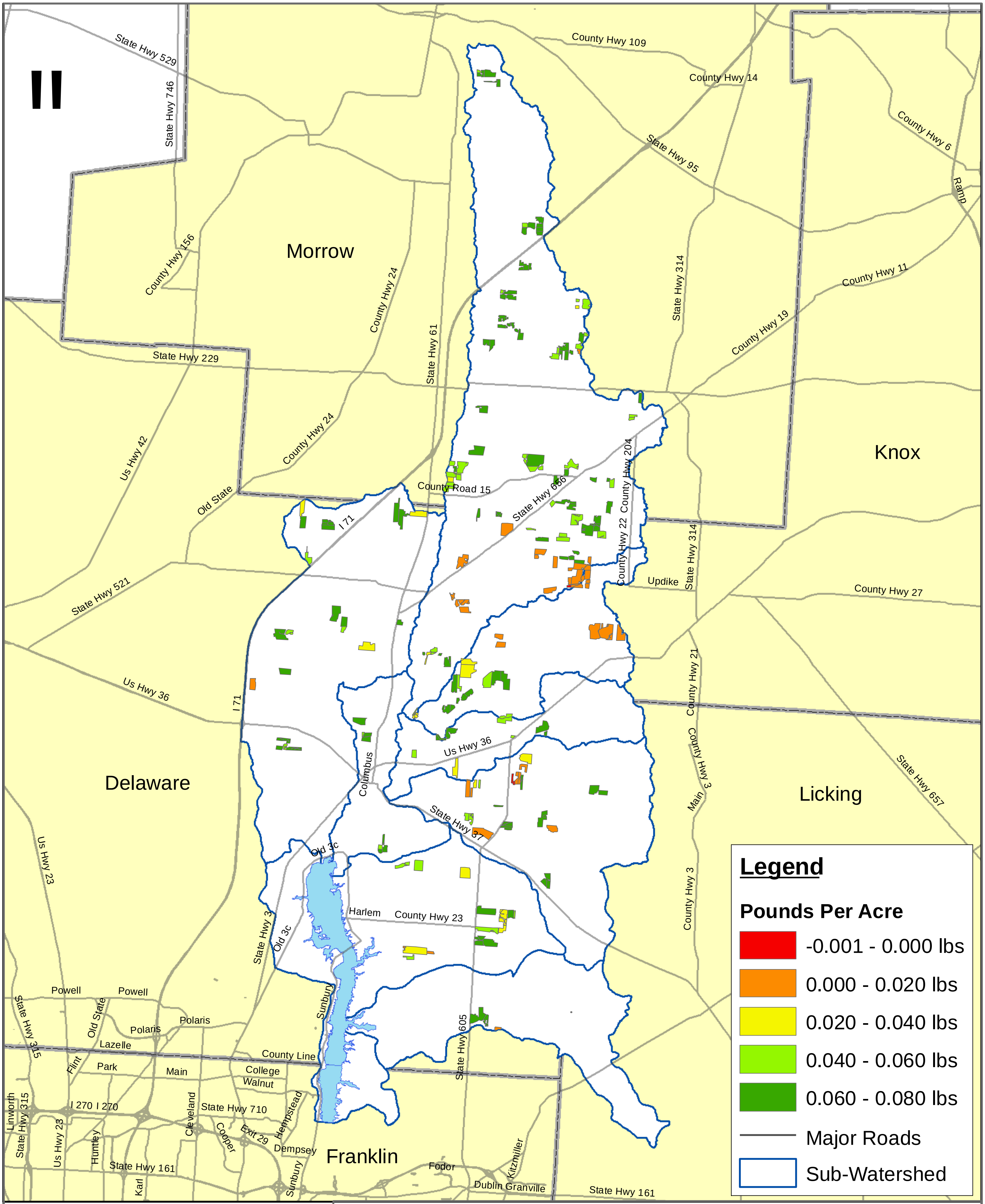
1999 Mass Reduction from BMP Implementation

USEPA/ORSANCO BMP Evaluation Methodology

June 2007

0 1 2 4 Miles

FIGURE 6



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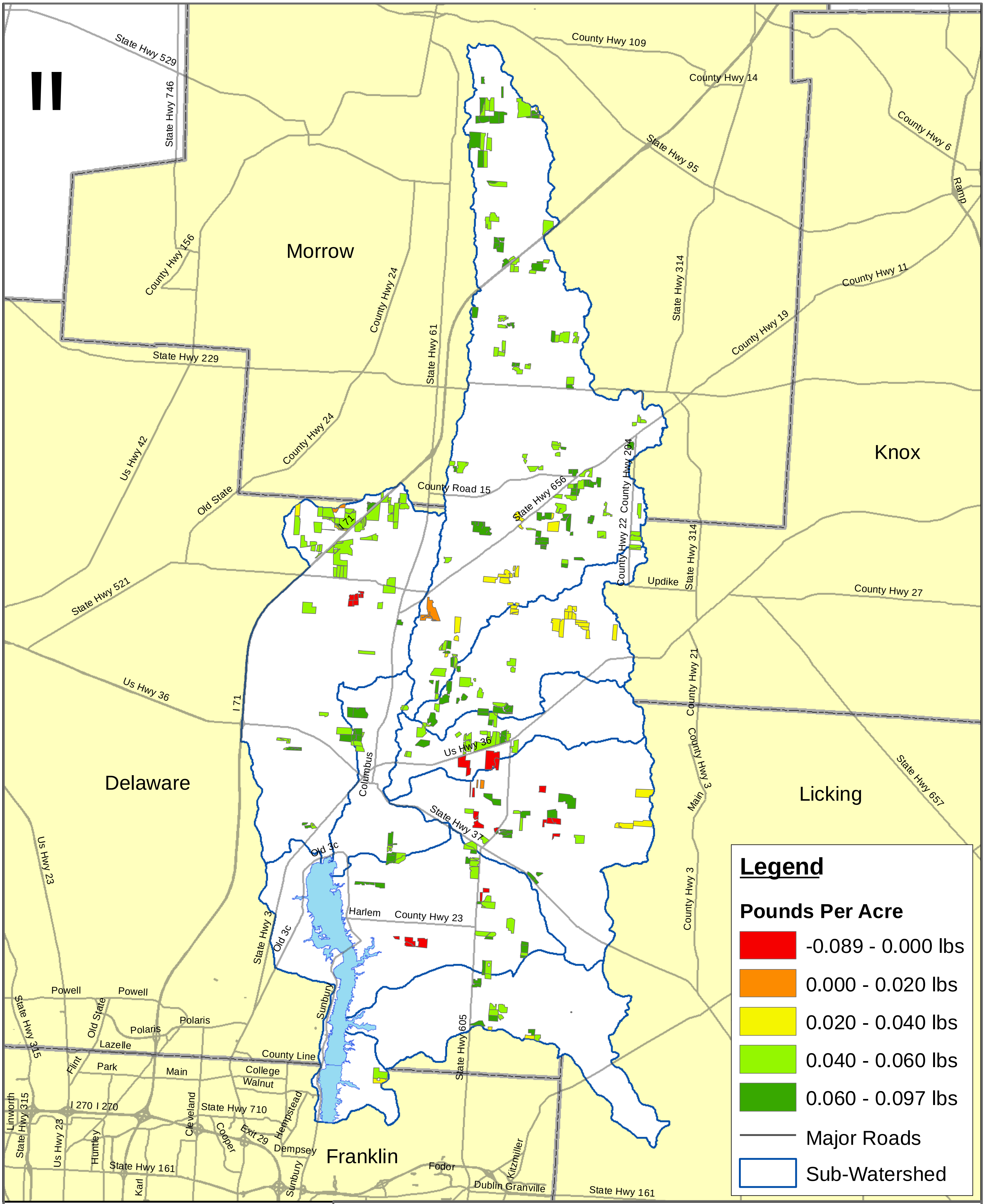
2000 Mass Reduction from BMP Implementation

USEPA/ORSANCO BMP Evaluation Methodology

June 2007

0 1 2 4 Miles

FIGURE 7



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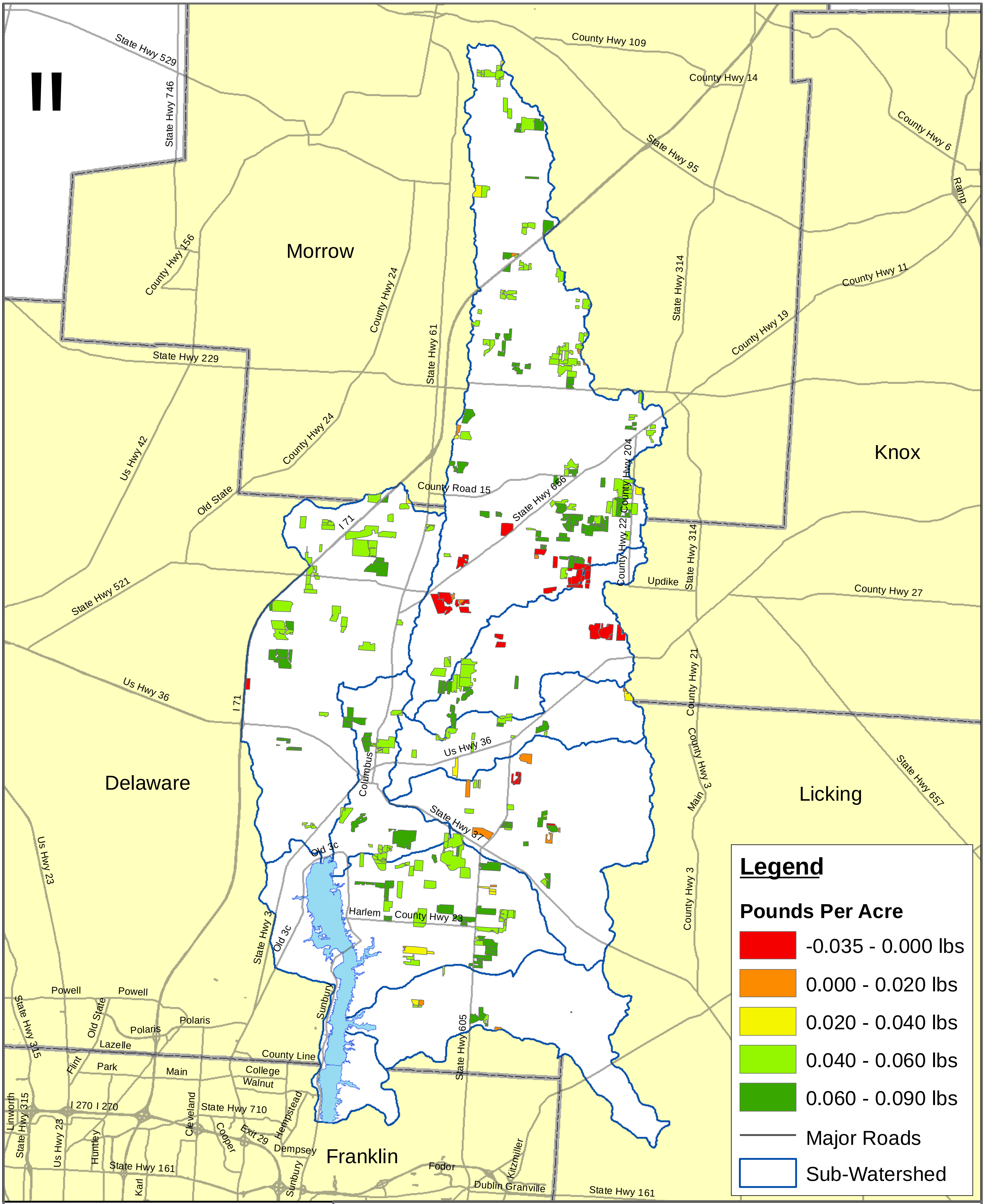
2001 Mass Reduction from BMP Implementation

USEPA/ORSANCO BMP Evaluation Methodology

June 2007

0 1 2 4 Miles

FIGURE 8



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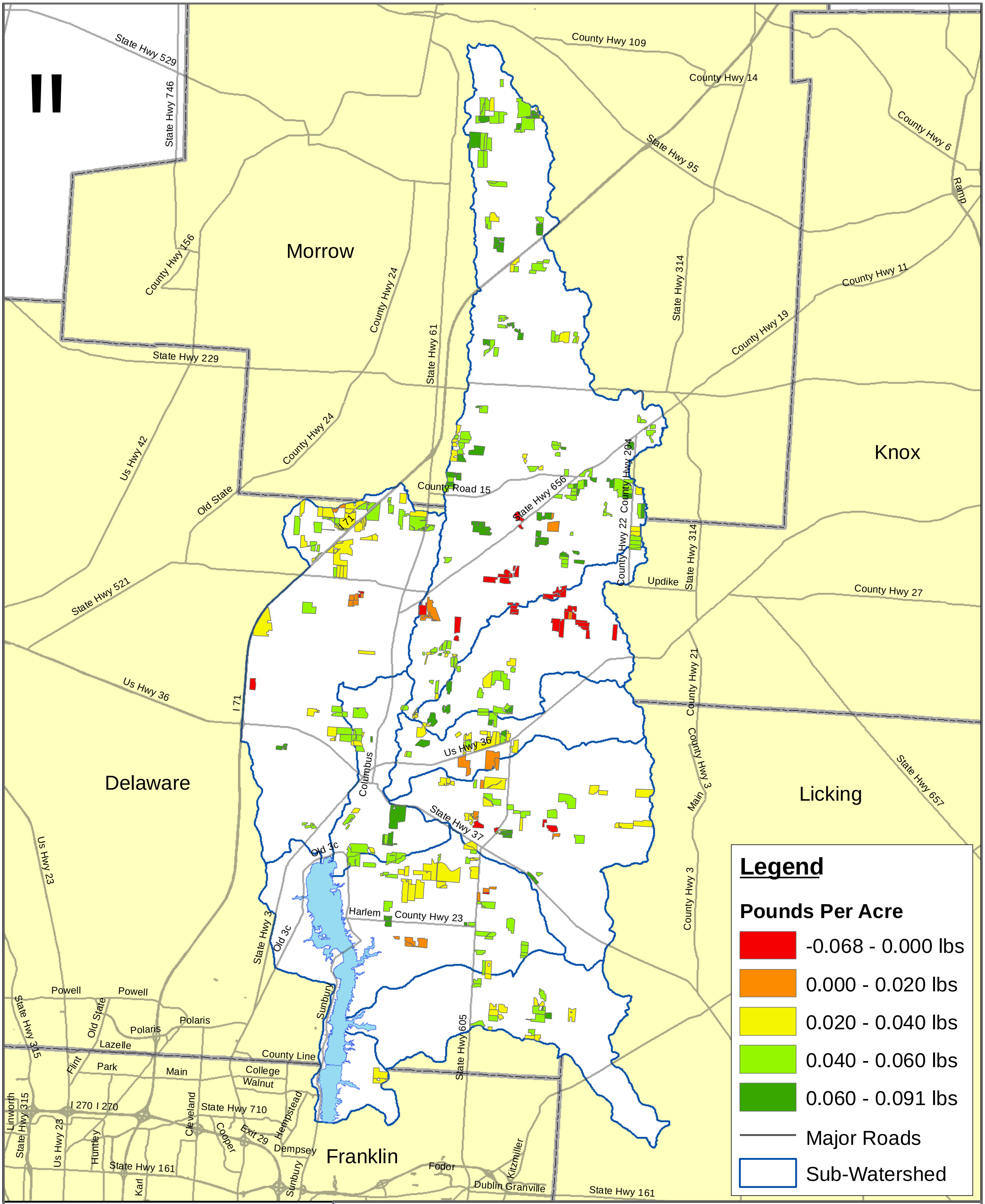
2002 Mass Reduction from BMP Implementation

USEPA/ORSANCO BMP Evaluation Methodology

June 2007

0 1 2 4 Miles

FIGURE 9



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2003 Mass Reduction from BMP Implementation

USEPA/ORSANCO BMP Evaluation Methodology

June 2007

0 1 2 4 Miles

FIGURE 10

Figure 11: Hoover Reservoir Volumes and Atrazine Concentrations
Baseline Period of Record

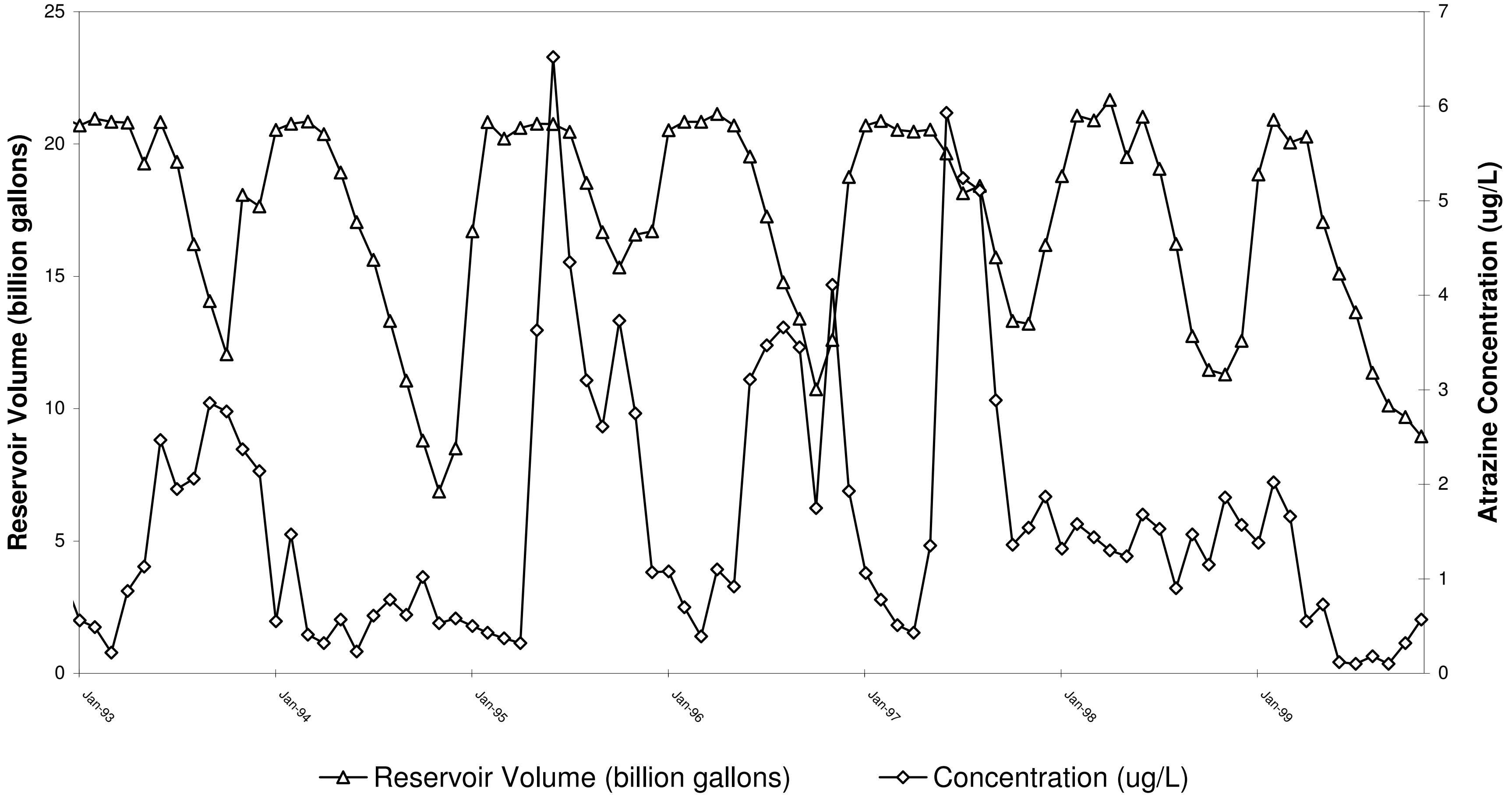


Figure 12: Hoover Reservoir Atrazine Concentrations and Loads
Baseline Period of Record

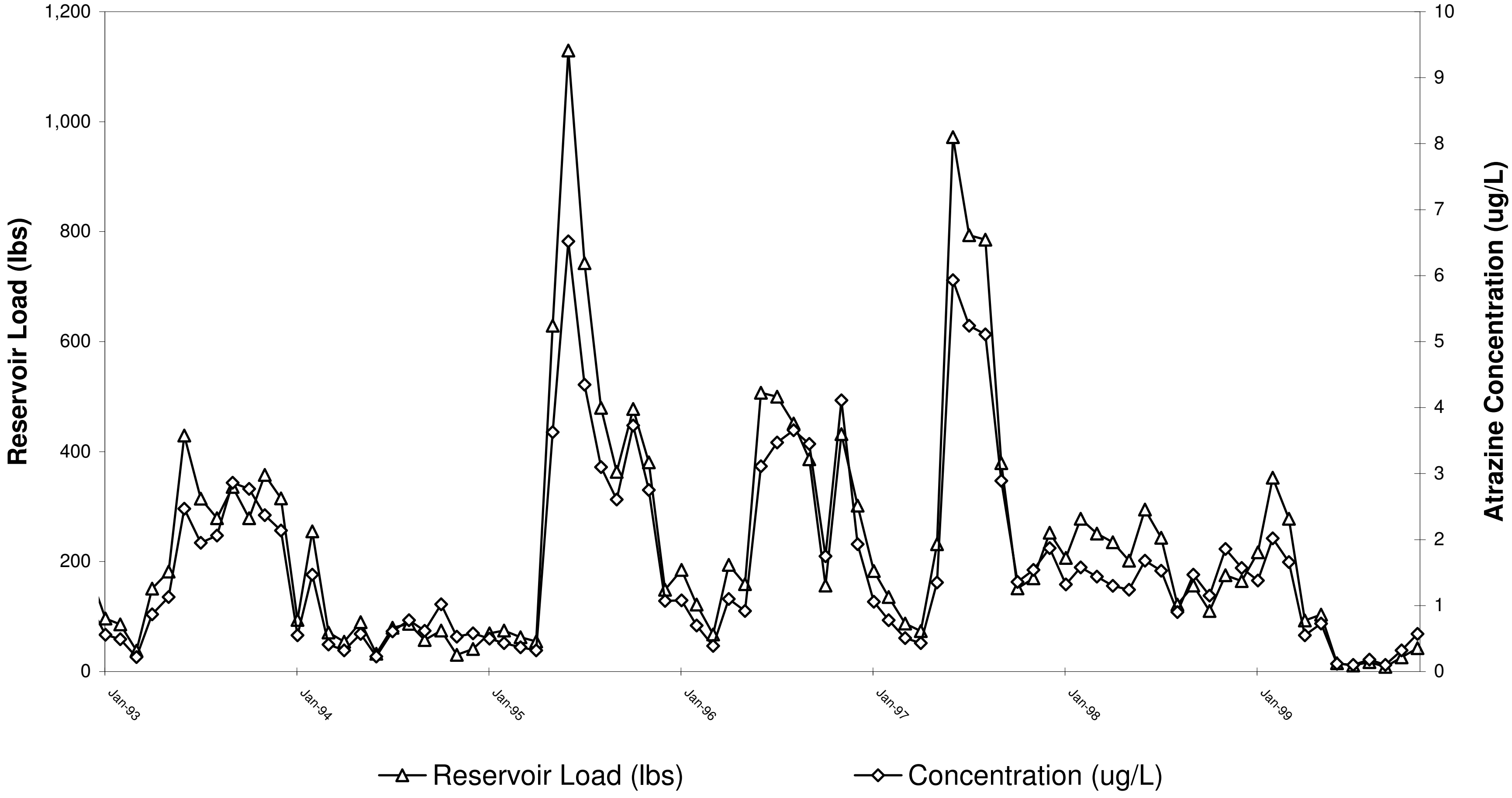
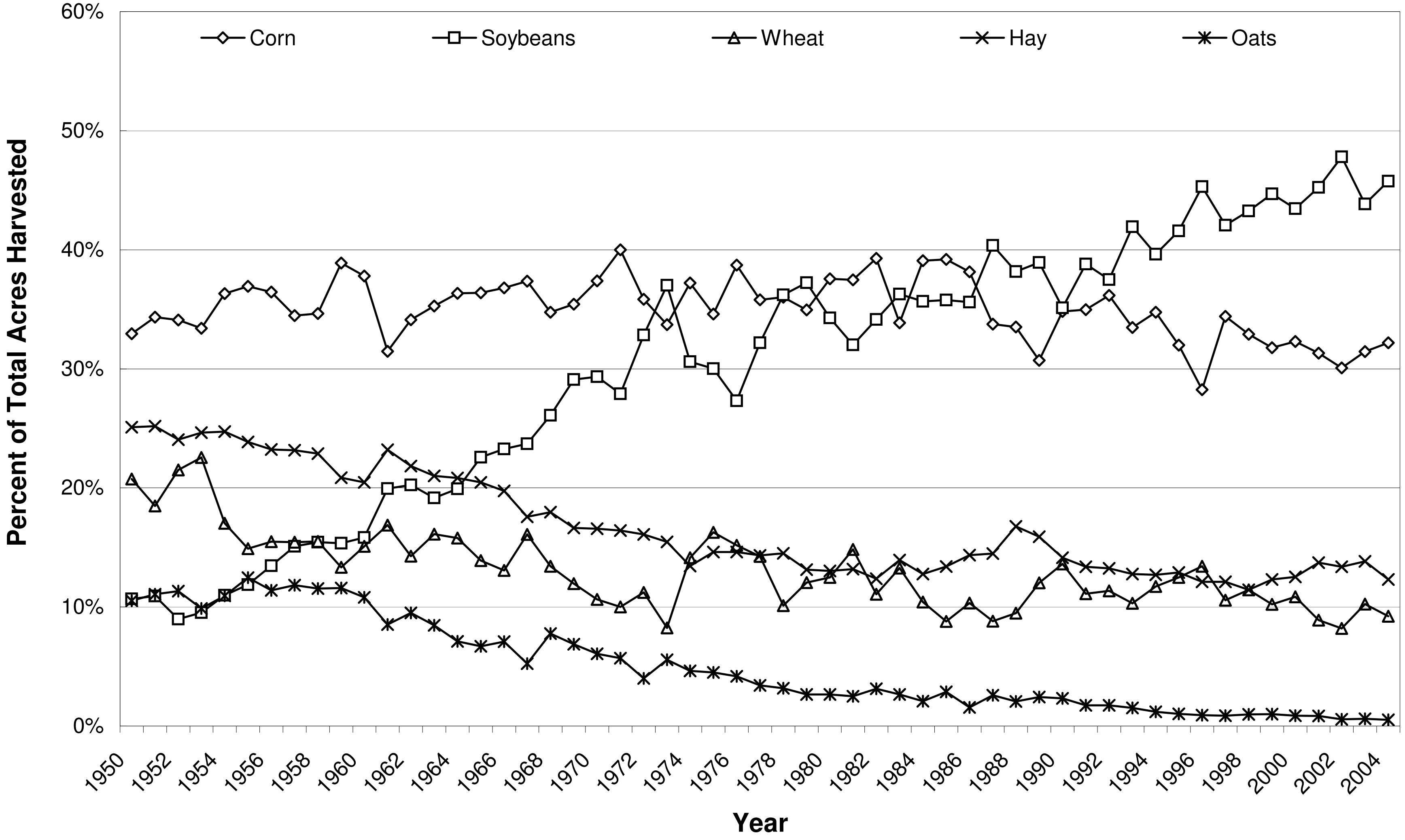


Figure 13: Trends in Harvested Crops for Ohio



Attachment A
Model Input Files

TABLE 1:
Crop Codes
GLMSCROP.dbf

GLMS_CCODE	DESCRIPTION	YIELD_KGHA	DRYMATRAT	CN_RATIO	NP_RATIO	C1	C2	CRHT_METRS	RT_DPTH_IN	RT_DPTH_CM	PERENNIAL
1	Alfalfa - Seed	900	5.00	12	5.6	2.80	-0.165	1.0	RD	RD	TRUE
2	Alfalfa - Hay	4500	1.00	12	5.6	2.80	-0.165	1.0	RD	RD	TRUE
3	Winter Barley - Grain	2150	2.50	75	5.6	1.15	-0.296	1.0	RD	RD	
4	Winter Barley - Grain + Straw	4390	1.35	75	6.2	1.15	-0.296	1.0	RD	RD	
5	Spring Barley - Grain	1880	2.50	75	5.6	1.15	-0.296	1.0	RD	RD	
6	Spring Barley - Grain + Straw	4200	1.35	75	6.2	1.15	-0.296	1.0	RD	RD	
7	Beans - Dry	1950	2.50	24	3.3	1.00	-0.350	0.5	12	30	
8	Beans - Snap	6720	2.00	12	10.6	1.26	-0.299	0.5	12	30	
9	Beets	33600	1.20	40	6.0	0.30	-0.562	0.4	12	30	
10	Bermuda Grass	17920	1.35	80	6.7	1.25	-0.278	0.4	RD	RD	TRUE
11	Bluegrass	4480	1.35	80	7.4	1.50	-0.239	1.0	RD	RD	TRUE
12	Broccoli	7392	2.50	60	16.5	0.89	-0.352	0.6	12	30	
13	Bromegrass	11200	1.35	80	2.5	1.66	-0.217	1.2	RD	RD	
14	Brussel Sprouts	10752	2.50	60	8.1	0.87	-0.357	1.0	12	30	
15	Cabbage	44800	1.50	40	9.3	0.38	-0.537	0.4	12	30	
16	Cantaloupes	22400	2.00	40	6.2	0.34	-0.535	0.3	18	45	
17	Carrots	33600	1.20	40	5.8	0.35	-0.529	0.3	12	30	
18	Cauliflower	16800	1.50	60	9.3	0.38	-0.537	0.6	12	30	
19	Clover	4480	1.35	24	5.0	3.00	-0.151	1.0	RD	RD	TRUE
20	Corn - Grain	9400	2.50	80	2.5	1.30	-0.264	2.0	RD	RD	
21	Corn - Pop	3760	2.50	80	2.5	1.30	-0.264	1.8	18	45	
22	Corn - Silage	44800	1.35	75	2.5	0.40	-0.548	2.2	RD	RD	
23	Corn - Sweet	9400	2.50	75	7.8	1.50	-0.213	1.8	18	45	
24	Cotton	2240	2.50	80	5.8	2.60	-0.119	1.5	RD	RD	
25	Cowpeas - Hay	4480	1.35	24	4.3	3.00	-0.151	0.8	24	60	
26	Cucumbers	13440	2.00	40	6.0	0.34	-0.535	0.3	12	30	
27	Eggplant	28000	2.00	60	6.0	0.40	-0.548	0.8	18	45	
28	Lettuce - Leaf	33600	1.50	40	7.9	0.17	-0.657	0.3	12	30	
29	Lettuce - Head	44800	1.50	40	7.9	0.17	-0.657	0.3	12	30	
30	Lespedeza	4480	1.35	24	5.0	2.05	-0.214	0.6	RD	RD	TRUE
31	Millet, row - Grain	3000	5.00	80	2.5	1.30	-0.264	1.5	RD	RD	
32	Millet, row - Grain + Forage	11200	1.35	80	2.5	1.30	-0.264	1.5	RD	RD	
33	Millet, broadcast - Grain	3000	5.00	80	2.5	1.30	-0.264	1.5	RD	RD	
34	Millet, broadcast - Grain + Forage	13000	1.35	80	2.5	1.30	-0.264	1.5	RD	RD	
35	Mustard Greens	22400	1.35	40	8.3	0.36	-0.494	0.4	12	30	
36	Winter Oats - Grain	3200	3.00	75	3.0	1.30	-0.244	1.0	RD	RD	
37	Winter Oats - Grain + Straw	7680	1.35	75	3.0	1.30	-0.244	1.0	RD	RD	
38	Spring Oats - Grain	2800	3.00	75	3.0	1.30	-0.244	1.0	RD	RD	
39	Spring Oats - Grain + Straw	7000	1.35	75	3.0	1.30	-0.244	1.0	RD	RD	
40	Onions	44800	1.20	60	5.8	0.29	-0.570	0.4	12	30	
41	Orchardgrass	13440	1.35	80	3.0	2.50	-0.128	1.2	RD	RD	TRUE
42	Peas	6720	2.25	24	7.7	1.12	-0.325	0.6	12	30	
43	Pepper, Bell	22400	2.00	40	11.7	0.31	-0.555	0.8	12	30	
44	Peanuts, 2-row	4480	2.20	24	17.6	3.66	-0.107	0.4	18	45	
45	Peanuts + Hay, 2-row	8960	1.10	24	17.6	3.66	-0.107	0.4	18	45	
46	Peanuts, 4-row	5040	2.20	24	17.6	3.66	-0.107	0.4	18	45	
47	Peanuts + Hay, 4-row	9800	1.10	24	17.6	3.66	-0.107	0.4	18	45	

TABLE 1:
Crop Codes
GLMSCROP.dbf

GLMS_CCODE	DESCRIPTION	YIELD_KGHA	DRYMATRAT	CN_RATIO	NP_RATIO	C1	C2	CRHT_METRS	RT_DPTH_IN	RT_DPTH_CM	PERENNIAL
48	Potatoes - Irish	39200	1.25	60	8.2	0.43	-0.484	0.6	12	30	
49	Rape Seed	3000	3.00	40	8.5	0.36	-0.494	0.8	RD	RD	
50	Rice	4540	2.50	75	4.8	1.37	-0.258	1.0	RD	RD	
51	Winter Rye - Grain	1880	3.00	75	2.6	1.05	-0.290	1.0	RD	RD	
52	Winter Rye - Grain + Straw	5240	1.35	75	2.6	1.05	-0.290	1.0	RD	RD	
53	Spring Rye - Grain	1700	3.00	75	2.6	1.05	-0.290	1.0	RD	RD	
54	Spring Rye - Grain + Straw	5000	1.35	75	2.6	1.05	-0.290	1.0	RD	RD	
55	Safflower	1120	3.00	80	4.5	1.20	-0.261	1.0	RD	RD	
56	Sorghum - Grain	5000	3.00	80	5.1	1.67	-0.190	1.5	RD	RD	
57	Sorghum - Forage	11200	1.35	80	4.5	1.40	-0.228	2.0	RD	RD	
58	Soybeans, row	3020	2.25	24	5.3	2.30	-0.208	1.2	RD	RD	
59	Soybeans, broadcast	3200	2.25	24	5.3	2.30	-0.208	1.0	RD	RD	
60	Spinach	22400	1.35	40	8.3	0.36	-0.494	0.3	12	30	
61	Squash	33600	2.00	40	6.0	0.34	-0.535	0.5	12	30	
62	Sugarbeets	44800	1.80	40	6.0	0.30	-0.562	0.4	24	60	
63	Sugarcane	67200	1.80	80	5.1	0.17	-0.686	2.5	RD	RD	TRUE
64	Sunflower	2240	3.00	80	4.5	1.20	-0.261	2.0	RD	RD	
65	Sweet Potatoes	22400	1.30	60	7.0	0.42	-0.489	0.3	24	60	
66	Timothy Grass	5600	1.35	80	6.0	1.20	-0.261	1.5	RD	RD	TRUE
67	Tobacco	3360	2.00	75	11.7	3.84	-0.034	1.5	RD	RD	
68	Tomatoes	56000	1.45	40	8.6	0.27	-0.556	1.0	24	60	
69	Trees - Conifer		0.00	0	0.0	0.00	0.000	0.0			
70	Trees - Hardwood		0.00	0	0.0	0.00	0.000	0.0			
71	Trees - Hardwood + Conifer		0.00	0	0.0	0.00	0.000	0.0			
72	Turnips	36300	1.10	40	8.3	0.36	-0.494	0.4	12	30	
73	Watermelon	22400	1.50	40	6.0	0.34	-0.535	0.3	24	60	
74	Winter Wheat - Grain	3360	2.50	75	2.5	1.00	-0.301	1.0	RD	RD	
75	Winter Wheat - Grain + Straw	6720	1.35	75	2.5	1.00	-0.301	1.0	RD	RD	
76	Spring Wheat - Grain	3000	2.50	75	2.5	1.00	-0.301	1.0	RD	RD	
77	Spring Wheat - Grain + Straw	6000	1.35	75	2.5	1.00	-0.301	1.0	RD	RD	
78	Weeds	1000	0.00	60	7.0	1.10	-0.264	1.0	RD	RD	
-9	UNDEFINED										
79	USER DEFINED CROP.										
80	USER DEFINED CROP.										
81	USER DEFINED CROP.										
82	USER DEFINED CROP.										
83	USER DEFINED CROP.										
84	USER DEFINED CROP.										
85	USER DEFINED CROP.										
86	USER DEFINED CROP.										
87	USER DEFINED CROP.										
88	USER DEFINED CROP.										
89	USER DEFINED CROP.										
90	USER DEFINED CROP.										

TABLE 2:
Crop Practice Dates
CROPDATE.dbf

CROPDATEID	COMMENT	PLNT_MONTH	PLNT_DAY	MATURMONTH	MATURDAY	CTRUNMONTH	CTRUNDAY
1	EDS #1	APR	20	OCT	15	NOV	15
2	EDS #2	APR	30	OCT	15	NOV	15
3	EDS #3	MAY	10	OCT	15	NOV	15
4	EDS #4	MAY	20	OCT	15	NOV	15
5	EDS #5	MAY	30	OCT	15	NOV	15

TABLE 3:
Crop Practices
CROPPRAC.dbf

CPRACT_ID	TAGGED	DESCRIPTION	LEAFAREAID	ROOT_DEPTH	GLMS_CCODE	PERRENNIAL	RCNCRCATID
1		Corn - Grain	-9	24.00	20	FALSE	22

TABLE 4:
Crop Tillage Relationships
DATEFACT.dbf

DATEFACTID	COMMENT	RPT_ABBR	HYD_COND	SOILMAN_ID	CPRACT_ID	CROPDATEID	CDATE_ID	SLR_ID	PFACT_ID	SFACT_ID
1	Conv./Corn after Corn/Event Date Set #1	Conv/CC/EDS#1	POOR	4	1	1	1	1	1	1
2	Conv./Corn after Corn/Event Date Set #2	Conv/CC/EDS#2	POOR	4	1	2	2	1	1	1
3	Conv./Corn after Corn/Event Date Set #3	Conv/CC/EDS#3	POOR	4	1	3	3	1	1	1
4	Conv./Corn after Corn/Event Date Set #4	Conv/CC/EDS#4	POOR	4	1	4	4	1	1	1
5	Conv./Corn after Corn/Event Date Set #5	Conv/CC/EDS#5	POOR	4	1	5	5	1	1	1
6	Conv./Corn after Beans/Event Date Set #1	Conv/BC/EDS#1	POOR	4	1	1	1	2	1	2
7	Conv./Corn after Beans/Event Date Set #2	Conv/BC/EDS#2	POOR	4	1	2	2	2	1	2
8	Conv./Corn after Beans/Event Date Set #3	Conv/BC/EDS#3	POOR	4	1	3	3	2	1	2
9	Conv./Corn after Beans/Event Date Set #4	Conv/BC/EDS#4	POOR	4	1	4	4	2	1	2
10	Conv./Corn after Beans/Event Date Set #5	Conv/BC/EDS#5	POOR	4	1	5	5	2	1	2
11	Conv./Corn after Small Grain/Event Date Set #1	Conv/WC/EDS#1	POOR	4	1	1	1	3	1	3
12	Conv./Corn after Small Grain/Event Date Set #2	Conv/WC/EDS#2	POOR	4	1	2	2	3	1	3
13	Conv./Corn after Small Grain/Event Date Set #3	Conv/WC/EDS#3	POOR	4	1	3	3	3	1	3
14	Conv./Corn after Small Grain/Event Date Set #4	Conv/WC/EDS#4	POOR	4	1	4	4	3	1	3
15	Conv./Corn after Small Grain/Event Date Set #5	Conv/WC/EDS#5	POOR	4	1	5	5	3	1	3
16	Cons./Corn after Corn/Event Date Set #1	Cons/CC/EDS#1	POOR	5	1	1	1	4	1	4
17	Cons./Corn after Corn/Event Date Set #2	Cons/CC/EDS#2	POOR	5	1	2	2	4	1	4
18	Cons./Corn after Corn/Event Date Set #3	Cons/CC/EDS#3	POOR	5	1	3	3	4	1	4
19	Cons./Corn after Corn/Event Date Set #4	Cons/CC/EDS#4	POOR	5	1	4	4	4	1	4
20	Cons./Corn after Corn/Event Date Set #5	Cons/CC/EDS#5	POOR	5	1	5	5	4	1	4
21	Cons./Corn after Beans/Event Date Set #1	Cons/BC/EDS#1	POOR	5	1	1	1	5	1	5
22	Cons./Corn after Beans/Event Date Set #2	Cons/BC/EDS#2	POOR	5	1	2	2	5	1	5
23	Cons./Corn after Beans/Event Date Set #3	Cons/BC/EDS#3	POOR	5	1	3	3	5	1	5
24	Cons./Corn after Beans/Event Date Set #4	Cons/BC/EDS#4	POOR	5	1	4	4	5	1	5
25	Cons./Corn after Beans/Event Date Set #5	Cons/BC/EDS#5	POOR	5	1	5	5	5	1	5
26	Cons./Corn after Small Grain/Event Date Set #1	Cons/WC/EDS#1	POOR	5	1	1	1	6	1	6
27	Cons./Corn after Small Grain/Event Date Set #2	Cons/WC/EDS#2	POOR	5	1	2	2	6	1	6
28	Cons./Corn after Small Grain/Event Date Set #3	Cons/WC/EDS#3	POOR	5	1	3	3	6	1	6
29	Cons./Corn after Small Grain/Event Date Set #4	Cons/WC/EDS#4	POOR	5	1	4	4	6	1	6
30	Cons./Corn after Small Grain/Event Date Set #5	Cons/WC/EDS#5	POOR	5	1	5	5	6	1	6
31	No-Till/Corn after Corn/Event Date Set #1	No/CC/EDS#1	POOR	5	1	1	1	7	1	7
32	No-Till/Corn after Corn/Event Date Set #2	No/CC/EDS#2	POOR	5	1	2	2	7	1	7
33	No-Till/Corn after Corn/Event Date Set #3	No/CC/EDS#3	POOR	5	1	3	3	7	1	7
34	No-Till/Corn after Corn/Event Date Set #4	No/CC/EDS#4	POOR	5	1	4	4	7	1	7
35	No-Till/Corn after Corn/Event Date Set #5	No/CC/EDS#5	POOR	5	1	5	5	7	1	7
36	No-Till/Corn after Beans/Event Date Set #1	No/BC/EDS#1	POOR	5	1	1	1	8	1	8
37	No-Till/Corn after Beans/Event Date Set #2	No/BC/EDS#2	POOR	5	1	2	2	8	1	8
38	No-Till/Corn after Beans/Event Date Set #3	No/BC/EDS#3	POOR	5	1	3	3	8	1	8
39	No-Till/Corn after Beans/Event Date Set #4	No/BC/EDS#4	POOR	5	1	4	4	8	1	8
40	No-Till/Corn after Beans/Event Date Set #5	No/BC/EDS#5	POOR	5	1	5	5	8	1	8
41	No-Till/Corn after Small Grain/Event Date Set #1	No/WC/EDS#1	POOR	5	1	1	1	9	1	9
42	No-Till/Corn after Small Grain/Event Date Set #2	No/WC/EDS#2	POOR	5	1	2	2	9	1	9
43	No-Till/Corn after Small Grain/Event Date Set #3	No/WC/EDS#3	POOR	5	1	3	3	9	1	9
44	No-Till/Corn after Small Grain/Event Date Set #4	No/WC/EDS#4	POOR	5	1	4	4	9	1	9
45	No-Till/Corn after Small Grain/Event Date Set #5	No/WC/EDS#5	POOR	5	1	5	5	9	1	9

TABLE 5:
Leaf Area Indexes
LEAFAREA.dbf

LEAFAREA ID	NUM_UPDATE	MAX_HEIGHT	FILENAME
-9			UNDEFINED
1	10		tobacco.lai

TABLE 6:
Runoff Curve Number Crop Categories
RCNCRCAT.dbf

RCNCRCATID	DESCRIPTION
1	Open space (lawns, parks, golf courses, cemeteries, etc.) Grass cover < 50%
2	Open space (lawns, parks, golf courses, cemeteries, etc.) Grass cover 50%-75%
3	Open space (lawns, parks, golf courses, cemeteries, etc.) Grass cover > 75%
4	Paved parking lots, roofs, driveways, curbs, storm sewers, etc. (excluding right-of-way)
5	Paved roads with open ditches (including right-of-way)
6	Gravel roads (including right-of-way)
7	Dirt roads (including right-of-way)
8	Natural desert landscaping (pervious areas only)
9	Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders.)
10	Commercial and business districts. (85% average impervious area.)
11	Industrial districts. (72% average impervious area.)
12	Residential districts: Average lot size of 1/8 acre or less (town houses.) (65% average impervious area.)
13	Residential districts: Average lot size of 1/4 acre (38% average impervious area.)
14	Residential districts: Average lot size of 1/3 acre (30% average impervious area.)
15	Residential districts: Average lot size of 1/2 acre (25% average impervious area.)
16	Residential districts: Average lot size of 1 acre (20% average impervious area.)
17	Residential districts: Average lot size of 2 acres (12% average impervious area.)
18	Newly graded areas (pervious areas only, no vegetation.)
19	Fallow
22	Row crops
34	Small grain
46	Close-seeded or broadcast legumes or rotation meadow
52	Pasture, grassland, or range-continuous forage for grazing
55	Meadow: Continuous grass, protected from grazing and generally mowed for hay
56	Brush: Brush-weed-grass mixture with brush the major element
59	Woods-grass combination (orchard or tree farm) 50% woods/50% grass
62	Woods
65	Farmsteads: Buildings, lanes, driveways, and surrounding lots
66	Herbaceous: Mixture of grass, weeds, and low-growing brush, with brush the minor element
69	Oak-aspen: Mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.
72	Pinyon-juniper: Pinyon, juniper, or both; grass understory
75	Sagebrush with grass understory
78	Desert shrub: Major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

HYDRO	SOILMAN_ID	RCNCRCATID	HYD_COND	COMMENT	RCN_RATIO
A	1	1	UNSP		0.88312
B	1	1	UNSP		0.91860
C	1	1	UNSP		0.94505
D	1	1	UNSP		0.94681
A	1	2	UNSP		0.63636
B	1	2	UNSP		0.80233
C	1	2	UNSP		0.86813
D	1	2	UNSP		0.89362
A	1	3	UNSP		0.50649
B	1	3	UNSP		0.70930
C	1	3	UNSP		0.81319
D	1	3	UNSP		0.85106
A	1	4	UNSP		1.27273
B	1	4	UNSP		1.13953
C	1	4	UNSP		1.07692
D	1	4	UNSP		1.04255
A	1	5	UNSP		1.07792
B	1	5	UNSP		1.03488
C	1	5	UNSP		1.01099
D	1	5	UNSP		0.98936
A	1	6	UNSP		0.98701
B	1	6	UNSP		0.98837
C	1	6	UNSP		0.97802
D	1	6	UNSP		0.96809
A	1	7	UNSP		0.93506
B	1	7	UNSP		0.95349
C	1	7	UNSP		0.95604
D	1	7	UNSP		0.94681
A	1	8	UNSP		0.81818
B	1	8	UNSP		0.89535
C	1	8	UNSP		0.93407
D	1	8	UNSP		0.93617
A	1	9	UNSP		1.24675
B	1	9	UNSP		1.11628
C	1	9	UNSP		1.05495
D	1	9	UNSP		1.02128
A	1	10	UNSP		1.15584
B	1	10	UNSP		1.06977
C	1	10	UNSP		1.03297
D	1	10	UNSP		1.01064
A	1	11	UNSP		1.05195

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

B	1	11	UNSP		1.02326
C	1	11	UNSP		1.00000
D	1	11	UNSP		0.98936
A	1	12	UNSP		1.00000
B	1	12	UNSP		0.98837
C	1	12	UNSP		0.98901
D	1	12	UNSP		0.97872
A	1	13	UNSP		0.79221
B	1	13	UNSP		0.87209
C	1	13	UNSP		0.91209
D	1	13	UNSP		0.92553
A	1	14	UNSP		0.74026
B	1	14	UNSP		0.83721
C	1	14	UNSP		0.89011
D	1	14	UNSP		0.91489
A	1	15	UNSP		0.70130
B	1	15	UNSP		0.81395
C	1	15	UNSP		0.87912
D	1	15	UNSP		0.90426
A	1	16	UNSP		0.66234
B	1	16	UNSP		0.79070
C	1	16	UNSP		0.86813
D	1	16	UNSP		0.89362
A	1	17	UNSP		0.59740
B	1	17	UNSP		0.75581
C	1	17	UNSP		0.84615
D	1	17	UNSP		0.87234
A	1	18	UNSP		1.00000
B	1	18	UNSP		1.00000
C	1	18	UNSP		1.00000
D	1	18	UNSP		1.00000
A	2	19	FAIR		1.00000
B	2	19	FAIR		1.00000
C	2	19	FAIR		1.00000
D	2	19	FAIR		1.00000
A	3	19	POOR	factors impair infiltration and increase runoff	0.98701
B	3	19	POOR	factors impair infiltration and increase runoff	0.98837
C	3	19	POOR	factors impair infiltration and increase runoff	0.98901
D	3	19	POOR	factors impair infiltration and increase runoff	0.98936
A	3	19	GOOD	factors encourage infiltration and decrease runoff	0.96104
B	3	19	GOOD	factors encourage infiltration and decrease runoff	0.96512
C	3	19	GOOD	factors encourage infiltration and decrease runoff	0.96703

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

D	3	19	GOOD	factors encourage infiltration and decrease runoff	0.95745
A	4	22	POOR	factors impair infiltration and increase runoff	0.93506
B	4	22	POOR	factors impair infiltration and increase runoff	0.94186
C	4	22	POOR	factors impair infiltration and increase runoff	0.96703
D	4	22	POOR	factors impair infiltration and increase runoff	0.96809
A	4	22	GOOD	factors encourage infiltration and decrease runoff	0.87013
B	4	22	GOOD	factors encourage infiltration and decrease runoff	0.90698
C	4	22	GOOD	factors encourage infiltration and decrease runoff	0.93407
D	4	22	GOOD	factors encourage infiltration and decrease runoff	0.94681
A	5	22	POOR	factors impair infiltration and increase runoff	0.92208
B	5	22	POOR	factors impair infiltration and increase runoff	0.93023
C	5	22	POOR	factors impair infiltration and increase runoff	0.95604
D	5	22	POOR	factors impair infiltration and increase runoff	0.95745
A	5	22	GOOD	factors encourage infiltration and decrease runoff	0.83117
B	5	22	GOOD	factors encourage infiltration and decrease runoff	0.87209
C	5	22	GOOD	factors encourage infiltration and decrease runoff	0.90110
D	5	22	GOOD	factors encourage infiltration and decrease runoff	0.90426
A	6	22	POOR	factors impair infiltration and increase runoff	0.90909
B	6	22	POOR	factors impair infiltration and increase runoff	0.91860
C	6	22	POOR	factors impair infiltration and increase runoff	0.92308
D	6	22	POOR	factors impair infiltration and increase runoff	0.93617
A	6	22	GOOD	factors encourage infiltration and decrease runoff	0.84416
B	6	22	GOOD	factors encourage infiltration and decrease runoff	0.87209
C	6	22	GOOD	factors encourage infiltration and decrease runoff	0.90110
D	6	22	GOOD	factors encourage infiltration and decrease runoff	0.91489
A	7	22	POOR	factors impair infiltration and increase runoff	0.89610
B	7	22	POOR	factors impair infiltration and increase runoff	0.90698
C	7	22	POOR	factors impair infiltration and increase runoff	0.91209
D	7	22	POOR	factors impair infiltration and increase runoff	0.92553
A	7	22	GOOD	factors encourage infiltration and decrease runoff	0.83117
B	7	22	GOOD	factors encourage infiltration and decrease runoff	0.86047
C	7	22	GOOD	factors encourage infiltration and decrease runoff	0.89011
D	7	22	GOOD	factors encourage infiltration and decrease runoff	0.90426
A	8	22	POOR	factors impair infiltration and increase runoff	0.85714
B	8	22	POOR	factors impair infiltration and increase runoff	0.86047
C	8	22	POOR	factors impair infiltration and increase runoff	0.87912
D	8	22	POOR	factors impair infiltration and increase runoff	0.87234
A	8	22	GOOD	factors encourage infiltration and decrease runoff	0.80519
B	8	22	GOOD	factors encourage infiltration and decrease runoff	0.82558
C	8	22	GOOD	factors encourage infiltration and decrease runoff	0.85714
D	8	22	GOOD	factors encourage infiltration and decrease runoff	0.86170
A	9	22	POOR	factors impair infiltration and increase runoff	0.84416

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

B	9	22	POOR	factors impair infiltration and increase runoff	0.84884
C	9	22	POOR	factors impair infiltration and increase runoff	0.86813
D	9	22	POOR	factors impair infiltration and increase runoff	0.86170
A	9	22	GOOD	factors encourage infiltration and decrease runoff	0.79221
B	9	22	GOOD	factors encourage infiltration and decrease runoff	0.81395
C	9	22	GOOD	factors encourage infiltration and decrease runoff	0.84615
D	9	22	GOOD	factors encourage infiltration and decrease runoff	0.85106
A	4	34	POOR	factors impair infiltration and increase runoff	0.84416
B	4	34	POOR	factors impair infiltration and increase runoff	0.88372
C	4	34	POOR	factors impair infiltration and increase runoff	0.92308
D	4	34	POOR	factors impair infiltration and increase runoff	0.93617
A	4	34	GOOD	factors encourage infiltration and decrease runoff	0.81818
B	4	34	GOOD	factors encourage infiltration and decrease runoff	0.87209
C	4	34	GOOD	factors encourage infiltration and decrease runoff	0.91209
D	4	34	GOOD	factors encourage infiltration and decrease runoff	0.92553
A	5	34	POOR	factors impair infiltration and increase runoff	0.83117
B	5	34	POOR	factors impair infiltration and increase runoff	0.87209
C	5	34	POOR	factors impair infiltration and increase runoff	0.91209
D	5	34	POOR	factors impair infiltration and increase runoff	0.91489
A	5	34	GOOD	factors encourage infiltration and decrease runoff	0.77922
B	5	34	GOOD	factors encourage infiltration and decrease runoff	0.83721
C	5	34	GOOD	factors encourage infiltration and decrease runoff	0.87912
D	5	34	GOOD	factors encourage infiltration and decrease runoff	0.89362
A	6	34	POOR	factors impair infiltration and increase runoff	0.81818
B	6	34	POOR	factors impair infiltration and increase runoff	0.86047
C	6	34	POOR	factors impair infiltration and increase runoff	0.90110
D	6	34	POOR	factors impair infiltration and increase runoff	0.90426
A	6	34	GOOD	factors encourage infiltration and decrease runoff	0.79221
B	6	34	GOOD	factors encourage infiltration and decrease runoff	0.84884
C	6	34	GOOD	factors encourage infiltration and decrease runoff	0.89011
D	6	34	GOOD	factors encourage infiltration and decrease runoff	0.89362
A	7	34	POOR	factors impair infiltration and increase runoff	0.80519
B	7	34	POOR	factors impair infiltration and increase runoff	0.84884
C	7	34	POOR	factors impair infiltration and increase runoff	0.89011
D	7	34	POOR	factors impair infiltration and increase runoff	0.89362
A	7	34	GOOD	factors encourage infiltration and decrease runoff	0.77922
B	7	34	GOOD	factors encourage infiltration and decrease runoff	0.83721
C	7	34	GOOD	factors encourage infiltration and decrease runoff	0.87912
D	7	34	GOOD	factors encourage infiltration and decrease runoff	0.88298
A	8	34	POOR	factors impair infiltration and increase runoff	0.79221
B	8	34	POOR	factors impair infiltration and increase runoff	0.83721
C	8	34	POOR	factors impair infiltration and increase runoff	0.86813

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

D	8	34	POOR	factors impair infiltration and increase runoff	0.87234
A	8	34	GOOD	factors encourage infiltration and decrease runoff	0.76623
B	8	34	GOOD	factors encourage infiltration and decrease runoff	0.81395
C	8	34	GOOD	factors encourage infiltration and decrease runoff	0.85714
D	8	34	GOOD	factors encourage infiltration and decrease runoff	0.86170
A	9	34	POOR	factors impair infiltration and increase runoff	0.77922
B	9	34	POOR	factors impair infiltration and increase runoff	0.82558
C	9	34	POOR	factors impair infiltration and increase runoff	0.85714
D	9	34	POOR	factors impair infiltration and increase runoff	0.86170
A	9	34	GOOD	factors encourage infiltration and decrease runoff	0.75325
B	9	34	GOOD	factors encourage infiltration and decrease runoff	0.80233
C	9	34	GOOD	factors encourage infiltration and decrease runoff	0.84615
D	9	34	GOOD	factors encourage infiltration and decrease runoff	0.85106
A	4	46	POOR	factors impair infiltration and increase runoff	0.85714
B	4	46	POOR	factors impair infiltration and increase runoff	0.89535
C	4	46	POOR	factors impair infiltration and increase runoff	0.93407
D	4	46	POOR	factors impair infiltration and increase runoff	0.94681
A	4	46	GOOD	factors encourage infiltration and decrease runoff	0.75325
B	4	46	GOOD	factors encourage infiltration and decrease runoff	0.83721
C	4	46	GOOD	factors encourage infiltration and decrease runoff	0.89011
D	4	46	GOOD	factors encourage infiltration and decrease runoff	0.90426
A	6	46	POOR	factors impair infiltration and increase runoff	0.83117
B	6	46	POOR	factors impair infiltration and increase runoff	0.87209
C	6	46	POOR	factors impair infiltration and increase runoff	0.91209
D	6	46	POOR	factors impair infiltration and increase runoff	0.90426
A	6	46	GOOD	factors encourage infiltration and decrease runoff	0.71429
B	6	46	GOOD	factors encourage infiltration and decrease runoff	0.80233
C	6	46	GOOD	factors encourage infiltration and decrease runoff	0.85714
D	6	46	GOOD	factors encourage infiltration and decrease runoff	0.88298
A	8	46	POOR	factors impair infiltration and increase runoff	0.81818
B	8	46	POOR	factors impair infiltration and increase runoff	0.84884
C	8	46	POOR	factors impair infiltration and increase runoff	0.87912
D	8	46	POOR	factors impair infiltration and increase runoff	0.88298
A	8	46	GOOD	factors encourage infiltration and decrease runoff	0.66234
B	8	46	GOOD	factors encourage infiltration and decrease runoff	0.77907
C	8	46	GOOD	factors encourage infiltration and decrease runoff	0.83516
D	8	46	GOOD	factors encourage infiltration and decrease runoff	0.85106
A	1	52	POOR	<50% ground cover or heavily grazed with no mulch	0.88312
B	1	52	POOR	<50% ground cover or heavily grazed with no mulch	0.91860
C	1	52	POOR	<50% ground cover or heavily grazed with no mulch	0.94505
D	1	52	POOR	<50% ground cover or heavily grazed with no mulch	0.94681
A	1	52	FAIR	50-75% ground cover and not heavily grazed	0.63636

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

D	1	62	FAIR	some forest litter, brush grazed but not burned	0.84043
A	1	62	GOOD	forest liter and brush adequately cover soil, not grazed	0.38961
B	1	62	GOOD	forest liter and brush adequately cover soil, not grazed	0.63953
C	1	62	GOOD	forest liter and brush adequately cover soil, not grazed	0.76923
D	1	62	GOOD	forest liter and brush adequately cover soil, not grazed	0.81915
A	1	65	UNSP		0.76623
B	1	65	UNSP		0.86047
C	1	65	UNSP		0.90110
D	1	65	UNSP		0.91489
B	1	66	POOR	<30% ground cover	0.93023
C	1	66	POOR	<30% ground cover	0.95604
D	1	66	POOR	<30% ground cover	0.98936
B	1	66	FAIR	30-70% ground cover	0.82558
C	1	66	FAIR	30-70% ground cover	0.89011
D	1	66	FAIR	30-70% ground cover	0.94681
B	1	66	GOOD	>70% ground cover	0.72093
C	1	66	GOOD	>70% ground cover	0.81319
D	1	66	GOOD	>70% ground cover	0.90426
B	1	69	POOR	<30% ground cover	0.76744
C	1	69	POOR	<30% ground cover	0.81319
D	1	69	POOR	<30% ground cover	0.84043
B	1	69	FAIR	30-70% ground cover	0.55814
C	1	69	FAIR	30-70% ground cover	0.62637
D	1	69	FAIR	30-70% ground cover	0.67021
B	1	69	GOOD	>70% ground cover	0.34884
C	1	69	GOOD	>70% ground cover	0.45055
D	1	69	GOOD	>70% ground cover	0.51064
B	1	72	POOR	<30% ground cover	0.87209
C	1	72	POOR	<30% ground cover	0.93407
D	1	72	POOR	<30% ground cover	0.94681
B	1	72	FAIR	30-70% ground cover	0.67442
C	1	72	FAIR	30-70% ground cover	0.80220
D	1	72	FAIR	30-70% ground cover	0.85106
B	1	72	GOOD	>70% ground cover	0.47674
C	1	72	GOOD	>70% ground cover	0.67033
D	1	72	GOOD	>70% ground cover	0.75532
B	1	75	POOR	<30% ground cover	0.77907
C	1	75	POOR	<30% ground cover	0.87912
D	1	75	POOR	<30% ground cover	0.90426
B	1	75	FAIR	30-70% ground cover	0.59302
C	1	75	FAIR	30-70% ground cover	0.69231
D	1	75	FAIR	30-70% ground cover	0.74468

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

B	1	75	GOOD	>70% ground cover	0.40698
C	1	75	GOOD	>70% ground cover	0.51648
D	1	75	GOOD	>70% ground cover	0.58511
A	1	78	POOR	<30% ground cover	0.81818
B	1	78	POOR	<30% ground cover	0.89535
C	1	78	POOR	<30% ground cover	0.93407
D	1	78	POOR	<30% ground cover	0.93617
A	1	78	FAIR	30-70% ground cover	0.71429
B	1	78	FAIR	30-70% ground cover	0.83721
C	1	78	FAIR	30-70% ground cover	0.89011
D	1	78	FAIR	30-70% ground cover	0.91489
A	1	78	GOOD	>70% ground cover	0.63636
B	1	78	GOOD	>70% ground cover	0.79070
C	1	78	GOOD	>70% ground cover	0.86813
D	1	78	GOOD	>70% ground cover	0.89362
A	10	22	GOOD	Median between Straight Row & Contoured RCN's	0.85715
A	10	22	POOR	Median between Straight Row & Contoured RCN's	0.92208
A	10	34	GOOD	Median between Straight Row & Contoured RCN's	0.80520
A	10	34	POOR	Median between Straight Row & Contoured RCN's	0.83117
A	10	46	GOOD	Median between Straight Row & Contoured RCN's	0.73377
A	10	46	POOR	Median between Straight Row & Contoured RCN's	0.84416
B	10	22	GOOD	Median between Straight Row & Contoured RCN's	0.88954
B	10	22	POOR	Median between Straight Row & Contoured RCN's	0.93023
B	10	34	GOOD	Median between Straight Row & Contoured RCN's	0.86047
B	10	34	POOR	Median between Straight Row & Contoured RCN's	0.87210
B	10	46	GOOD	Median between Straight Row & Contoured RCN's	0.81977
B	10	46	POOR	Median between Straight Row & Contoured RCN's	0.88372
C	10	22	GOOD	Median between Straight Row & Contoured RCN's	0.91759
C	10	22	POOR	Median between Straight Row & Contoured RCN's	0.94506
C	10	34	GOOD	Median between Straight Row & Contoured RCN's	0.90110
C	10	34	POOR	Median between Straight Row & Contoured RCN's	0.91209
C	10	46	GOOD	Median between Straight Row & Contoured RCN's	0.87363
C	10	46	POOR	Median between Straight Row & Contoured RCN's	0.92308
D	10	22	GOOD	Median between Straight Row & Contoured RCN's	0.93085
D	10	22	POOR	Median between Straight Row & Contoured RCN's	0.95213
D	10	34	GOOD	Median between Straight Row & Contoured RCN's	0.90958
D	10	34	POOR	Median between Straight Row & Contoured RCN's	0.92022
D	10	46	GOOD	Median between Straight Row & Contoured RCN's	0.89362
D	10	46	POOR	Median between Straight Row & Contoured RCN's	0.92554
A	11	22	GOOD	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.83117
A	11	22	POOR	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.90909
A	11	34	GOOD	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.77922

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

A	11	34	POOR	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.81818
B	11	22	GOOD	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.86628
B	11	22	POOR	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.91861
B	11	34	GOOD	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.83721
B	11	34	POOR	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.86047
C	11	22	GOOD	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.89561
C	11	22	POOR	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.93407
C	11	34	GOOD	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.87912
C	11	34	POOR	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.90110
D	11	22	GOOD	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.90426
D	11	22	POOR	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.94149
D	11	34	GOOD	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.88830
D	11	34	POOR	Median between SR Cons. Till & C Cons. Till RCN's. Cons. Till is AKA CR, Crop Re	0.90426

TABLE 7:
Runoff Curve Number Ratio Table
RCN_RAT.dbf

B	1	52	FAIR	50-75% ground cover and not heavily grazed	0.80233
C	1	52	FAIR	50-75% ground cover and not heavily grazed	0.86813
D	1	52	FAIR	50-75% ground cover and not heavily grazed	0.89362
A	1	52	GOOD	>75% ground cover and lightly or occasionaly grazed	0.50649
B	1	52	GOOD	>75% ground cover and lightly or occasionaly grazed	0.70930
C	1	52	GOOD	>75% ground cover and lightly or occasionaly grazed	0.81319
D	1	52	GOOD	>75% ground cover and lightly or occasionaly grazed	0.85106
A	1	55	UNSP		0.38961
B	1	55	UNSP		0.67442
C	1	55	UNSP		0.78022
D	1	55	UNSP		0.82979
A	1	56	POOR	<50% ground cover	0.62338
B	1	56	POOR	<50% ground cover	0.77907
C	1	56	POOR	<50% ground cover	0.84615
D	1	56	POOR	<50% ground cover	0.88298
A	1	56	FAIR	50-75% ground cover	0.45455
B	1	56	FAIR	50-75% ground cover	0.65116
C	1	56	FAIR	50-75% ground cover	0.76923
D	1	56	FAIR	50-75% ground cover	0.81915
A	1	56	GOOD	>75% ground cover	0.38961
B	1	56	GOOD	>75% ground cover	0.55814
C	1	56	GOOD	>75% ground cover	0.71429
D	1	56	GOOD	>75% ground cover	0.77660
A	1	59	POOR		0.74026
B	1	59	POOR		0.84884
C	1	59	POOR		0.90110
D	1	59	POOR		0.91489
A	1	59	FAIR		0.55844
B	1	59	FAIR		0.75581
C	1	59	FAIR		0.83516
D	1	59	FAIR		0.87234
A	1	59	GOOD		0.41558
B	1	59	GOOD		0.67442
C	1	59	GOOD		0.79121
D	1	59	GOOD		0.84043
A	1	62	POOR	forest litter, small trees, brush heavily grazed/burned	0.58442
B	1	62	POOR	forest litter, small trees, brush heavily grazed/burned	0.76744
C	1	62	POOR	forest litter, small trees, brush heavily grazed/burned	0.84615
D	1	62	POOR	forest litter, small trees, brush heavily grazed/burned	0.88298
A	1	62	FAIR	some forest litter, brush grazed but not burned	0.46753
B	1	62	FAIR	some forest litter, brush grazed but not burned	0.69767
C	1	62	FAIR	some forest litter, brush grazed but not burned	0.80220

TABLE 8:
Soil Management
SOILMAN.dbf

SOILMAN_ID	TAGGED	DESCRIPTION
1	FALSE	None
2	FALSE	Bare Soil
3	TRUE	Crop Residue Cover (CR)
4	TRUE	Straight Row (SR)
5	FALSE	Straight Row with Crop Residue Cover (SR + CR)
6	FALSE	Contoured (C)
7	FALSE	Contoured with Crop Residue Cover (C + CR)
8	FALSE	Contoured & Terraced (C&T)
9	FALSE	Contoured, Terraced, with Crop Residue Cover (C&T + CR)
-9		UNDEFINED
10		Cross-Slope (XS)
11		Cross Slope with Crop Residue Cover (Cons. Tillage) (XS + CR)

TABLE 9:
Water Management
WAT_MAN.dbf

WATMAN_ID	TAGGED	COMMENT	PREIRRFRAC	POSTIRRFRA	BEGINMONTH	BEGINDAY	ENDMONTH	ENDDAY	PPLNTMONTH	PPLNTDAY	PREPLNTDEP
1		No Irrigation. (ID #1 MUST be no irrigation. Do not reassign this ID.)			JAN	0	JAN	0	JAN	0	
-9		UNDEFINED									
2		Sensor Irrigation. On at 70% FC, off at 140% FC, May 5 - Sep 20.	0.700	1.400	MAY	5	SEP	20	APR	30	0.5000

TABLE 10:
Erosion Factor Dates
CDATE.dbf

CDATE_ID	COMMENT	NUM_CDATES	MONTH2	DAY2	DESCR2	MONTH3	DAY3	DESCR3	MONTH4	DAY4	DESCR4	MONTH5	DAY5	DESCR5	MONTH6	DAY6	DESCR6	MONTH7	DAY7	DESCR7	MONTH8	DAY8	DESCR8	MONTH9	DAY9	DESCR9	MONTH10	DAY10	DESCR10
1	EDS #1	10	FEB	15	Thaw	APR	5	Soil Restructu	APR	20	Planting	MAY	5	10% Canopy Cover	JUN	5	50% Canopy Cover	JUL	5	75% Canopy Cover	AUG	5	96% Canopy Cover	OCT	15	Freeze	NOV	15	Harvest
2	EDS #2	10	FEB	15	Thaw	APR	15	Soil Restructu	APR	30	Planting	MAY	15	10% Canopy Cover	JUN	15	50% Canopy Cover	JUL	15	75% Canopy Cover	AUG	15	96% Canopy Cover	OCT	15	Freeze	NOV	15	Harvest
3	EDS #3	10	FEB	15	Thaw	APR	25	Soil Restructu	MAY	10	Planting	MAY	25	10% Canopy Cover	JUN	25	50% Canopy Cover	JUL	25	75% Canopy Cover	AUG	25	96% Canopy Cover	OCT	15	Freeze	NOV	15	Harvest
4	EDS #4	10	FEB	15	Thaw	MAY	5	Soil Restructu	MAY	20	Planting	JUN	5	10% Canopy Cover	JUL	5	50% Canopy Cover	AUG	5	75% Canopy Cover	SEP	5	96% Canopy Cover	OCT	15	Freeze	NOV	15	Harvest
5	EDS #5	10	FEB	15	Thaw	MAY	15	Soil Restructu	MAY	30	Planting	JUN	15	10% Canopy Cover	JUL	15	50% Canopy Cover	AUG	15	75% Canopy Cover	SEP	15	96% Canopy Cover	OCT	15	Freeze	NOV	15	Harvest

TABLE 11:
Practice Factors
P_FACT.dbf

PFACT_ID	COMMENT	PFACT1	DESCR1	PFACT2	DESCR2	PFACT3	DESCR3	PFACT4	DESCR4	PFACT5	DESCR5	PFACT6	DESCR6	PFACT7	DESCR7	PFACT8	DESCR8	PFACT9	DESCR9	PFACT10	DESCR10
1	Up/Down Slope (SR)	1.00	Jan 1	1.00	Thaw	1.00	Soil Restructuring	1.00	Planting	1.00	10% Canopy Cover	1.00	50% Canopy Cover	1.00	75% Canopy Cover	1.00	96% Canopy Cover	1.00	Freeze	1.00	Harvest

TABLE 12:
Smoothness Factors
SFACT.dbf

SFACT_ID	COMMENT	SFACT1	DESCR1	SFACT2	DESCR2	SFACT3	DESCR3	SFACT4	DESCR4	SFACT5	DESCR5	SFACT6	DESCR6	SFACT7	DESCR7	SFACT8	DESCR8	SFACT9	DESCR9	SFACT10	DESCR10
1	Grain Corn; Tillage - Cnvtl (Disk/Chisel); Corn after Corn	0.017	Jan. 1	0.017	Thaw	0.017	Soil Restructure	0.040	Seedbed Preparation, Pla	0.017	10% Canopy Cover	0.017	50% Canopy Cover	0.017	75% Canopy Cover	0.017	96% Canopy Cover	0.017	Freeze	0.017	Harvest
2	Grain Corn; Tillage - Cnvtl (Disk/Chisel); Corn after Beans	0.017	Jan. 1	0.017	Thaw	0.017	Soil Restructure	0.040	Seedbed Preparation, Pla	0.017	10% Canopy Cover	0.017	50% Canopy Cover	0.017	75% Canopy Cover	0.017	96% Canopy Cover	0.017	Freeze	0.017	Harvest
3	Grain Corn; Tillage - Cnvtl (Disk/Chisel); Corn aft sml Grn	0.017	Jan. 1	0.017	Thaw	0.017	Soil Restructure	0.040	Seedbed Preparation, Pla	0.017	10% Canopy Cover	0.017	50% Canopy Cover	0.017	75% Canopy Cover	0.017	96% Canopy Cover	0.017	Freeze	0.017	Harvest
4	Grain Corn; Tillage - Conservation; Corn after Corn	0.025	Jan. 1	0.025	Thaw	0.025	Soil Restructure	0.025	Seedbed Preparation, Pla	0.025	10% Canopy Cover	0.025	50% Canopy Cover	0.025	75% Canopy Cover	0.025	96% Canopy Cover	0.025	Freeze	0.025	Harvest
5	Grain Corn; Tillage - Conservation; Corn after Beans	0.025	Jan. 1	0.025	Thaw	0.025	Soil Restructure	0.025	Seedbed Preparation, Pla	0.025	10% Canopy Cover	0.025	50% Canopy Cover	0.025	75% Canopy Cover	0.025	96% Canopy Cover	0.025	Freeze	0.025	Harvest
6	Grain Corn; Tillage - Conservation; Corn after Small Grain	0.025	Jan. 1	0.025	Thaw	0.025	Soil Restructure	0.025	Seedbed Preparation, Pla	0.025	10% Canopy Cover	0.025	50% Canopy Cover	0.025	75% Canopy Cover	0.025	96% Canopy Cover	0.025	Freeze	0.025	Harvest
7	Grain Corn; Tillage - No-Till; Corn after Corn	0.040	Jan. 1	0.040	Thaw	0.040	Soil Restructure	0.040	Seedbed Preparation, Pla	0.040	10% Canopy Cover	0.040	50% Canopy Cover	0.040	75% Canopy Cover	0.040	96% Canopy Cover	0.040	Freeze	0.040	Harvest
8	Grain Corn; Tillage - No-Till; Corn after Beans	0.040	Jan. 1	0.040	Thaw	0.040	Soil Restructure	0.040	Seedbed Preparation, Pla	0.040	10% Canopy Cover	0.040	50% Canopy Cover	0.040	75% Canopy Cover	0.040	96% Canopy Cover	0.040	Freeze	0.040	Harvest
9	Grain Corn; Tillage - No-Till; Corn after Small Grain	0.040	Jan. 1	0.040	Thaw	0.040	Soil Restructure	0.040	Seedbed Preparation, Pla	0.040	10% Canopy Cover	0.040	50% Canopy Cover	0.040	75% Canopy Cover	0.040	96% Canopy Cover	0.040	Freeze	0.040	Harvest
-9	UNDEFINED																				

TABLE 13:
Soil Loss Ratio
SLR.dbf

SLR_ID	COMMENT	SLR1	DESCR1	SLR2	DESCR2	SLR3	DESCR3	SLR4	DESCR4	SLR5	DESCR5	SLR6	DESCR6	SLR7	DESCR7	SLR8	DESCR8	SLR9	DESCR9	SLR10	DESCR10
1	Grain Corn; Tillage - Cnvtl (Disk/Chisel); Corn aft Corn	0.010	Jan. 1	0.250	Thaw	0.250	Soil Restructu	0.250	Seedbed Preparation, Pla	0.220	10% Canopy Cover	0.190	50% Canopy Cover	0.190	75% Canopy Cover	0.160	96% Canopy Cover	0.220	Freeze	0.010	Harvest
2	Grain Corn; Tillage - Cnvtl (Disk/Chisel); Corn aft Beans	0.010	Jan. 1	0.510	Thaw	0.510	Soil Restructu	0.510	Seedbed Preparation, Pla	0.440	10% Canopy Cover	0.390	50% Canopy Cover	0.340	75% Canopy Cover	0.230	96% Canopy Cover	0.370	Freeze	0.010	Harvest
3	Grain Corn; Tillage - Cnvtl (Disk/Chisel); Corn aft sml Grn	0.010	Jan. 1	0.290	Thaw	0.290	Soil Restructu	0.290	Seedbed Preparation, Pla	0.250	10% Canopy Cover	0.230	50% Canopy Cover	0.230	75% Canopy Cover	0.160	96% Canopy Cover	0.270	Freeze	0.010	Harvest
4	Grain Corn; Tillage - Conservation; Corn after Corn	0.010	Jan. 1	0.140	Thaw	0.140	Soil Restructu	0.140	Seedbed Preparation, Pla	0.130	10% Canopy Cover	0.110	50% Canopy Cover	0.110	75% Canopy Cover	0.090	96% Canopy Cover	0.190	Freeze	0.010	Harvest
5	Grain Corn; Tillage - Conservation; Corn after Beans	0.010	Jan. 1	0.400	Thaw	0.400	Soil Restructu	0.400	Seedbed Preparation, Pla	0.350	10% Canopy Cover	0.290	50% Canopy Cover	0.290	75% Canopy Cover	0.230	96% Canopy Cover	0.290	Freeze	0.010	Harvest
6	Grain Corn; Tillage - Conservation; Corn after Small Grain	0.010	Jan. 1	0.160	Thaw	0.160	Soil Restructu	0.160	Seedbed Preparation, Pla	0.130	10% Canopy Cover	0.120	50% Canopy Cover	0.120	75% Canopy Cover	0.090	96% Canopy Cover	0.240	Freeze	0.010	Harvest
7	Grain Corn; Tillage - No-Till; Corn after Corn	0.010	Jan. 1	0.050	Thaw	0.050	Soil Restructu	0.050	Seedbed Preparation, Pla	0.050	10% Canopy Cover	0.050	50% Canopy Cover	0.050	75% Canopy Cover	0.050	96% Canopy Cover	0.150	Freeze	0.010	Harvest
8	Grain Corn; Tillage - No-Till; Corn after Beans	0.010	Jan. 1	0.250	Thaw	0.250	Soil Restructu	0.250	Seedbed Preparation, Pla	0.200	10% Canopy Cover	0.190	50% Canopy Cover	0.190	75% Canopy Cover	0.110	96% Canopy Cover	0.260	Freeze	0.010	Harvest
9	Grain Corn; Tillage - No-Till; Corn after Small Grain	0.010	Jan. 1	0.080	Thaw	0.080	Soil Restructu	0.080	Seedbed Preparation, Pla	0.080	10% Canopy Cover	0.080	50% Canopy Cover	0.080	75% Canopy Cover	0.060	96% Canopy Cover	0.190	Freeze	0.010	Harvest
-9	UNDEFINED																				

Table 14:
Soil Loss Ratio Assumption Descriptions

Crop Rotation	Tillage Practice	Jan. 1	Thaw	Soil Restructure	Seedbed Preparation, Plant	10% Canopy Cover	50% Canopy Cover	75% Canopy Cover	96% Canopy Cover	Harvest	Freeze	Assumptions
Corn after Corn	Conventional (Disk/Chisel)	0.01	0.25	0.25	0.25	0.22	0.19	0.19	0.16	0.22	0.01	4500 lbs/ac of Spring residue, Chisel plow, 20% of soil surface covered by crop residue after seeding
Corn after Beans	Conventional (Disk/Chisel)	0.01	0.51	0.51	0.51	0.44	0.39	0.34	0.23	0.37	0.01	Spring chisel with 20% of soil surface covered by crop residue after seeding
Corn after Small Grain	Conventional (Disk/Chisel)	0.01	0.29	0.29	0.29	0.25	0.23	0.23	0.16	0.27	0.01	3400 lbs/ac of Spring residue, Chisel plow, 20% of soil surface covered by crop residue after seeding
Corn after Corn	Conservation	0.01	0.14	0.14	0.14	0.13	0.11	0.11	0.09	0.19	0.01	4500 lbs/ac of Spring residue, Chisel plow, 50% of soil surface covered by crop residue after seeding
Corn after Beans	Conservation	0.01	0.4	0.4	0.4	0.35	0.29	0.29	0.23	0.29	0.01	Spring chisel with 30% of soil surface covered by crop residue after seeding
Corn after Small Grain	Conservation	0.01	0.16	0.16	0.16	0.13	0.12	0.12	0.09	0.24	0.01	3400 lbs/ac of Spring residue, Chisel plow, 50% of soil surface covered by crop residue after seeding
Corn after Corn	No-Till	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.15	0.01	4500 lbs/ac of Spring residue
Corn after Beans	No-Till	0.01	0.25	0.25	0.25	0.2	0.19	0.19	0.11	0.26	0.01	No-till with 40% of soil surface covered by crop residue after seeding
Corn after Small Grain	No-Till	0.01	0.08	0.08	0.08	0.08	0.08	0.08	0.06	0.19	0.01	3400 lbs/ac of Spring residue

References:
1) Knisel, W.G. and Davis, F.M. 2000. GLEAMS: Groundwater Loading Effects of Agricultural Management Systems, Version 3.0 User Manual. Table E-6, Pages 94 - 96.
2) Wischmeier, W.H. and Smith, D.D. 1978. *Predicting Rainfall Erosion Losses: A Guide to Conservation Planning.* US Department of Agriculture, Agricultural Handbook 537. Table 5: Table of soil loss from cropland, Page 22-23.

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

CHEM_ID	TAGGED	CASRN	CAS_CODE	COMMONNAME	FOLI_HL_RV	FOLI_HL_GE	PCT_WASHOF
1	TRUE	1918-00-9		Dicamba	9		0.650
-9				UNDEFINED			0.500
2		78-87-5	0	1,2-Dichloropropane	0		0.000
3		542-75-6	0	Dichloropropene	0		0.000
4		86-86-2	0	Naphthaleneacetamide	0		0.000
5		93-76-5	A	2,4,5-T Acid	0		0.000
6		93-76-5	B	2,4,5-T Amine(o) salts	0		0.000
7		94-75-7	0	2,4-D Acid	0		0.000
8		2008-39-1	0	2,4-D Dimethylamine salt	0		0.000
9		1928-38-7	0	2,4-D Esters or Oil-Sol. Amines	0		0.000
10		32357-46-3	0	2,4-DB Butoxyethyl Ester	0		0.000
11		94-82-6	0	2,4-DB Dimethylamine salt	0		0.000
12		5825-87-6	0	3-CPA Sodium salt	0		0.000
13		30560-19-1	0	Acephate	3		0.700
14		62476-59-9	0	Acifluorfen Sodium salt	5		0.950
15		107-02-8	0	Acrolein	0		0.000
16		15972-60-8	0	Alachlor	3		0.400
17		116-06-3	0	Aldicarb	0		0.000
18		309-00-2	0	Aldrin	2		0.050
19		834-12-8	0	Ametryn	5		0.650
20		2032-59-9	0	Aminocarb	4		0.900
21		33089-61-1	0	Amitraz	1		0.450
22		773-06-0	0	Ammonium Sulfamate	0		0.000
23		12771-68-5	0	Ancymidol	30		0.500
24		101-05-3	0	Anilazine	1		0.500
25		1327-58-3	0	Arsenic Acid	10000		0.950
26		2302-17-2	0	Asulam Sodium Salt	3		0.950
27		1912-24-9	0	Atrazine	5		0.450
28		86-50-0	0	Azinphos-Methyl	0		0.000
29		101-27-9	0	Barban	0		0.000
30		71626-11-4	0	Benalaxyl	0		0.000
31		22781-23-3	0	Bendiocarb	3		0.850
32		1861-40-1	0	Benefin	0		0.000
33		15310-01-7	0	Benodanil	0		0.000
34		17804-35-2	0	Benomyl	6		0.250
35		83055-99-6	0	Bensulfuron-Methyl	0		0.000
36		741-58-2	0	Bensulide	30		0.400
37		50723-80-3	0	Bentazon Sodium salt	2		0.600
38		42576-02-3	0	Bifenox	3		0.400

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

39		82657-04-3	0	Bifenthrin	7		0.400
40		3861-41-4	0	Bromoxynil Butyrate (Ester)	0		0.000
41		1689-99-2	0	Bromoxynil Octanoate	0		0.000
42		23184-66-9	0	Butachlor	0		0.000
43		2008-41-5	0	Butylate	1		0.300
44		2425-06-1	0	Captafol	0		0.000
45		133-06-2	0	Captan	9		0.650
46		10605-21-7	0	Carbendazim	0		0.000
47		1563-66-2	0	Carbofuran	0		0.000
48		786-19-6	0	Carbophenothion	6		0.650
49		5234-68-4	0	Carboxin	0		0.000
50		93-71-0	0	Allidochlor	0		0.000
51		74115-24-5	0	Clofentezine	0		0.000
52		133-90-4	0	Chloramben	0		0.000
53		13360-45-7	0	Chlorbromuron	0		0.000
54		57-74-9	0	Chlordane	3		0.050
55		6164-98-3	0	Chlordimeform	0		0.000
56		90982-32-4	0	Chlorimuron Ethyl	15		0.900
57		510-15-6	0	Chlorobenzilate	10		0.050
58		2675-77-6	0	Chloroneb	30		0.500
59		76-06-2	0	Chloropicrin	0		0.000
60		1897-45-6	0	Chlorothalonil	10		0.500
61		1982-47-4	0	Chloroxuron	15		0.400
62		101-21-3	0	Chlorpropham	0		0.000
63		2921-88-2	0	Chlorpyrifos	3		0.650
64		5598-13-0	0	Chlorpyrifos-Methyl	0		0.000
65		64902-72-3	0	Chlorsulfuron	30		0.750
66		72391-46-9	0	Chlozolinate	0		0.000
67		87818-31-3	0	Cinmethylin	0		0.000
68		81777-89-1	0	Clomazone	0		0.000
69		1702-17-6	0	Clopyralid Amine salt	2		0.950
70		15096-52-3	0	Cryolite	0		0.000
71		21725-46-2	0	Cyanazine	5		0.600
72		1134-23-2	0	Cycloate	0		0.000
73		68359-37-5	0	Cyfluthrin	5		0.400
74		52315-07-8	0	Cypermethrin	0		0.000
75		66215-27-8	0	Cyromazine	0		0.000
76		127-20-8	0	Dalapon Sodium salt	37		0.950
77		1596-84-5	0	Daminozide	0		0.000
78		533-74-4	0	Dazomet	0		0.000

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

79		96-12-8	0	DBCP Also known as Dibromochloropropane	0		0.000
80		99-30-9	0	DCNA	0		0.000
81		1861-32-1	0	Chlorthal-Dimethyl	0		0.000
82		72-54-8	0	DDD	0		0.000
83		3424-82-6	0	DDE (o,p')	0		0.000
84		50-29-3	0	DDT	4		0.050
85		8065-48-3	0	Demeton	0		0.000
86		13684-56-5	0	Desmedipham	5		0.700
87		2303-16-4	0	Diallate	0		0.000
88		1194-65-6	0	Dichlobenil	5		0.450
89		37764-25-3	0	Dichlormid	0		0.000
90		120-36-5	0	Dichlorprop (2,4-DP) Ester	0		0.000
91		62-73-7	0	Dichlorvos (DDVP)	0		0.000
92		51338-27-3	0	Diclofop-Methyl	0		0.000
93		115-32-2	0	Dicofol	4		0.050
94		141-66-2	0	Dicrotophos	20		0.700
95		60-57-1	0	Dieldrin	5		0.050
96		2227-17-0	0	Dienochlor	0		0.000
97		58727-55-8	0	Diethatyl-Ethyl	0		0.000
98		43222-46-6	0	Difenzoquat Methylsulfate	0		0.000
99		35367-38-5	0	Diflubenzuron	27		0.050
100		55290-64-7	0	Dimethipin	3		0.800
101		5221-53-4	0	Dimethirimol	0		0.000
102		60-51-5	0	Dimethoate	3		0.950
103		29091-05-2	0	Dinitramine	0		0.000
104		39300-45-3	0	Dinocap	8		0.300
105		88-85-7	A	Dinoseb	0		0.000
106		957-51-7	0	Diphenamid	5		0.800
107		4147-51-7	0	Dipropetryn	5		0.400
108		85-00-7	0	Diquat Dibromide	0		0.000
109		298-04-4	0	Disulfoton	3		0.500
110		330-54-1	0	Diuron	30		0.450
111		534-52-1	0	DNOC	0		0.000
112		2439-10-3	0	Dodine	0		0.000
113		144-21-8	0	Methylarsonic Acid Disodium salt	0		0.000
114		115-29-7	0	Endosulfan	3		0.050
115		145-73-3	0	Endothall	0		0.000
116		72-20-8	0	Endrin	0		0.000
117		2104-64-5	0	EPN	5		0.600
118		759-94-4	0	EPTC (Eradicane)	3		0.750

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

119		66230-04-4	0	Esfenvalerate	8		0.400
120		55283-68-6	0	Ethalfluralin	4		0.400
121		16672-87-0	0	Ethephon	5		0.950
122		563-12-2	0	Ethion	7		0.650
123		26225-79-6	0	Ethofumesate	10		0.650
124		13194-48-4	0	Ethoprop	0		0.000
125		106-93-4	0	EDB	0		0.000
126		2593-15-9	0	Etridiazole	3		0.600
127		2439-00-1	0	Fenac salt	0		0.000
128		140-56-7	0	Fenaminosulf	0		0.000
129		22224-92-6	0	Fenamiphos	0		0.000
130		60168-88-9	0	Fenarimol	30		0.400
131		13356-08-6	0	Fenbutatin Oxide	30		0.200
132		24691-80-3	0	Fenfuram	0		0.000
133		122-14-5	0	Fenitrothion	0		0.000
134		66441-23-4	0	Fenoxaprop-Ethyl	0		0.000
135		72490-01-8	0	Fenoxycarb	0		0.000
136		64257-84-7	0	Fenpropathrin	0		0.000
137		55-38-9	0	Fenthion	2		0.650
138		101-42-8	0	Fenuron	0		0.000
139		51630-58-1	0	Fenvalerate	10		0.250
140		14484-64-1	0	Ferbam	3		0.900
141		69806-50-4	0	Fluazifop-Butyl	0		0.000
142		79241-46-6	0	Fluazifop-P-Butyl	0		0.000
143		33245-39-5	0	Fluchloralin	0		0.000
144		70124-77-5	0	Flucythrinate	5		0.400
145		62924-70-3	0	Flumetralin	7		0.400
146		2164-17-2	0	Fluometuron	30		0.500
147		59756-60-4	0	Fluridone	0		0.000
148		69409-94-5	0	Tau-Fluvalinate Also Known as Fluvalinate	0		0.000
149		72178-2-0	0	Fomesafen Sodium salt	30		0.950
150		944-22-9	0	Fonofos	3		0.600
151		23422-53-9	0	Formetanate Hydrochloride	0		0.000
152		25954-13-6	0	Fosamine Ammonium	0		0.000
153		39148-24-8	0	Fosetyl-Aluminum	0		0.000
154		77182-82-2	0	Glufosinate-Ammonium	0		0.000
155		1071-83-6	0	Glyphosate Isopropylammonium	0		0.000
156		69806-40-2	0	Haloxyfop-Methyl	0		0.000
157		76-44-8	0	Heptachlor	0		0.000
158		118-74-1	0	HCB	0		0.000

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

159		51235-04-2	0	Hexazinone	30		0.900
160		78587-05-0	0	Hexythiazox	5		0.400
161		67485-29-4	0	Amdro	0		0.000
162		35554-44-0	0	Imazalil	0		0.000
163		81334-34-1	0	Imazapyr Acid	30		0.900
164		81335-37-7	0	Imazaquin Acid	0		0.000
165		81335-47-9	0	Imazaquin Ammonium salt	20		0.950
166		81335-77-5	0	AC 263, 499	0		0.000
167		36734-19-7	0	Iprodione	5		0.400
168		42509-80-8	0	Isazofos	5		0.650
169		25311-71-1	0	Isofenphos	30		0.650
170		33820-53-0	0	Isopropalin	0		0.000
171		82558-50-7	0	Isoxaben	0		0.000
172		83513-60-4	0	Lactofen	2		0.200
173		58-89-9	0	Lindane	3		0.050
174		330-55-2	0	Linuron	15		0.600
175		121-75-5	0	Malathion	3		0.900
176		123-33-1	A	Maleic Hydrazide	0		0.000
177		8018-01-7	0	Mancozeb	10		0.250
178		12427-38-2	0	Maneb	0		0.000
179		94-81-5	0	MCPB Sodium salt	0		0.000
180		7085-19-0	0	Mecoprop	0		0.000
181		53780-34-0	0	Mefluidide	0		0.000
182		24307-26-4	0	Mepiquat Chloride	0		0.000
183		57837-19-1	0	Metalaxyl	30		0.700
184		137-42-8	0	Metam Sodium Metham	0		0.000
185		10265-92-6	0	Methamidophos	4		0.950
186		2163-80-6	0	Methanearsonic Acid Sodium salt	0		0.000
187		20354-26-1	0	Methazole	5		0.400
188		950-37-8	0	Methidathion	3		0.900
189		16752-77-5	0	Methomyl	1		0.550
190		72-43-5	0	Methoxychlor	6		0.050
191		74-83-9	0	Methyl Bromide	0		0.000
192		556-61-6	0	Methyl Isothiocyanate	0		0.000
193		298-00-0	0	Methyl Parathion	3		0.900
194		9006-42-2	0	Metiram	7		0.400
195		51218-45-2	0	Metolachlor	5		0.600
196		21087-64-9	0	Metribuzin	5		0.800
197		74223-64-6	0	Metsulfuron-Methyl	0		0.000
198		7786-34-7	0	Mevinphos	1		0.950

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

199		315-18-4	0	Mexacarbate	0		0.000
200		2385-85-5	0	Mirex	0		0.000
201		2212-67-1	0	Molinate	0		0.000
202		6923-22-4	0	Monocrotophos	2		0.950
203		1746-81-2	0	Monolinuron	0		0.000
204		150-68-5	0	Monuron	0		0.000
205		2163-80-6	0	MSMA	0		0.000
206		88671-89-0	0	Myclobutanil	0		0.000
207		86-87-3	A	1-Naphthaleneacetic acid Also known as NAA Ethyl Ester, and NAA	0		0.000
208		86-87-3	B	NAA Sodium salt	0		0.000
209		300-76-5	0	Naled	1		0.900
210		15299-99-7	0	Napropamide	15		0.600
211		132-66-1	0	Naptalam	0		0.000
212		91-20-3	0	Napthalene	0		0.000
213		555-37-3	0	Neburon	0		0.000
214		111991-09-4	0	Nicosulfuron	0		0.000
215		1929-82-4	0	Nitrapyrin	0		0.000
216		1836-75-5	0	Nitrofen	0		0.000
217		27314-13-2	0	Norflurazon	15		0.500
218		19044-88-3	0	Oryzalin	5		0.400
219		19666-30-9	0	Oxadiazon	20		0.500
220		23135-22-0	0	Oxamyl	4		0.950
221		5259-88-1	0	Oxycarboxin	10		0.700
222		301-12-2	0	Oxydemeton-Methyl	0		0.000
223		4287-03-3	0	Oxyfluorfen	8		0.400
224		76738-62-0	0	Paclobutrazol	0		0.000
225		1910-42-5	0	Paraquat Dichloride salt	30		0.600
226		56-38-2	0	Ethyl Parathion	0		0.000
227		82-68-8	0	PCNB	4		0.400
228		1114-71-2	0	Pebulate	4		0.700
229		40487-42-1	0	Pendimethalin	30		0.400
230		608-93-5	0	PCP (Pentachlorophenol) Also Known As Pentachlorophenol	0		0.000
231		37924-13-3	0	Perfluidone	0		0.000
232		52645-53-1	0	Permethrin	8		0.300
233		13684-63-4	0	Phenmedipham	5		0.700
234		2597-03-7	0	Phenthoate	2		0.650
235		298-02-2	0	Phorate	2		0.600
236		2310-17-0	0	Phosalone	8		0.650
237		732-11-6	0	Phosmet	3		0.900
238		13171-21-6	0	Phosphamidon	5		0.950

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

239		1918-02-1	0	Picloram salt	8		0.600
240		3478-94-2	0	Piperalin	10		0.600
241		23103-98-2	0	Pirimicarb	0		0.000
242		23505-41-1	0	Pirimiphos-Ethyl	0		0.000
243		29232-93-7	0	Pirimiphos-Methyl	0		0.000
244		86209-51-0	0	Primisulfuron-Methyl	0		0.000
245		67747-09-5	0	Prochloraz	30		0.500
246		32809-16-8	0	Procymidone	0		0.000
247		29091-21-2	0	Prodiamine	0		0.000
248		41198-8-7	0	Profenofos	3		0.900
249		26399-36-0	0	Profluralin	1		0.350
250		2631-37-0	0	Promecarb	0		0.000
251		1610-18-0	0	Prometon	30		0.750
252		7287-19-6	0	Prometryn	10		0.500
253		23950-58-5	0	Pronamide	0		0.000
254		1918-16-7	0	Propachlor	3		0.400
255		25606-41-1	0	Propamocarb	15		0.950
256		709-98-8	0	Propanil	1		0.700
257		2312-35-8	0	Propargite	5		0.200
258		139-40-2	0	Propazine	5		0.450
259		122-42-9	0	IPC	0		0.000
260		60207-90-1	0	Propiconazole	30		0.700
261		114-26-1	0	Propoxur	0		0.000
262		800-3-34-7	0	Pyrethrins	0		0.000
263		76578-14-8	0	Quizalofop-Ethyl	0		0.000
264		10453-86-8	0	Resmethrin	0		0.000
265		83-79-4	0	Rotenone	0		0.000
266		26259-45-0	0	Secbumeton	0		0.000
267		74051-80-2	0	Sethoxydim	3		0.700
268		1982-49-6	0	Siduron	30		0.700
269		122-34-9	0	Simazine	5		0.400
270		1014-70-6	0	Simetryn	0		0.000
271		74222-97-2	0	Sulfometuron Methyl	10		0.650
272		35400-43-2	0	Sulprofos	1		0.550
273		76-03-9	0	TCA	0		0.000
274		34014-18-1	0	Tebuthiuron	30		0.900
275		3383-96-8	0	Temephos	5		0.650
276		5902-51-2	0	Terbacil	30		0.700
277		13071-79-9	0	Terbufos	3		0.600
278		886-50-0	0	Terbutryn	5		0.500

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

279		22248-79-9	0	Tetrachlorvinphos	0		0.000
280		148-79-8	0	Thiabendazole	30		0.600
281		51707-55-2	0	Thidiazuron	3		0.400
282		79277-27-3	0	Thifensulfuron-Methyl	0		0.000
283		28249-77-6	0	Thiobencarb	7		0.700
284		31895-22-4	0	Thiocyclam-Hydrogen Oxalate	0		0.000
285		59669-26-0	0	Thiodicarb	4		0.700
286		23564-05-8	0	Thiophanate-Methyl	0		0.000
287		137-26-8	0	Thiram	8		0.500
288		57018-04-9	0	Tolclofos-Methyl	0		0.000
289		8001-35-2	0	Toxaphene Also Known as Camphechlor	2		0.050
290		66841-25-6	0	Tralomethrin	1		0.400
291		43121-43-3	0	Triadimefon	8		0.300
292		55219-65-3	0	Triadimenol	0		0.000
293		2303-17-5	0	Triallate	15		0.400
294		101200-48-0	0	Tribenuron Methyl	0		0.000
295		78-48-8	0	Merfos	0		0.000
296		52-68-6	0	Trichlorfon	3		0.950
297		327-98-0	0	Trichloronate	0		0.000
298		55335-06-3	0	Triclopyr Amine salt	15		0.950
299		55335-06-3	0	Triclopyr Ester	15		0.700
300		41814-78-2	0	Tricyclazole	0		0.000
301		58138-08-2	0	Tridiphane	8		0.400
302		99387-89-0	0	Triflumizole	0		0.000
303		1582-09-8	0	Trifluralin	3		0.400
304		2686-99-9	0	Trimethacarb	0		0.000
305		76-87-9	0	Triphenyltin Hydroxide	18		0.400
306		1929-77-7	0	Vernolate	2		0.800
307		50471-44-8	0	Vinclozolin	0		0.000
308		137-30-4	0	Ziram	0		0.000
309		75-15-0	0	Carbon Disulfide	0		0.000
310		13121-70-5	0	Cyhexatin	0		0.000
311		117-80-6	0	Dichlone	0		0.000
312		6988-21-2	0	Dioxacarb	0		0.000
313		7775-09-9	0	Sodium Chlorate	0		0.000
314		12122-67-7	0	Zineb	0		0.000
315		10433-59-7	0	2,4-DB Acid	0		0.000
316		8022-00-2	0	Demeton-Methyl	0		0.000
317		31218-83-4	0	Propetamphos	0		0.000
318		7173-98-0	0	2,4,5-T Esters (butometyl) 2,4,5-T Esters (butotyl), 2545-59-7; 2,4,5-T Esters	0		0.000

TABLE 15:
Active Ingredient Data
CHEMICAL.dbf

319		61-82-5	0	Amino-triazole	0		0.000
320		63-25-2	0	Carbaryl	7		0.550
321		10605-21-7	0	MBC	0		0.000
322		333-41-5	0	Diazinon	4		0.900
323		115-90-2	0	Fensulfothion	3		0.900
324		94-74-6	A	MCPA Dimethylamine salt	7		0.950
325		94-74-6	B	MCPA Ester	8		0.500
326		108-62-3	0	Metaldehyde	0		0.000
327		26644-46-2	0	Triforine	5		0.800
328		65195-55-3	0	Avermectin ?	0		0.000
329		72-55-9	0	DDE (p,p')	0		0.000
330		298-03-3	0	Demeton (demeton-O)	0		0.000
331		126-75-0	0	Demeton (demeton-S)	0		0.000
332		75-60-5	0	Cacodylic Acid	0		0.000
333		65195-55-3	0	Avermectin B1A	0		0.000
334		71751-41-2	0	Abamectin	0		0.000
335		65195-56-4	0	Avermectin B1B	0		0.000
336		1646-88-4	0	Aldicarb Sulfone	0		0.000
337		101-21-3	0	CIPC	0		0.000
338		141-66-2	0	Dicrotofos	20		0.700
339		2439-01-2	0	Oxythioquinox	0		0.000
340		1698-60-8	0	Chloridazon	0		0.000
341		93-72-1	0	2,4,5-TP	0		0.000
342		23950-58-5	0	Propyzamide	0		0.000
343		75-60-5	0	Dimethylarsinic Acid	0		0.000
344		91465-08-6	0	Lambdacyhalothrin	5		0.400
345		25606-41-1	0	Propamocarb Hydrochloride	15		0.950
346		2032-65-7	0	Methiocarb	0		0.000
347		72-54-8	0	TDE	0		0.000
348		314-40-9	0	Bromacil (Lithium salt), and Acid	0		0.000
349		2439-00-1	0	Chlorfenac	0		0.000
350		67485-29-4	0	Hydramethylnon	0		0.000
351		81777-89-1	0	Dimethazone	0		0.000
352		81510-83-0	0	Imazapyr Isopropylamine salt	0		0.000
353		144-21-8	0	DSMA	0		0.000
354		81335-77-5	0	Imazethapyr	30		0.900
355		7085-19-0	0	MCPP	0		0.000
356		86-86-2	0	2-(1-Naphthyl)acetamide	0		0.000
357		098967-40-9	0	Flumetsulam	0		0.000
-8				DATA TEMPLATE: Common Name			0.500

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

CHEM_ID	PH	SOL_RV	SOL_GE	KOC_RV	KOC_GE	SOIL_HL_RV	SOIL_HL_GE
-9	-9.0	0.000		0		0	
2	0.0	2700.000		50		700	E
3	0.0	2250.000		32		10	
4	0.0	100.000	E	100	E	10	G
5	0.0	278.000		80		30	
6	0.0	500000.000	E	80		24	
7	0.0	890.000		20		10	
8	0.0	796000.000		20		10	
9	0.0	100.000	E	100	E	10	
10	0.0	8.000		500		7	
11	0.0	709000.000		20	E	10	E
12	0.0	200000.000	E	20	E	10	E
13	0.0	818000.000		2		3	
14	0.0	250000.000		113	E	14	
15	0.0	208000.000		1		14	
16	0.0	240.000		170		15	
17	0.0	6000.000		30		30	
18	0.0	0.027		5000	E	365	
19	0.0	185.000		300		60	
20	0.0	915.000		100		6	
21	0.0	1.000		1000	E	2	
22	0.0	684000.000		30	E	14	
23	0.0	650.000		120		120	
24	0.0	8.000		1000	E	1	
25	0.0	17000.000		31000	E	10000	E
26	0.0	550000.000		40		7	
27	0.0	33.000		100		60	
28	0.0	29.000		1000		10	
29	0.0	11.000		1000	E	5	
30	0.0	37.000		1000	E	30	
31	0.0	40.000		570		5	
32	0.0	0.100		9000		40	
33	0.0	20.000		700	E	25	
34	0.0	2.000		1900		240	
35	7.0	120.000		310		5	
36	0.0	5.600		1000	E	120	

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

37	0.0	2300000.000		34		20	
38	0.0	0.398		10000	E	7	
39	0.0	0.100		31000		26	
40	0.0	27.000		1079		7	
41	0.0	0.080		10000	E	7	
42	0.0	23.000		700		12	
43	0.0	44.000		400		13	
44	0.0	1.400		3000	E	7	
45	0.0	5.100		200		3	
46	7.0	8.000		400		120	
47	0.0	351.000		22		50	
48	0.0	0.340		31000		30	
49	0.0	195.000		260		7	
50	0.0	20000.000		20	E	10	
51	0.0	0.100	E	11000		40	
52	0.0	900000.000	E	15	E	14	
53	0.0	35.000		500	E	40	
54	0.0	0.060		20000		350	
55	0.0	500000.000		31000	E	60	G
56	7.0	1200.000		110		40	
57	0.0	13.000		2000	E	20	G
58	0.0	8.000		1650		130	
59	0.0	2270.000		62		1	E
60	0.0	0.600		1380		30	
61	0.0	2.500		3000		60	
62	0.0	89.000		400	E	30	
63	0.0	0.400		6070		30	
64	0.0	4.000		3000	E	7	
65	7.0	7000.000		40		160	
66	0.0	1.000	E	10000		2	
67	0.0	63.000		300		30	
68	0.0	1100.000		300		24	
69	0.0	300000.000	E	6		30	
70	0.0	420.000		10000	E	3000	
71	0.0	170.000		190		14	
72	0.0	95.000		430		30	
73	0.0	0.002		31000	E	30	E

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

74	0.0	0.004		31000	E	30	E
75	0.0	136000.000		200	E	150	
76	0.0	900000.000		1		30	
77	0.0	100000.000		30	E	21	
78	0.0	3000.000		10	E	7	
79	0.0	1000.000		70		180	
80	0.0	7.000		1000	E	10	G
81	0.0	0.500		5000		100	
82	0.0	0.020		31000	E	1000	E
83	0.0	0.100	E	31000	E	1000	E
84	0.0	0.006		31000	E	2000	E
85	0.0	60.000		70	E	15	
86	0.0	8.000		1500		30	
87	0.0	14.000		500		30	
1	0.0	400000.000		2		14	
88	0.0	21.200		400	E	60	
89	0.0	5000.000		40	E	7	
90	0.0	50.000	E	1000	E	10	
91	0.0	10000.000	E	30	E	1	
92	0.0	0.800		16000		37	
93	0.0	1.000	E	31000	E	60	G
94	0.0	1000000.000		75		28	
95	0.0	0.200		12000	E	1000	E
96	0.0	25.000		1000	E	300	E
97	0.0	105.000		1400	E	21	
98	0.0	817000.000		31000		100	
99	0.0	0.080		10000		10	
100	0.0	3000.000		10	E	10	G
101	0.0	1200.000		90	E	120	
102	0.0	39800.000		20		7	
103	0.0	1.100		4000	E	30	
104	0.0	4.000		550	E	20	G
105	7.0	2200.000		63		20	
106	0.0	260.000		210		30	
107	0.0	16.000		900		30	E
108	0.0	718000.000		31000	E	1000	
109	0.0	25.000		600	E	30	E

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

110	0.0	42.000		480		90	
111	7.0	100000.000	E	20		20	G
112	0.0	700.000		31000	E	20	G
113	0.0	250000.000		7000	E	180	E
114	0.0	0.320		12400		50	
115	7.0	100000.000		20	E	7	
116	0.0	0.230		10000	E	4300	
117	0.0	0.500		4000	E	15	
118	0.0	344.000		200		6	
119	0.0	0.002		5300		35	
120	0.0	0.300		4000		60	
121	0.0	1239000.000		31000	E	10	
122	0.0	1.100		10000		150	
123	0.0	50.000		340		30	
124	0.0	750.000		70		25	
125	0.0	4300.000		34	E	100	E
126	0.0	50.000		1000	E	20	G
127	7.0	500000.000	E	20	E	180	
128	0.0	20000.000		40	E	2	
129	0.0	400.000		100		50	E
130	0.0	14.000		600		360	
131	0.0	0.013		2300		90	
132	0.0	100.000		300	E	42	
133	0.0	30.000		2000		4	
134	0.0	0.800		9490		9	
135	0.0	6.000		1000	E	1	
136	0.0	0.330		5000	E	5	E
137	0.0	4.200		1500		34	
138	0.0	3850.000		42		60	
139	0.0	0.002		5300		35	
140	0.0	120.000		300		17	
141	0.0	2.000		3000	E	21	E
142	0.0	2.000		5700		15	
143	0.0	0.900		3000	E	60	E
144	0.0	0.060		31000	E	21	
145	0.0	0.100		10000	E	20	G
146	0.0	110.000		100		85	

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

147	0.0	10.000		1000	E	21	
148	0.0	0.005		31000	E	30	E
149	0.0	700000.000		60		100	
150	0.0	16.900		870		40	
151	0.0	500000.000		31000	E	100	G
152	0.0	1790000.000		150		8	
153	0.0	120000.000		20		1	
154	0.0	1370000.000		100	E	7	
155	0.0	9000000.000	E	24000	E	47	
156	0.0	43.000		75		55	
157	0.0	0.056		24000		250	
158	0.0	0.005		31000	E	1000	E
159	0.0	33000.000		54		90	
160	0.0	0.500		6200		30	
161	0.0	0.006		31000		10	E
162	0.0	1400.000		4000		150	
163	0.0	11000.000		100	E	90	
164	0.0	60.000		20	E	60	
165	7.0	160000.000	E	20	E	60	
166	7.0	200000.000	E	10	E	90	
167	0.0	13.900		700		14	
168	0.0	69.000		100		34	
169	0.0	24.000		600		150	E
170	0.0	0.100		10000		100	
171	0.0	1.000		1400		100	E
172	0.0	0.100		10000	E	3	
173	0.0	7.000		1100		400	
174	0.0	75.000		400		60	
175	0.0	130.000		1800		1	
176	0.0	6000.000	E	250	E	30	E
177	0.0	6.000		2000		70	
178	0.0	6.000	E	2000	E	70	
179	0.0	200000.000	E	20	E	14	
180	7.0	660000.000		20	E	21	
181	0.0	180.000		200	E	4	
182	0.0	1000000.000		31000	E	1000	E
183	0.0	8400.000		50		70	

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

184	0.0	963000.000		10	E	7	
185	0.0	1000000.000	E	5		6	
186	0.0	1400000.000		7000	E	180	
187	0.0	1.500		3000	E	14	
188	0.0	220.000		400	E	7	
189	0.0	58000.000		72		30	
190	0.0	0.100		31000		120	
191	0.0	13400.000		22		55	
192	0.0	7600.000		10		10	
193	0.0	60.000		5100	E	5	
194	0.0	0.100	E	31000	G	20	G
195	0.0	530.000		200		90	
196	0.0	1220.000		60	E	40	
197	7.0	9500.000		35		120	
198	0.0	600000.000		44		3	
199	0.0	100.000		300	E	10	E
200	0.0	0.000	E	31000	E	3000	E
201	0.0	970.000		190		21	
202	0.0	1000000.000		1	E	30	
203	0.0	735.000		200	E	60	E
204	0.0	230.000		150	E	170	E
205	0.0	1400000.000		7000	E	180	
206	0.0	142.000		500		66	
207	0.0	105.000		300	E	10	G
208	7.0	419000.000		20	E	10	G
209	0.0	2000.000		180		1	
210	0.0	74.000		400		70	
211	7.0	231000.000		20	E	14	
212	0.0	30.000		500	E	30	E
213	0.0	5.000		2500	E	120	
214	7.0	22000.000		30		21	
215	0.0	40.000		570		10	
216	0.0	1.000		10000	E	30	E
217	0.0	28.000		600		90	
218	0.0	2.500		600		20	
219	0.0	0.700		3200		60	
220	0.0	282000.000		25		4	

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

221	0.0	1000.000		95	E	20	G
222	0.0	1000000.000		10		10	
223	0.0	0.100		31000	E	35	
224	0.0	35.000		400	E	200	E
225	0.0	620000.000		31000	E	1000	E
226	0.0	24.000		5000	E	14	
227	0.0	0.440		5000	E	21	
228	0.0	100.000		430		14	
229	0.0	0.275		5000		90	
230	5.0	100000.000		30	E	48	
231	0.0	500000.000		30	E	30	
232	0.0	0.006		31000		30	
233	0.0	4.700		2400		30	
234	0.0	11.000		1000	E	35	
235	0.0	22.000		1000	E	60	E
236	0.0	3.000		1800		21	
237	0.0	20.000		820		19	
238	0.0	1000000.000	E	7		17	
239	0.0	200000.000	E	16		90	
240	0.0	20.000		5000		30	
241	0.0	2700.000		60	E	10	E
242	0.0	93.000		300	E	45	
243	0.0	9.000		1000	E	10	
244	7.0	70.000		50	E	30	
245	0.0	34.000		500	E	120	
246	0.0	4.500		1500	E	7	
247	0.0	0.013		13000		120	
248	0.0	28.000		2000		8	
249	0.0	0.100		10000	E	110	
250	0.0	91.000		200	E	20	
251	0.0	720.000		150		500	
252	0.0	33.000		400		60	
253	0.0	15.000		200		60	
254	0.0	613.000		80		6	
255	0.0	1000000.000		31000	E	30	
256	0.0	200.000		149		1	
257	0.0	0.500		4000	E	56	

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

258	0.0	8.600		154		135	
259	0.0	250.000		200	E	10	
260	0.0	110.000		1000	E	110	
261	0.0	1800.000		30		30	
262	0.0	0.001	E	31000	E	12	
263	0.0	0.310		510		60	
264	0.0	0.010	E	31000	E	30	E
265	0.0	0.200		10000	E	3	
266	0.0	600.000		150		60	E
267	7.0	4390.000		100	E	5	
268	0.0	18.000		420		90	
269	0.0	6.200		130		60	
270	0.0	450.000		200	E	60	E
271	7.0	70.000		78		20	
272	0.0	0.310		12000	E	140	E
273	0.0	1200000.000		3	E	21	E
274	0.0	2500.000		80		360	
275	0.0	0.001		31000	E	30	G
276	0.0	710.000		55		120	
277	4.0	5.000		500		5	
278	0.0	22.000		2000		42	E
279	0.0	11.000		900	E	2	
280	7.0	50.000		2500		403	
281	0.0	20.000		110	E	10	G
282	6.0	2400.000		45		12	
283	0.0	28.000		900		21	
284	0.0	84000.000		20	E	1	
285	0.0	19.100		350		7	
286	0.0	3.500		1830	E	10	G
287	0.0	30.000		670		15	
288	0.0	0.300		2000	E	30	
289	0.0	3.000		31000		9	
290	0.0	0.001	E	31000	E	27	
291	0.0	71.500		300		26	
292	0.0	47.000	E	1000	E	300	E
293	0.0	4.000		2400		82	
294	6.0	280.000		46		10	E

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

295	0.0	2.300		5000		30	
296	0.0	120000.000		10		10	
297	0.0	50.000		400	E	139	
298	0.0	2100000.000		20	E	46	
299	0.0	23.000		780		46	
300	0.0	1600.000		1000		21	
301	0.0	1.800		5600		28	
302	0.0	12500.000		40	E	14	
303	0.0	0.300		8000		60	
304	0.0	58.000		400	E	20	G
305	0.0	1.000		23000		75	
306	0.0	108.000		260		12	
307	0.0	1000.000	E	100	E	20	
308	0.0	65.000		400	E	30	E
309	0.0	2300.000		60	E	2	
310	0.0	1.000		4000	E	50	E
311	0.0	0.300		10000	E	10	E
312	0.0	6000.000		40	E	2	E
313	0.0	100000.000		10	E	200	E
314	0.0	10.000		1000		30	E
315	0.0	46.000		440	E	5	
316	0.0	3300.000		51		30	
317	0.0	110.000		330		30	
318	0.0	50.000	E	80		24	
319	0.0	360000.000		100		14	
320	0.0	120.000		300		10	
321	7.0	8.000		400		120	
322	0.0	60.000		1000	E	40	
323	0.0	1540.000		300		30	E
324	7.0	866000.000		20	E	25	
325	0.0	5.000	E	1000	E	25	
326	0.0	230.000		240		10	G
327	0.0	30.000		540	E	21	
328	0.0	5.000		5000	E	28	
329	0.0	0.100	E	31000	E	1000	E
330	0.0	60.000		70	E	15	
331	0.0	60.000		70	E	15	

TABLE 16:
Active Ingredient Data by Soil pH
SOIL_pH.dbf

332	0.0	2000000.000		1000	E	50	E
333	0.0	5.000		5000	E	28	
334	0.0	5.000		5000	E	28	
335	0.0	5.000		5000	E	28	
336	0.0	10000.000		10	E	20	
337	0.0	89.000		400	E	30	
338	0.0	1000000.000		75		28	
339	0.0	1.000		2300		30	
340	0.0	400.000		120		21	
341	0.0	140.000		300		21	
342	0.0	15.000		200		60	
343	0.0	2000000.000		1000	E	50	E
344	0.0	0.005		31000		30	
345	0.0	1000000.000		31000	E	30	
346	0.0	24.000		300	E	30	E
347	0.0	0.020		31000	E	1000	E
348	0.0	700.000		32		60	
349	7.0	500000.000	E	20	E	180	
350	0.0	0.006		31000		10	E
351	0.0	1100.000		300		24	
352	0.0	500000.000	E	100	E	90	
353	0.0	250000.000		7000	E	180	E
354	0.0	11000.000		100	E	90	
355	7.0	660000.000		20	E	21	
356	0.0	100.000	E	100	E	10	G
357	7.0	5650.000		28		47	
-8	7.0						

TABLE 17:
Application Codes
GAC_ID.dbf

GAC_ID	DESCRIPTION
0	Surface applied.
1	Soil Incorporated
2	Injected, or in the bottom of the furrow.
3	Chemigation.

TABLE 18:
Application Method
APP_METH.dbf

APP_METHID	TAGGED	DESCRIPTIO	CHEMIG_DEP	GAC_ID	INCORP_DEP	PCT_FOLIAR	PCT_SOIL	Total %Applied
1		Pre-Emg Surf. Appl.; Grain Corn; Cnvtl (Disk/Chisel); Corn aft Corn	0.0	0	1.0	0.20	0.75	0.95
2		Pre-Emg Surf. Appl.; Grain Corn; Cnvtl (Disk/Chisel); Corn aft Beans	0.0	0	1.0	0.20	0.75	0.95
3		Pre-Emg Surf. Appl.; Grain Corn; Cnvtl (Disk/Chisel); Corn aft Sml Grn	0.0	0	1.0	0.20	0.75	0.95
4		Pre-Emg Surf. Appl.; Grain Corn; Conservation; Corn after Corn	0.0	0	1.0	0.50	0.45	0.95
5		Pre-Emg Surf. Appl.; Grain Corn; Conservation; Corn after Beans	0.0	0	1.0	0.30	0.65	0.95
6		Pre-Emge Surf. Appl.; Grain Corn; Conservation; Corn aft Sml Grain	0.0	0	1.0	0.50	0.45	0.95
7		Pre-Emg Surf. Appl.; Grain Corn; No-Till; Corn after Corn	0.0	0	1.0	0.80	0.15	0.95
8		Pre-Emg Surf. Appl.; Grain Corn; No-Till; Corn after Beans	0.0	0	1.0	0.40	0.35	0.75
9		Pre-Emg Surf. Appl.; Grain Corn; No-Till; Corn after Small Grain	0.0	0	1.0	0.70	0.25	0.95
10		Pre-Plant Soil Inc.; Grain Corn; Cnvtl (Disk/Chisel); Corn aft Corn	0.0	1	7.5	0.00	1.00	1.00
11		Pre-Plant Soil Inc.; Grain Corn; Cnvtl (Disk/Chisel); Corn after Beans	0.0	1	7.5	0.00	1.00	1.00
12		Pre-Plant Soil Inc.; Grain Corn; Cnvtl (Disk/Chisel); Corn aft Sml Grn	0.0	1	7.5	0.00	1.00	1.00
13		Pre-Plant Soil Inc.; Grain Corn; Conservation; Corn after Corn	0.0	1	7.5	0.00	1.00	1.00
14		Pre-Plant Soil Inc.; Grain Corn; Conservation; Corn after Beans	0.0	1	7.5	0.00	1.00	1.00
15		Pre-Plant Soil Inc.; Grain Corn; Conservation; Corn after Small Grain	0.0	1	7.5	0.00	1.00	1.00
16		Pre-Plant Soil Inc.; Grain Corn; No-Till; Corn after Corn	0.0	1	7.5	0.00	1.00	1.00
17		Pre-Plant Soil Inc.; Grain Corn; No-Till; Corn after Beans	0.0	1	7.5	0.00	1.00	1.00
18		Pre-Plant Soil Inc.; Grain Corn; No-Till; Corn after Small Grain	0.0	1	7.5	0.00	1.00	1.00
19		Post-Emg Surf. Appl.; Grain Corn; Cnvtl (Disk/Chisel); Corn aft Corn	0.0	0	1.0	0.30	0.65	0.95
20		Post-Emg Surf. Appl.; Grain Corn; Cnvtl (Disk/Chisel); Corn aft Beans	0.0	0	1.0	0.30	0.65	0.95
21		Post-Emg Surf. Appl.; Grain Corn; Cnvtl (Disk/Chisel); Corn aft Sml Grn	0.0	0	1.0	0.30	0.65	0.95
22		Post-Emg Surf. Appl.; Grain Corn; Conservation; Corn after Corn	0.0	0	1.0	0.60	0.35	0.95
23		Post-Emg Surf. Appl.; Grain Corn; Conservation; Corn after Beans	0.0	0	1.0	0.40	0.55	0.95
24		Post-Emg Surf. Appl.; Grain Corn; Conservation; Corn after Sml Grn	0.0	0	1.0	0.60	0.35	0.95
25		Post-Emg Surf. Appl.; Grain Corn; No-Till; Corn after Corn	0.0	0	1.0	0.90	0.05	0.95
26		Post-Emg Surf. Appl.; Grain Corn; No-Till; Corn after Beans	0.0	0	1.0	0.50	0.45	0.95
27		Post-EmgSurf. Appl.; Grain Corn; No-Till; Corn after Small Grain	0.0	0	1.0	0.80	0.15	0.95

GAC Code 0 = Surface Application, Incorporation depth of 1 cm
GAC Code 1 = Soil Incorporation, Incorporation depth of 7.5 cm
Both pre and post-emergent pesticide applications assumes 5% Drift

TABLE 19:
Application Timing-TIMING.dbf

TIMING_ID	DESCRIPTIO	STARTMONTH	STARTDAY	NUM_APPLIC	DAYS_UNTIL
1	Pre-Emergence Surf. Appl. - Event Date Set #1	APR	20	1	0
2	Pre-Emergence Surf. Appl. - Event Date Set #2	APR	30	1	0
3	Pre-Emergence Surf. Appl. - Event Date Set #3	MAY	10	1	0
4	Pre-Emergence Surf. Appl. - Event Date Set #4	MAY	20	1	0
5	Pre-Emergence Surf. Appl. - Event Date Set #5	MAY	30	1	0
6	Pre-Plant Soil Inc. - Event Date Set #1	APR	20	1	0
7	Pre-Plant Soil Inc. - Event Date Set #2	APR	30	1	0
8	Pre-Plant Soil Inc. - Event Date Set #3	MAY	10	1	0
9	Pre-Plant Soil Inc. - Event Date Set #4	MAY	20	1	0
10	Pre-Plant Soil Inc. - Event Date Set #5	MAY	30	1	0
11	Post-Emergence Surf. Appl. - Event Date Set #1	MAY	5	1	0
12	Post-Emergence Surf. Appl. - Event Date Set #2	MAY	15	1	0
13	Post-Emergence Surf. Appl. - Event Date Set #3	MAY	25	1	0
14	Post-Emergence Surf. Appl. - Event Date Set #4	JUN	5	1	0
15	Post-Emergence Surf. Appl. - Event Date Set #5	JUN	15	1	0
-9	UNDEFINED	JAN	1	1	0

TABLE 20:
Chemical Use Practice-
CHEM_USE.dbf

C_USAGE_ID	COMMENT	RPT_ABBR	CHEM_ID	APP_METHID	TIMING_ID	RATE_KG_HA
1	Pre-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #1	PreSurf/Conv/CC/EDS#1	27	1	1	1.210
2	Pre-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #1	PreSurf/Conv/BC/EDS#1	27	2	1	1.210
3	Pre-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set #1	PreSurf/Conv/WC/EDS#1	27	3	1	1.210
4	Pre-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #1	PreSurf/Cons/CC/EDS#1	27	4	1	1.210
5	Pre-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #1	PreSurf/Cons/BC/EDS#1	27	5	1	1.210
6	Pre-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set #1	PreSurf/Cons/WC/EDS#1	27	6	1	1.210
7	Pre-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #1	PreSurf/No/CC/EDS#1	27	7	1	1.210
8	Pre-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #1	PreSurf/No/BC/EDS#1	27	8	1	1.210
9	Pre-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #1	PreSurf/No/WC/EDS#1	27	9	1	1.210
10	Pre-Plant Soil Inc.; Conv.; Corn after Corn; Event Date Set #1	PreInc/Conv/CC/EDS#1	27	10	6	1.210
11	Pre-Plant Soil Inc.; Conv.; Corn after Beans; Event Date Set #1	PreInc/Conv/BC/EDS#1	27	11	6	1.210
12	Pre-Plant Soil Inc.; Conv.; Corn after Small Grain; Event Date Set #1	PreInc/Conv/WC/EDS#1	27	12	6	1.210
13	Pre-Plant Soil Inc.; Cons.; Corn after Corn; Event Date Set #1	PreInc/Cons/CC/EDS#1	27	13	6	1.210
14	Pre-Plant Soil Inc.; Cons.; Corn after Beans; Event Date Set #1	PreInc/Cons/BC/EDS#1	27	14	6	1.210
15	Pre-Plant Soil Inc.; Cons.; Corn after Small Grain; Event Date Set #1	PreInc/Cons/WC/EDS#1	27	15	6	1.210
16	Pre-Plant Soil Inc.; No-Till; Corn after Corn; Event Date Set #1	PreInc/No/CC/EDS#1	27	16	6	1.210
17	Pre-Plant Soil Inc.; No-Till; Corn after Beans; Event Date Set #1	PreInc/No/BC/EDS#1	27	17	6	1.210
18	Pre-Plant Soil Inc.; No-Till; Corn after Small Grain; Event Date Set #1	PreInc/No/WC/EDS#1	27	18	6	1.210
19	Post-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #1	PostSurf/Conv/CC/EDS#1	27	19	11	1.210
20	Post-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #1	PostSurf/Conv/BC/EDS#1	27	20	11	1.210
21	Post-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set # 1	PostSurf/Conv/WC/EDS#1	27	21	11	1.210
22	Post-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #1	PostSurf/Cons/CC/EDS#1	27	22	11	1.210
23	Post-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #1	PostSurf/Cons/BC/EDS#1	27	23	11	1.210
24	Post-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set # 1	PostSurf/Cons/WC/EDS#1	27	24	11	1.210
25	Post-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #1	PostSurf/No/CC/EDS#1	27	25	11	1.210
26	Post-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #1	PostSurf/No/BC/EDS#1	27	26	11	1.210
27	Post-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #1	PostSurf/No/WC/EDS#1	27	27	11	1.210
28	Pre-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #2	PreSurf/Conv/CC/EDS#2	27	1	2	1.210
29	Pre-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #2	PreSurf/Conv/BC/EDS#2	27	2	2	1.210
30	Pre-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set #2	PreSurf/Conv/WC/EDS#2	27	3	2	1.210
31	Pre-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #2	PreSurf/Cons/CC/EDS#2	27	4	2	1.210
32	Pre-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #2	PreSurf/Cons/BC/EDS#2	27	5	2	1.210
33	Pre-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set #2	PreSurf/Cons/WC/EDS#2	27	6	2	1.210
34	Pre-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #2	PreSurf/No/CC/EDS#2	27	7	2	1.210
35	Pre-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #2	PreSurf/No/BC/EDS#2	27	8	2	1.210
36	Pre-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #2	PreSurf/No/WC/EDS#2	27	9	2	1.210
37	Pre-Plant Soil Inc.; Conv.; Corn after Corn; Event Date Set #2	PreInc/Conv/CC/EDS#2	27	10	7	1.210
38	Pre-Plant Soil Inc.; Conv.; Corn after Beans; Event Date Set #2	PreInc/Conv/BC/EDS#2	27	11	7	1.210
39	Pre-Plant Soil Inc.; Conv.; Corn after Small Grain; Event Date Set #2	PreInc/Conv/WC/EDS#2	27	12	7	1.210
40	Pre-Plant Soil Inc.; Cons.; Corn after Corn; Event Date Set #2	PreInc/Cons/CC/EDS#2	27	13	7	1.210
41	Pre-PlantSoil Inc.; Cons.; Corn after Beans; Event Date Set #2	PreInc/Cons/BC/EDS#2	27	14	7	1.210
42	Pre-Plant Soil Inc.; Cons.; Corn after Small Grain; Event Date Set #2	PreInc/Cons/WC/EDS#2	27	15	7	1.210
43	Pre-Plant Soil Inc.; No-Till; Corn after Corn; Event Date Set #2	PreInc/No/CC/EDS#2	27	16	7	1.210
44	Pre-Plant Soil Inc.; No-Till; Corn after Beans; Event Date Set #2	PreInc/No/BC/EDS#2	27	17	7	1.210
45	Pre-Plant Soil Inc.; No-Till; Corn after Small Grain; Event Date Set #2	PreInc/No/WC/EDS#2	27	18	7	1.210
46	Post-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #2	PostSurf/Conv/CC/EDS#2	27	19	12	1.210
47	Post-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #2	PostSurf/Conv/BC/EDS#2	27	20	12	1.210

TABLE 20:
Chemical Use Practice-
CHEM_USE.dbf

48	Post-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set # 2	PostSurf/Conv/WC/EDS#2	27	21	12	1.210
49	Post-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #2	PostSurf/Cons/CC/EDS#2	27	22	12	1.210
50	Post-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #2	PostSurf/Cons/BC/EDS#2	27	23	12	1.210
51	Post-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set # 2	PostSurf/Cons/WC/EDS#2	27	24	12	1.210
52	Post-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #2	PostSurf/No/CC/EDS#2	27	25	12	1.210
53	Post-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #2	PostSurf/No/BC/EDS#2	27	26	12	1.210
54	Post-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #2	PostSurf/No/WC/EDS#2	27	27	12	1.210
55	Pre-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #3	PreSurf/Conv/CC/EDS#3	27	1	3	1.210
56	Pre-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #3	PreSurf/Conv/BC/EDS#3	27	2	3	1.210
57	Pre-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set #3	PreSurf/Conv/WC/EDS#3	27	3	3	1.210
58	Pre-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #3	PreSurf/Cons/CC/EDS#3	27	4	3	1.210
59	Pre-Emerg. Surf. Appl.; CCons.; Corn after Beans; Event Date Set #3	PreSurf/Cons/BC/EDS#3	27	5	3	1.210
60	Pre-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set #3	PreSurf/Cons/WC/EDS#3	27	6	3	1.210
61	Pre-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #3	PreSurf/No/CC/EDS#3	27	7	3	1.210
62	Pre-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #3	PreSurf/No/BC/EDS#3	27	8	3	1.210
63	Pre-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #3	PreSurf/No/WC/EDS#3	27	9	3	1.210
64	Pre-Plant Soil Inc.; Conv.; Corn after Corn; Event Date Set #3	PreInc/Conv/CC/EDS#3	27	10	8	1.210
65	Pre-Plant Soil Inc.; Conv.; Corn after Beans; Event Date Set #3	PreInc/Conv/BC/EDS#3	27	11	8	1.210
66	Pre-Plant Soil Inc.; Conv.; Corn after Small Grain; Event Date Set #3	PreInc/Conv/WC/EDS#3	27	12	8	1.210
67	Pre-Plant Soil Inc.; Cons.; Corn after Corn; Event Date Set #3	PreInc/Cons/CC/EDS#3	27	13	8	1.210
68	Pre-Plant Soil Inc.; Cons.; Corn after Beans; Event Date Set #3	PreInc/Cons/BC/EDS#3	27	14	8	1.210
69	Pre-Plant Soil Inc.; Cons.; Corn after Small Grain; Event Date Set #3	PreInc/Cons/WC/EDS#3	27	15	8	1.210
70	Pre-Plant Soil Inc.; No-Till; Corn after Corn; Event Date Set #3	PreInc/No/CC/EDS#3	27	16	8	1.210
71	Pre-Plant Soil Inc.; No-Till; Corn after Beans; Event Date Set #3	PreInc/No/BC/EDS#3	27	17	8	1.210
72	Pre-Plant Soil Inc.; No-Till; Corn after Small Grain; Event Date Set #3	PreInc/No/WC/EDS#3	27	18	8	1.210
73	Post-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #3	PostSurf/Conv/CC/EDS#3	27	19	13	1.210
74	Post-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #3	PostSurf/Conv/BC/EDS#3	27	20	13	1.210
75	Post-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set # 3	PostSurf/Conv/WC/EDS#3	27	21	13	1.210
76	Post-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #3	PostSurf/Cons/CC/EDS#3	27	22	13	1.210
77	Post-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #3	PostSurf/Cons/BC/EDS#3	27	23	13	1.210
78	Post-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set # 3	PostSurf/Cons/WC/EDS#3	27	24	13	1.210
79	Post-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #3	PostSurf/No/CC/EDS#3	27	25	13	1.210
80	Post-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #3	PostSurf/No/BC/EDS#3	27	26	13	1.210
81	Post-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #3	PostSurf/No/WC/EDS#3	27	27	13	1.210
82	Pre-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #4	PreSurf/Conv/CC/EDS#4	27	1	4	1.210
83	Pre-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #4	PreSurf/Conv/BC/EDS#4	27	2	4	1.210
84	Pre-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set #4	PreSurf/Conv/WC/EDS#4	27	3	4	1.210
85	Pre-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #4	PreSurf/Cons/CC/EDS#4	27	4	4	1.210
86	Pre-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #4	PreSurf/Cons/BC/EDS#4	27	5	4	1.210
87	Pre-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set #4	PreSurf/Cons/WC/EDS#4	27	6	4	1.210
88	Pre-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #4	PreSurf/No/CC/EDS#4	27	7	4	1.210
89	Pre-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #4	PreSurf/No/BC/EDS#4	27	8	4	1.210
90	Pre-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #4	PreSurf/No/WC/EDS#4	27	9	4	1.210
91	Pre-Plant Soil Inc.; Conv.; Corn after Corn; Event Date Set #4	PreInc/Conv/CC/EDS#4	27	10	9	1.210
92	Pre-Plant Soil Inc.; Conv.; Corn after Beans; Event Date Set #4	PreInc/Conv/BC/EDS#4	27	11	9	1.210
93	Pre-Plant Soil Inc.; Conv.; Corn after Small Grain; Event Date Set #4	PreInc/Conv/WC/EDS#4	27	12	9	1.210
94	Pre-Plant Soil Inc.; Cons.; Corn after Corn; Event Date Set #4	PreInc/Cons/CC/EDS#4	27	13	9	1.210
95	Pre-Plant Soil Inc.; Cons.; Corn after Beans; Event Date Set #4	PreInc/Cons/BC/EDS#4	27	14	9	1.210

TABLE 20:
Chemical Use Practice-
CHEM_USE.dbf

96	Pre-Plant Soil Inc.; Cons.; Corn after Small Grain; Event Date Set #4	PreInc/Cons/WC/EDS#4	27	15	9	1.210
97	Pre-Plant Soil Inc.; No-Till; Corn after Corn; Event Date Set #4	PreInc/No/CC/EDS#4	27	16	9	1.210
98	Pre-Plant. Soil Inc.; No-Till; Corn after Beans; Event Date Set #4	PreInc/No/BC/EDS#4	27	17	9	1.210
99	Pre-Plant Soil Inc.; No-Till; Corn after Small Grain; Event Date Set #4	PreInc/No/WC/EDS#4	27	18	9	1.210
100	Post-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #4	PostSurf/Conv/CC/EDS#4	27	19	14	1.210
101	Post-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #4	PostSurf/Conv/BC/EDS#4	27	20	14	1.210
102	Post-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set # 4	PostSurf/Conv/WC/EDS#4	27	21	14	1.210
103	Post-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #4	PostSurf/Cons/CC/EDS#4	27	22	14	1.210
104	Post-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #4	PostSurf/Cons/BC/EDS#4	27	23	14	1.210
105	Post-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set # 4	PostSurf/Cons/WC/EDS#4	27	24	14	1.210
106	Post-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #4	PostSurf/No/CC/EDS#4	27	25	14	1.210
107	Post-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #4	PostSurf/No/BC/EDS#4	27	26	14	1.210
108	Post-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #4	PostSurf/No/WC/EDS#4	27	27	14	1.210
109	Pre-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #5	PreSurf/Conv/CC/EDS#5	27	1	5	1.210
110	Pre-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #5	PreSurf/Conv/BC/EDS#5	27	2	5	1.210
111	Pre-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set #5	PreSurf/Conv/WC/EDS#5	27	3	5	1.210
112	Pre-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #5	PreSurf/Cons/CC/EDS#5	27	4	5	1.210
113	Pre-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #5	PreSurf/Cons/BC/EDS#5	27	5	5	1.210
114	Pre-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set #5	PreSurf/Cons/WC/EDS#5	27	6	5	1.210
115	Pre-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #5	PreSurf/No/CC/EDS#5	27	7	5	1.210
116	Pre-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #5	PreSurf/No/BC/EDS#5	27	8	5	1.210
117	Pre-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #5	PreSurf/No/WC/EDS#5	27	9	5	1.210
118	Pre-Plant Soil Inc.; Conv.; Corn after Corn; Event Date Set #5	PreInc/Conv/CC/EDS#5	27	10	10	1.210
119	Pre-Plant Soil Inc.; Conv.; Corn after Beans; Event Date Set #5	PreInc/Conv/BC/EDS#5	27	11	10	1.210
120	Pre-Plant Soil Inc.; Conv.; Corn after Small Grain; Event Date Set #5	PreInc/Conv/WC/EDS#5	27	12	10	1.210
121	Pre-Plant Soil Inc.; Cons.; Corn after Corn; Event Date Set #5	PreInc/Cons/CC/EDS#5	27	13	10	1.210
122	Pre-Plant Soil Inc.; Cons.; Corn after Beans; Event Date Set #5	PreInc/Cons/BC/EDS#5	27	14	10	1.210
123	Pre-Plant Soil Inc.; Cons.; Corn after Small Grain; Event Date Set #5	PreInc/Cons/WC/EDS#5	27	15	10	1.210
124	Pre-Plant Soil Inc.; No-Till; Corn after Corn; Event Date Set #5	PreInc/No/CC/EDS#5	27	16	10	1.210
125	Pre-Plant Soil Inc.; No-Till; Corn after Beans; Event Date Set #5	PreInc/No/BC/EDS#5	27	17	10	1.210
126	Pre-Plant Soil Inc.; No-Till; Corn after Small Grain; Event Date Set #5	PreInc/No/WC/EDS#5	27	18	10	1.210
127	Post-Emerg. Surf. Appl.; Conv.; Corn after Corn; Event Date Set #5	PostSurf/Conv/CC/EDS#5	27	19	15	1.210
128	Post-Emerg. Surf. Appl.; Conv.; Corn after Beans; Event Date Set #5	PostSurf/Conv/BC/EDS#5	27	20	15	1.210
129	Post-Emerg. Surf. Appl.; Conv.; Corn after Small Grain; Event Date Set # 5	PostSurf/Conv/WC/EDS#5	27	21	15	1.210
130	Post-Emerg. Surf. Appl.; Cons.; Corn after Corn; Event Date Set #5	PostSurf/Cons/CC/EDS#5	27	22	15	1.210
131	Post-Emerg. Surf. Appl.; Cons.; Corn after Beans; Event Date Set #5	PostSurf/Cons/BC/EDS#5	27	23	15	1.210
132	Post-Emerg. Surf. Appl.; Cons.; Corn after Small Grain; Event Date Set # 5	PostSurf/Cons/WC/EDS#5	27	24	15	1.210
133	Post-Emerg. Surf. Appl.; No-Till; Corn after Corn; Event Date Set #5	PostSurf/No/CC/EDS#5	27	25	15	1.210
134	Post-Emerg. Surf. Appl.; No-Till; Corn after Beans; Event Date Set #5	PostSurf/No/BC/EDS#5	27	26	15	1.210
135	Post-Emerg. Surf. Appl.; No-Till; Corn after Small Grain; Event Date Set #5	PostSurf/No/WC/EDS#5	27	27	15	1.210

TABLE 21:
Pesticide Loss Types Pathways-CURVTYPE.dbf

CURVE_TYPE	DESCRIPTIO	RPT_ABBR	UNITS	C_PERIOD	RESOURCE
1	Percolation, Pesticide In Solution. Annual 4-Day Maximum Concentration.		ppb	Acute	Ground Water
2	Percolation, Pesticide In Solution. Annual Loading.		g/ha		Ground Water
3	Percolation, Pesticide In Solution. Annual Concentration.		ppb	Chronic	Ground Water
4	Runoff, Pesticide In Solution. Annual 4-Day Maximum Concentration.		ppb	Acute	Surface Water
5	Runoff, Pesticide In Solution. Annual Loading.		g/ha		Surface Water
6	Runoff, Pesticide In Solution. Annual Concentration.		ppb	Chronic	Surface Water
7	Pesticide Adsorbed To Sediment. Annual Loading.		g/ha		Soil Loss
8	Pesticide Adsorbed To Organic Carbon. Annual Concentration.		ppb	Chronic	Soil Loss
9	Annual Rainfall Runoff.		in		Other
10	Annual Rainfall Percolation.		in		Other
11	Organic Carbon In Sediment.		g/ha		Other
-9	UNDEFINED				

TABLE 22:
Climate Data-Measured
CLIMATE.dbf

CLIMATE_ID	TAGGED	STATION	CLIGEN_ID	FROZENSOIL	T_DLY_RAIN	D_AVE_TEMP	NUM_YEARS	MM_MAX_TMP	MM_MIN_TMP	MM_SOLAR
1		Centerburg OH	726	TRUE	.\climate_OH\CENT.PRP	.\climate_oh\cent.tem	50	.\climate_OH\CENT.max	.\climate_OH\CENT.min	

TABLE 23:
Climate Data-Generated
CLIGEN.dbf

CLIGEN_ID	STATION	STATE	STATE_CODE	LATITUDE	LONGITUDE	YEARS	STORM_TYPE	ELEVATION	TP5	TP6	TMAX_AVE1	TMAX_AVE2	TMAX_AVE3
720	AKRON-CANTON WB AP	OH	33	40.92	81.43	42	3	210.00	1.99	3.68	33.24	36.17	46.07
721	CALDWELL 6 NW	OH	33	39.82	81.60	48	3	980.00	2.16	3.93	37.18	41.23	52.89
722	CELINA 3NE	OH	33	40.57	84.53	34	3	850.00	2.13	4.04	32.29	36.29	48.24
723	CLEVELAND WB AP	OH	33	41.40	81.85	42	3	790.00	1.95	3.60	33.28	35.74	45.35
724	DAYTON	OH	33	39.77	84.18	56	3	750.00	2.16	3.98	36.41	39.50	50.20
725	DEFIANCE	OH	33	41.28	84.38	54	3	710.00	2.03	3.78	31.67	34.87	45.45
726	FREDERICKTOWN SW PL	OH	33	40.48	82.53	41	3	70.00	2.06	3.69	33.23	36.60	47.29
727	KENTON 2 W	OH	33	40.65	83.65	66	3	20.00	2.07	3.75	34.20	37.30	47.32
728	NEW LEXINGTON 2 NW	OH	33	39.73	82.22	48	3	890.00	2.15	3.85	38.26	41.96	53.08
729	NEW PHILADELPHIA	OH	33	40.50	81.45	30	3	900.00	2.02	3.73	33.66	37.20	49.12
730	SANDUSKY WB CITY	OH	33	41.45	82.72	54	3	610.00	1.95	3.59	33.29	35.24	44.46
731	TOLEDO EXPRESS WSAP	OH	33	41.58	83.80	35	3	660.00	1.99	3.65	30.08	33.48	44.91
732	WASHINGTON COURT HS	OH	33	39.52	83.42	54	3	960.00	2.14	3.85	36.55	40.17	50.97

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TABLE 23:
Climate Data-Generated
CLIGEN.dbf

TMAX_AVE4	TMAX_AVE5	TMAX_AVE6	TMAX_AVE7	TMAX_AVE8	TMAX_AVE9	TMAX_AVE10	TMAX_AVE11	TMAX_AVE12	TMIN_AVE1	TMIN_AVE2	TMIN_AVE3
58.97	69.94	78.72	82.51	80.89	73.88	62.38	49.17	37.25	17.95	19.58	27.57
64.58	74.26	81.60	84.82	84.09	78.22	66.93	53.24	41.52	18.64	20.68	29.34
62.07	73.06	81.63	84.72	83.13	77.42	65.22	50.46	37.56	16.77	19.31	29.04
58.16	69.37	78.66	82.73	80.92	74.21	62.94	49.82	37.63	18.95	20.47	28.33
62.72	74.00	83.31	86.88	85.03	78.25	66.15	51.64	39.98	21.82	23.54	32.35
59.21	71.30	81.13	85.03	83.41	76.38	64.49	48.79	36.47	15.15	16.64	25.65
60.08	71.63	80.28	84.12	82.91	76.33	64.74	50.15	37.92	14.68	16.53	25.78
60.21	71.44	80.61	84.89	83.14	76.60	64.56	49.60	37.32	17.65	19.70	27.67
65.06	75.03	82.67	85.59	84.42	78.40	67.55	53.36	41.39	18.12	19.97	28.26
60.67	72.28	80.79	84.58	83.00	76.42	64.00	51.10	38.37	15.90	17.46	27.14
57.13	68.65	78.73	83.10	81.66	74.73	63.33	49.47	37.36	19.40	20.81	29.17
59.03	70.66	79.61	83.62	81.67	74.66	62.64	48.22	35.15	15.16	17.46	26.37
63.03	73.22	81.11	84.37	83.38	77.75	66.88	52.19	40.32	20.33	22.34	30.65

TABLE 23:
Climate Data-Generated
CLIGEN.dbf

TMIN_AVE4	TMIN_AVE5	TMIN_AVE6	TMIN_AVE7	TMIN_AVE8	TMIN_AVE9	TMIN_AVE10	TMIN_AVE11	TMIN_AVE12	SOLAR1	SOLAR2	SOLAR3	SOLAR4	SOLAR5	SOLAR6
37.85	48.02	56.91	61.35	59.92	53.15	42.51	33.31	23.04	119	183	284	308	482	547
38.82	48.10	56.54	60.24	59.10	52.40	41.39	32.29	23.32	130	205	286	390	486	555
39.70	50.18	59.21	62.99	60.90	54.34	43.41	33.92	22.92	129	199	301	384	473	537
38.29	48.35	57.57	62.11	60.84	54.30	43.90	34.66	24.41	124	190	303	313	493	556
42.78	53.37	62.81	66.82	64.76	57.21	45.84	35.92	26.02	138	214	312	409	498	567
36.41	47.10	57.08	61.00	59.03	51.54	40.25	30.44	20.29	124	200	301	377	471	535
36.05	45.92	54.73	58.37	56.11	48.94	38.12	29.67	20.19	127	197	300	363	478	558
37.67	47.96	57.22	61.13	59.06	52.47	41.38	31.99	21.61	126	200	299	385	469	545
37.36	47.08	55.64	59.51	57.82	50.85	39.34	30.50	21.95	138	209	310	388	500	575
36.25	45.98	55.36	59.49	58.08	51.24	39.18	32.14	22.50	116	183	273	323	470	539
39.79	50.70	60.72	65.28	63.85	56.42	45.68	34.97	24.41	123	198	303	350	480	549
36.74	46.93	55.94	60.79	58.89	51.56	40.22	31.36	20.69	124	202	301	378	470	540
40.42	50.77	59.68	63.36	61.74	54.60	43.52	33.19	24.26	137	215	311	410	495	573

TABLE 23:
Climate Data-Generated
CLIGEN.dbf

SOLAR7	SOLAR8	SOLAR9	SOLAR10	SOLAR11	SOLAR12	DEWPT1	DEWPT2	DEWPT3	DEWPT4	DEWPT5	DEWPT6	DEWPT7	DEWPT8	DEWPT9	DEWPT10	DEWPT11	DEWPT12
545	474	312	271	141	109	22.00	22.00	27.00	37.00	47.00	56.00	60.00	60.00	53.00	42.00	32.00	24.00
546	476	414	265	165	122	25.19	24.49	29.76	39.27	49.76	58.76	62.76	62.00	55.00	44.49	33.24	25.73
530	476	398	280	166	120	21.25	22.47	28.12	37.25	48.47	57.78	61.78	61.00	54.00	43.78	32.78	23.34
558	488	309	281	140	112	23.00	22.00	28.00	37.00	47.00	57.00	61.00	61.00	54.00	44.00	33.00	24.00
554	497	429	300	188	135	23.74	24.49	29.09	38.65	50.02	59.25	62.78	61.78	54.78	43.53	32.07	25.02
540	476	381	270	148	110	20.95	21.99	27.80	36.95	47.99	57.61	61.61	61.00	54.00	43.61	32.61	23.19
552	484	375	284	159	121	22.30	22.80	28.50	38.50	48.50	57.70	61.70	61.20	54.20	43.20	32.50	24.30
544	479	396	278	158	117	22.37	23.05	28.72	38.72	49.05	58.04	62.04	61.36	54.36	43.68	32.68	24.04
561	498	407	290	175	134	24.63	24.35	29.80	39.43	49.80	58.80	62.80	61.99	54.99	44.35	33.18	25.54
535	462	335	261	142	106	23.15	22.76	27.52	37.57	47.52	56.76	60.76	60.33	53.57	42.76	32.38	24.09
554	482	349	272	140	109	22.00	21.61	27.38	37.00	47.00	56.77	60.77	60.77	53.77	43.16	32.38	23.61
549	479	380	270	144	108	20.57	20.82	26.82	36.57	46.82	56.98	60.98	60.70	53.85	43.13	32.13	23.00
562	498	430	299	185	135	25.01	25.07	29.87	39.67	50.54	59.54	63.20	62.20	55.20	44.07	32.54	25.74

TABLE 23:
Climate Data-Generated
CLIGEN.dbf

WIND1	WIND2	WIND3	WIND4	WIND5	WIND6	WIND7	WIND8	WIND9	WIND10	WIND11	WIND12
479.0	483.0	485.0	464.0	405.0	368.0	332.0	328.0	351.0	383.0	457.0	478.0
430.0	412.0	439.0	420.0	354.0	330.0	303.0	283.0	317.0	340.0	431.0	412.0
446.0	444.0	458.0	441.0	383.0	352.0	324.0	303.0	334.0	362.0	438.0	432.0
494.0	478.0	492.0	464.0	413.0	381.0	360.0	345.0	373.0	404.0	481.0	490.0
429.0	436.0	443.0	430.0	369.0	331.0	307.0	296.0	318.0	345.0	411.0	407.0
455.0	450.0	471.0	450.0	386.0	352.0	327.0	302.0	342.0	371.0	443.0	448.0
494.0	477.0	492.0	471.0	407.0	378.0	341.0	324.0	357.0	387.0	465.0	470.0
476.0	463.0	469.0	442.0	378.0	363.0	336.0	309.0	344.0	372.0	454.0	456.0
422.0	406.0	434.0	417.0	354.0	327.0	299.0	279.0	310.0	334.0	420.0	403.0
464.0	457.0	471.0	456.0	395.0	361.0	329.0	320.0	345.0	374.0	451.0	452.0
505.0	489.0	500.0	477.0	417.0	383.0	351.0	331.0	367.0	396.0	469.0	483.0
464.0	458.0	476.0	454.0	390.0	352.0	323.0	297.0	339.0	365.0	433.0	444.0
432.0	441.0	439.0	427.0	370.0	335.0	311.0	296.0	326.0	352.0	411.0	414.0

TABLE 24:
Regional Constants-
CONSTANT.dbf

CONSTANTID	REGION	RPT_ABBR	ET_MODEL	EFF_ROOT_D	DRAIN_AREA	PL_AVL_H2O	SSCLY	COFUP	OM_RATIO2	OM_RATIO3	OM_RATIO4	OM_RATIO5
1	Upper Big Walnut Creek watershed	BigWalnut	PT	24	10.00000	1.000	100.0	0.03	0.330	0.200	0.100	0.050

TABLE 25:
SSSD to Soil Group Cross Reference-
SOIL _MAP.dbf

SOIL_MAPID	COMPNAME	SURF_TEXT	STATE	SSA_ID	MUSYM	SEQNO	SGROUP_ID	HYDRO
4	Brownsville	CN-SIL	OH	083	BrC	1	0	C
5	Brownsville	CN-SIL	OH	083	BrD	1	0	C
6	Brownsville	CN-SIL	OH	083	BsE	1	0	C
7	Brownsville	CN-SIL	OH	083	BsF	1	0	C
8	Brownsville	CN-SIL	OH	083	BuG	1	0	C
9	Brownsville	CN-SIL	OH	089	BrC	1	1	C
10	Brownsville	CN-SIL	OH	089	BrD	1	1	C
11	Brownsville	CN-SIL	OH	089	BrE	1	1	C
12	Brownsville	CN-SIL	OH	089	BrF	1	1	C
13	Brownsville	CN-SIL	OH	089	BrG	1	1	C
14	Lybrand	SIL	OH	041	LyD2	1	11	C
15	Lybrand	SIL	OH	041	LyE2	1	11	C
16	Lybrand	SIL	OH	041	MpD2	1	79	C
17	Mentor	SIL	OH	041	McD2	1	85	B
18	Mentor	SIL	OH	089	MnA	1	12	B
19	Mentor	SIL	OH	089	MnB	1	12	B
20	Mentor	SIL	OH	089	MnC2	1	12	B
21	Mentor	SIL	OH	089	MnD2	1	12	B
22	Miamian	CL	OH	049	MmC3	1	88	C
23	Miamian	SICL	OH	049	MlB2	1	13	C
24	Miamian	SICL	OH	049	MlC2	1	13	C
25	Miamian	SICL	OH	049	MlD2	1	13	C
26	Miamian	L	OH	049	HeE2	2	89	C
27	Miamian	L	OH	049	HeF2	2	89	C
28	Miamian	SIL	OH	049	MkB	1	91	C
29	Miamian	SIL	OH	049	MnC	1	91	C
30	Ockley	SIL	OH	089	OcA	1	106	B
31	Ockley	SIL	OH	089	OcB	1	106	B
32	Ockley	SIL	OH	089	OcC2	1	106	B
33	Ockley	SIL	OH	089	OeA	1	106	B
34	Ockley	SIL	OH	089	OeC	1	106	B
35	Ockley	SIL	OH	117	OcB	1	107	B
36	Ockley	SIL	OH	117	OcC	1	107	B
37	Rigley	FSL	OH	089	RgC	1	116	B
38	Rigley	FSL	OH	089	RgD	1	116	B
39	Rigley	FSL	OH	089	RgE	1	116	B

TABLE 25:
SSSD to Soil Group Cross Reference-SOIL _MAP.dbf

40	Rigley	FSL	OH	089	RgF	1	116	B
41	Rigley	FSL	OH	089	RhE	1	116	B
42	Rigley	SL	OH	083	RgB	1	118	B
43	Rigley	SL	OH	083	RgC	1	118	B
44	Rigley	SL	OH	083	RgD	1	118	B
45	Rittman	SIL	OH	083	RmB	1	120	C
46	Rittman	SIL	OH	083	RmC2	1	121	C
47	Rittman	SIL	OH	117	RsB	1	121	C
48	Rittman	SIL	OH	117	RsC	1	121	C
49	Rittman	SIL	OH	117	RsC2	1	121	C
50	Stone	CL	OH	041	SuA	1	144	C
51	Stone	SICL	OH	041	StA	1	145	C
52	Titusville	SIL	OH	083	TvB	1	150	C
53	Titusville	SIL	OH	083	TvC	1	150	C
54	Titusville	SIL	OH	089	TsB	1	151	C
55	Titusville	SIL	OH	089	TsC2	1	151	C
56	Wooster	SIL	OH	117	WsB	1	162	C
57	Wooster	SIL	OH	117	WsC	1	162	C
58	Wooster	SIL	OH	117	WsC2	1	162	C
59	Wooster	SIL	OH	117	WsD2	1	162	C
60	Wooster	SIL	OH	117	WsE2	1	162	C
61	Wooster	SIL	OH	083	WsB	1	161	C
62	Wooster	SIL	OH	083	WsC	1	161	C
63	Wooster	SIL	OH	083	WsD2	1	161	C
64	Wooster	SIL	OH	083	WsE2	1	161	C
65	Negley	L	OH	089	NeC2	1	104	B
66	Negley	L	OH	089	NeD2	1	104	B
67	Negley	L	OH	089	NeE	1	104	B
68	Negley	L	OH	089	NeF	1	104	B
69	Warsaw	SIL	OH	049	WdA	1	155	B
70	Warsaw	SIL	OH	049	WdB	1	155	B
71	Holly	SIL	OH	083	Ho	1	57	D
72	Sloan	SIL	OH	041	RsA	2	141	D
73	Sloan	SIL	OH	041	SkA	1	141	B
74	Sloan	SIL	OH	049	So	1	141	B
75	Sloan	SIL	OH	083	Sn	1	141	B
76	Sloan	SIL	OH	089	So	1	141	B

TABLE 25:
SSSD to Soil Group Cross Reference-
SOIL _MAP.dbf

77	Millgrove	SICL	OH	041	MhA	1	96	D
78	Sloan	SICL	OH	041	SoA	1	135	D
79	Luray	SICL	OH	083	Ly	1	75	D
80	Luray	SICL	OH	089	Lu	1	75	C
81	Pewamo	SICL	OH	083	Pc	1	113	D
82	Pewamo	SICL	OH	089	Pe	1	113	C
83	Pewamo	SICL	OH	089	Pf	1	113	C
84	Pewamo	SICL	OH	117	Pm	1	113	C
85	Pewamo	SICL	OH	041	PwA	1	113	C
86	Algiers	SIL	OH	049	Ag	1	4	C
87	Algiers	SIL	OH	089	Ak	1	4	C
88	Gilpin	SIL	OH	083	GhB	1	45	C
89	Gilpin	SIL	OH	083	GhC	1	45	C
90	Bennington	SIL	OH	049	Uu	2	9	C
91	Celina	SIL	OH	049	CeA	1	19	C
92	Celina	SIL	OH	049	CeB	1	19	C
93	Celina	SIL	OH	049	CeB2	1	19	C
94	Celina	SIL	OH	049	CeC2	1	19	C
95	Celina	SIL	OH	049	CfB	1	19	C
96	Celina	SIL	OH	049	Uv	2	19	C
97	Eel	SIL	OH	049	Ee	1	35	C
98	Shoals	SIL	OH	049	Sh	1	132	C
99	Shoals	SIL	OH	083	Sh	1	132	C
100	Shoals	SIL	OH	089	Sh	1	132	C
101	Shoals	SIL	OH	117	Sh	1	132	C
102	Millgrove	SIL	OH	041	MfA	1	98	D
103	Millgrove	SIL	OH	117	Mg	1	98	B
104	Sloan	SIL	OH	041	LsA	2	139	D
105	Sloan	SIL	OH	041	SnA	1	139	B
106	Alexandria	SIL	OH	049	AdB	1	2	C
107	Alexandria	SIL	OH	049	AdC2	1	2	C
108	Alexandria	SIL	OH	049	AdD2	1	2	C
109	Alexandria	SIL	OH	049	AdE2	1	2	C
110	Alford	SIL	OH	089	AfA	1	3	B
111	Alford	SIL	OH	089	AfB	1	3	B
112	Alford	SIL	OH	089	AfC2	1	3	B
113	Alford	SIL	OH	089	AhB	1	3	B

TABLE 25:
SSSD to Soil Group Cross Reference-SOIL _MAP.dbf

114	Amanda	SIL	OH	083	AdD2	1	6	C
115	Amanda	SIL	OH	083	AdF2	1	6	C
116	Amanda	SIL	OH	089	AmB2	1	6	C
117	Amanda	SIL	OH	089	AmC2	1	6	C
118	Amanda	SIL	OH	089	AmD2	1	6	C
119	Amanda	SIL	OH	089	AmE	1	6	C
120	Amanda	SIL	OH	089	AmF	1	6	C
121	Amanda	SIL	OH	117	AdB	1	6	C
122	Amanda	SIL	OH	117	AdC2	1	6	C
123	Amanda	SIL	OH	117	AdD2	1	6	C
124	Amanda	SIL	OH	117	AdE2	1	6	C
125	Amanda	SIL	OH	041	AmD2	1	6	C
126	Amanda	SIL	OH	041	AmE	1	6	C
127	Amanda	SIL	OH	041	AmF	1	6	C
128	Amanda variant	SIL	OH	089	AvC2	1	7	B
129	Amanda variant	SIL	OH	089	AvD2	1	7	B
130	Bennington	SIL	OH	049	BeA	1	8	C
131	Bennington	SIL	OH	049	BeB	1	8	C
132	Bennington	SIL	OH	049	BfA	1	8	C
133	Bennington	SIL	OH	049	BfB	1	8	C
134	Bennington	SIL	OH	083	BnA	1	8	C
135	Bennington	SIL	OH	083	BnB	1	8	C
136	Bennington	SIL	OH	089	BeA	1	8	C
137	Bennington	SIL	OH	089	BeB	1	8	C
138	Bennington	SIL	OH	089	BfA	1	8	C
139	Bennington	SIL	OH	117	BeA	1	8	C
140	Bennington	SIL	OH	117	BeB	1	8	C
141	Bennington	SIL	OH	041	BeA	1	8	C
142	Bennington	SIL	OH	041	BeB	1	8	C
143	Berks	CN-SIL	OH	089	BgB	1	10	C
144	Berks	CN-SIL	OH	089	BgD	1	10	C
145	Blount	SIL	OH	041	BoA	1	11	C
146	Blount	SIL	OH	041	BoB	1	11	C
147	Blount	SIL	OH	049	BoA	1	12	C
148	Blount	SIL	OH	049	BoB	1	12	C
149	Blount	SIL	OH	117	BoA	1	12	C
150	Blount	SIL	OH	117	BoB	1	12	C

TABLE 25:
SSSD to Soil Group Cross Reference-SOIL _MAP.dbf

151	Bogart	SIL	OH	083	BoA	1	13	B
152	Bogart	SIL	OH	083	BoB	1	13	B
153	Brecksville	SIL	OH	041	LbF	2	14	C
154	Brecksville	SIL	OH	049	LbF	2	14	C
155	Canfield	SIL	OH	083	CaB	1	17	C
156	Canfield	SIL	OH	083	CaC	1	17	C
157	Canfield	SIL	OH	117	CaB	1	17	C
158	Canfield	SIL	OH	117	CaC	1	17	C
159	Canfield	SIL	OH	117	CaC2	1	17	C
160	Cardington	SIL	OH	049	CaB	1	18	C
161	Cardington	SIL	OH	049	CaB2	1	18	C
162	Cardington	SIL	OH	049	CaC2	1	18	C
163	Cardington	SIL	OH	049	CbB	1	18	C
164	Cardington	SIL	OH	049	CbC	1	18	C
165	Cardington	SIL	OH	041	CaB	1	18	C
166	Cardington	SIL	OH	041	CaC2	1	18	C
167	Centerburg	SIL	OH	083	CdB	1	21	C
168	Centerburg	SIL	OH	083	CdB2	1	21	C
169	Centerburg	SIL	OH	083	CdC	1	21	C
170	Centerburg	SIL	OH	083	CdC2	1	21	C
171	Centerburg	SIL	OH	089	CeB	1	21	C
172	Centerburg	SIL	OH	089	CeC2	1	21	C
173	Centerburg	SIL	OH	089	CfB	1	21	C
174	Centerburg	SIL	OH	089	CfC	1	21	C
175	Centerburg	SIL	OH	117	CdB	1	21	C
176	Centerburg	SIL	OH	117	CdC	1	21	C
177	Centerburg	SIL	OH	117	CdC2	1	21	C
178	Centerburg	SIL	OH	041	CeB	1	20	C
179	Centerburg	SIL	OH	041	CeC2	1	20	C
180	Chili	GR-L	OH	083	ChB	1	22	B
181	Chili	GR-L	OH	083	ChC	1	22	B
182	Chili	GR-L	OH	083	ChD	1	22	B
183	Chili	GR-L	OH	083	ChE	1	22	B
184	Chili	L	OH	089	ChA	1	23	B
185	Chili	L	OH	089	ChB	1	23	B
186	Chili	L	OH	089	ChC2	1	23	B
187	Chili	L	OH	089	ChD2	1	23	B

TABLE 25:
SSSD to Soil Group Cross Reference-
SOIL _MAP.dbf

188	Chili	L	OH	089	ChE2	1	23	B
189	Chili	L	OH	117	ChB	1	23	B
190	Chili	L	OH	117	ChC	1	23	B
191	Chili	SIL	OH	083	CmA	1	24	B
192	Chili	SIL	OH	083	CmB	1	24	B
193	Chili	SIL	OH	083	CnC	1	24	B
194	Chili	SIL	OH	083	CnD	1	24	B
195	Cincinnati	SIL	OH	089	CkB	1	25	C
196	Cincinnati	SIL	OH	089	CkC2	1	26	C
197	Clarksburg	SIL	OH	089	CmC2	1	27	C
198	Clarksburg	SIL	OH	089	CmD2	1	27	C
199	Colyer Variant	SIL	OH	117	CkF	1	28	B
200	Condit	SIL	OH	049	Cn	1	29	D
201	Condit	SIL	OH	041	CnA	1	29	D
202	Condit	SIL	OH	083	Cr	1	30	D
203	Condit	SIL	OH	089	Cn	1	30	D
204	Condit	SIL	OH	117	Co	1	30	D
205	Coshocton	CN-SIL	OH	083	RhE	2	31	C
206	Coshocton	SIL	OH	083	CvB	1	32	C
207	Coshocton	SIL	OH	083	CvC	1	32	C
208	Coshocton	SIL	OH	083	CvD	1	32	C
209	Coshocton	SIL	OH	089	CoB	1	32	C
210	Coshocton	SIL	OH	089	CoC2	1	32	C
211	Coshocton	SIL	OH	089	CoD2	1	32	C
212	Coshocton	SIL	OH	089	CoE2	1	32	C
213	Coshocton	SIL	OH	089	RhE	2	32	C
214	Crane	SIL	OH	049	CpA	1	33	B
215	Crane	SIL	OH	083	CzA	1	33	B
216	Crane	SIL	OH	089	CrA	1	33	B
217	Crosby	SIL	OH	049	CrA	1	34	C
218	Crosby	SIL	OH	049	CrB	1	34	C
219	Crosby	SIL	OH	049	CsA	1	34	C
220	Crosby	SIL	OH	049	CsB	1	34	C
221	Crosby	SIL	OH	049	LeB	1	34	C
222	Eldean	SIL	OH	049	ElA	1	36	B
223	Eldean	SIL	OH	049	ElB	1	36	B
224	Eldean	SIL	OH	049	ElC2	1	36	B

TABLE 25:
SSSD to Soil Group Cross Reference-SOIL _MAP.dbf

225	Eldean	SIL	OH	049	ElD2	1	36	B
226	Eldean	SIL	OH	049	EmA	1	36	B
227	Eldean	SIL	OH	049	EmB	1	36	B
228	Fairpoint	SICL	OH	089	FaD	1	37	C
229	Fitchville	SIL	OH	083	FcA	1	38	C
230	Fitchville	SIL	OH	083	FcB	1	38	C
231	Fitchville	SIL	OH	089	FcA	1	38	C
232	Fitchville	SIL	OH	089	FcB	1	38	C
233	Fox	GR-L	OH	083	FoA	1	39	B
234	Fox	GR-L	OH	083	FoB	1	39	B
235	Fox	GR-L	OH	083	FoC	1	39	B
236	Fox	GR-L	OH	083	FoD	1	39	B
237	Fox	GR-L	OH	089	FoD2	1	39	B
238	Fox	GR-L	OH	089	FoE2	1	39	B
239	Frankstown variant	SIL	OH	089	FrB	1	40	B
240	Gallman	L	OH	041	GaC2	1	41	B
241	Gallman	SIL	OH	117	GaB	1	43	B
242	Gallman	SIL	OH	117	GaC	1	43	B
243	Gallman	SIL	OH	041	GbA	1	43	B
244	Gallman	SIL	OH	041	GbB	1	43	B
245	Gallman	SIL	OH	041	GcB	1	42	B
246	Genesee	SIL	OH	049	Gn	1	44	B
247	Genesee	SIL	OH	049	Uw	2	44	B
248	Glenford	SIL	OH	089	GfA	1	47	C
249	Glenford	SIL	OH	089	GfB	1	47	C
250	Glenford	SIL	OH	083	GnA	1	46	C
251	Glenford	SIL	OH	083	GnB	1	46	C
252	Glenford	SIL	OH	083	GnC	1	46	C
253	Glynwood	CL	OH	117	GnB2	1	48	C
254	Glynwood	CL	OH	117	GnC2	1	48	C
255	Glynwood	SICL	OH	041	GzC3	1	49	C
256	Glynwood	SIL	OH	049	GwB	1	50	C
257	Glynwood	SIL	OH	049	GwC2	1	50	C
258	Glynwood	SIL	OH	041	GwB	1	50	C
259	Glynwood	SIL	OH	041	GwC2	1	50	C
260	Gresham	SIL	OH	083	GrB	1	51	C
261	Guernsey	SIL	OH	089	GnB	1	52	C

TABLE 25:
SSSD to Soil Group Cross Reference-
SOIL _MAP.dbf

262	Guernsey	SIL	OH	089	GnC2	1	52	C
263	Guernsey	SIL	OH	089	GnD	1	52	C
264	Hazleton	CN-SL	OH	089	HeF	1	53	B
265	Hennepin	L	OH	049	HeE2	1	54	B
266	Hennepin	L	OH	049	HeF2	1	54	B
267	Heverlo	SIL	OH	041	HeF	1	55	B
268	Hickory	SIL	OH	089	HkC2	1	56	B
269	Hickory	SIL	OH	089	HkD2	1	56	B
270	Holly	SIL	OH	083	Ho	1	58	B
271	Homewood	SIL	OH	083	CnC	2	59	C
272	Homewood	SIL	OH	083	CnD	2	59	C
273	Homewood	SIL	OH	083	HwB	1	59	C
274	Homewood	SIL	OH	083	HwC	1	59	C
275	Homewood	SIL	OH	083	HwD2	1	59	C
276	Homewood	SIL	OH	083	HwE2	1	59	C
277	Homewood	SIL	OH	089	HoB	1	59	C
278	Homewood	SIL	OH	089	HoC2	1	59	C
279	Homewood	SIL	OH	089	HoD2	1	59	C
280	Homewood	SIL	OH	089	HoE2	1	59	C
281	Hyatts	SIL	OH	041	HyA	1	60	C
282	Hyatts	SIL	OH	041	HyB	1	60	C
283	Jimtown	SIL	OH	041	JmA	1	61	C
284	Jimtown	SIL	OH	083	JmA	1	61	C
285	Jimtown	SIL	OH	083	JmB	1	61	C
286	Keene	SIL	OH	089	KeB	1	62	C
287	Keene	SIL	OH	089	KeC2	1	62	C
288	Keene	SIL	OH	089	KeD2	1	62	C
289	Kendallville	SIL	OH	049	KeA	1	63	B
290	Kendallville	SIL	OH	049	KeB	1	63	B
291	Kendallville	SIL	OH	049	KeC2	1	63	B
292	Killbuck	SIL	OH	089	Kk	1	64	C
293	Kokomo	SICL	OH	049	Ko	1	66	B
294	Kokomo	SICL	OH	049	Ku	1	66	B
295	Landes	FSL	OH	083	La	1	68	B
296	Latham	SIL	OH	041	LbF	1	69	D
297	Latham	SIL	OH	049	LbF	1	69	D
298	Leoni	GR-L	OH	041	LeE	1	70	B

TABLE 25:
SSSD to Soil Group Cross Reference-SOIL _MAP.dbf

299	Lewisburg	SIL	OH	049	LeB	2	71	C
300	Lobdell	SIL	OH	041	LoA	1	72	B
301	Lobdell	SIL	OH	041	LsA	1	72	B
302	Lobdell	SIL	OH	083	Lo	1	72	B
303	Lobdell	SIL	OH	117	Lo	1	72	B
304	Loudonville	SIL	OH	083	LvB	1	74	C
305	Loudonville	SIL	OH	083	LvC	1	74	C
306	Loudonville	SIL	OH	083	LvD	1	74	C
307	Loudonville	SIL	OH	083	LvE	1	74	C
308	Loudonville	SIL	OH	041	LvB	1	73	C
309	Luray	SICL	OH	083	Ly	1	76	C
310	Luray	SICL	OH	089	Lu	1	76	C
311	Lybrand	SICL	OH	041	LzD3	1	77	C
312	Martinsville	L	OH	041	MaB	1	80	B
313	Martinsville	L	OH	041	MbB	1	81	B
314	Mechanicsburg	SIL	OH	089	McB	1	82	C
315	Mechanicsburg	SIL	OH	089	McC2	1	82	C
316	Mechanicsburg	SIL	OH	089	McD2	1	82	C
317	Mechanicsburg	SIL	OH	089	McE	1	82	C
318	Medway	SIL	OH	049	Mh	1	83	B
319	Medway	SIL	OH	083	Md	1	83	B
320	Medway	SIL	OH	089	Md	1	83	B
321	Melvin	SIL	OH	089	Me	1	84	D
322	Mertz	STV-SIL	OH	089	FrB	2	87	C
323	Mertz	STV-SIL	OH	089	MrE	1	87	C
324	Milford	SICL	OH	117	Mf	1	92	B
325	Millgrove	SICL	OH	041	MgA	1	94	B
326	Millgrove	SICL	OH	041	MhA	1	97	B
327	Millgrove	SIL	OH	041	MfA	1	99	B
328	Millgrove	SIL	OH	117	Mg	1	99	B
329	Milton	SIL	OH	049	MoB	1	100	C
330	Milton	SIL	OH	049	MoC2	1	100	C
331	Milton	SIL	OH	049	MpB	1	100	C
332	Milton	SIL	OH	049	MpC	1	100	C
333	Milton	SIL	OH	041	MoB	1	100	C
334	Milton	SIL	OH	041	MoC2	1	100	C
335	Milton	SIL	OH	041	MpD2	2	100	C

TABLE 25:
SSSD to Soil Group Cross Reference-
SOIL _MAP.dbf

336	Mitiwanga	SIL	OH	049	MrB	1	101	C
337	Montgomery	SICL	OH	049	Ms	1	102	D
338	Morley	SIL	OH	117	MoC	1	103	C
339	Morley	SIL	OH	117	MoC2	1	103	C
340	Morley	SIL	OH	117	MoD2	1	103	C
341	Ockley	SIL	OH	049	OcA	1	105	B
342	Ockley	SIL	OH	049	OcB	1	105	B
343	Ockley	SIL	OH	049	OcC2	1	105	B
344	Ockley	SIL	OH	049	Ux	2	105	B
345	Ockley	SIL	OH	083	OcA	1	105	B
346	Ockley	SIL	OH	083	OcB	1	105	B
347	Orrville	SIL	OH	083	Or	1	108	C
348	Orrville	SIL	OH	089	Or	1	108	C
349	Pacer	SIL	OH	041	PaA	1	109	B
350	Parke	SIL	OH	089	PaC2	1	110	B
351	Pewamo	SICL	OH	083	Pc	1	114	C
352	Pewamo	SICL	OH	089	Pe	1	114	C
353	Pewamo	SICL	OH	089	Pf	1	114	C
354	Pewamo	SICL	OH	117	Pm	1	114	C
355	Pewamo	SICL	OH	041	PwA	1	114	C
356	Pewamo	SICL	OH	049	Pm	1	111	B
357	Pewamo	SICL	OH	049	Pn	1	111	B
358	Rarden	SIL	OH	041	RdB2	1	115	C
359	Rarden	SIL	OH	041	RdC2	1	115	C
360	Rarden	SIL	OH	041	RdF2	1	115	C
361	Rarden	SIL	OH	049	RdF2	1	115	C
362	Rigley	L	OH	083	RhE	1	117	B
363	Ritchey	SIL	OH	049	RhB	1	119	D
364	Ritchey	SIL	OH	049	RhD2	1	119	D
365	Ross	SIL	OH	049	Rs	1	122	B
366	Rossburg	SIL	OH	041	RoA	1	123	B
367	Rossburg	SIL	OH	041	RsA	1	123	B
368	Rush	SIL	OH	089	RsA	1	124	B
369	Schaffenaker	BYV-LS	OH	083	SdF	1	125	A
370	Schaffenaker	LS	OH	083	ScD	1	126	A
371	Scioto	SICL	OH	041	SdC2	1	127	B
372	Scioto	SIL	OH	041	ScA	1	128	B

TABLE 25:
SSSD to Soil Group Cross Reference-SOIL _MAP.dbf

373	Scioto	SIL	OH	041	ScB	1	128	B
374	Scioto	SIL	OH	041	SfA	1	128	B
375	Sebring	SIL	OH	083	Se	1	129	B
376	Sebring	SIL	OH	089	Se	1	129	B
377	Shoals	SIL	OH	041	SgA	1	131	C
378	Sleeth	SIL	OH	089	SkA	1	134	C
379	Sleeth	SIL	OH	049	SlA	1	133	C
380	Sleeth	SIL	OH	049	SmA	1	133	C
381	Sleeth	SIL	OH	117	SkA	1	133	C
382	Sloan	SICL	OH	117	So	1	137	B
383	Sloan	SICL	OH	041	SoA	1	136	B
384	Sloan	SIL	OH	041	RsA	2	142	B
385	Sloan	SIL	OH	041	SkA	1	142	B
386	Sloan	SIL	OH	049	So	1	142	B
387	Sloan	SIL	OH	083	Sn	1	142	B
388	Sloan	SIL	OH	089	So	1	142	B
389	Sloan	SIL	OH	041	LsA	2	140	B
390	Sloan	SIL	OH	041	SnA	1	140	B
391	Smothers	SIL	OH	041	SsA	1	143	C
392	Smothers	SIL	OH	041	SsB	1	143	C
393	Stonelick	L	OH	089	St	1	146	B
394	Stonelick	L	OH	089	Su	1	146	B
395	Thackery	SIL	OH	049	ThA	1	147	B
396	Thackery	SIL	OH	049	ThB	1	147	B
397	Tioga	FSL	OH	083	Tg	1	148	B
398	Tioga	FSL	OH	089	Tg	1	148	B
399	Tioga	L	OH	117	Tg	1	149	B
400	Wadsworth	SIL	OH	083	WaB	1	152	C
401	Wadsworth	SIL	OH	117	WaA	1	152	C
402	Wadsworth	SIL	OH	117	WaB	1	152	C
403	Wallkill	SIL	OH	089	Wa	1	153	C
404	Wea	SIL	OH	049	WeA	1	156	B
405	Wea	SIL	OH	049	WeB	1	156	B
406	Westland	SICL	OH	089	Ws	1	158	B
407	Westland	SICL	OH	089	Wt	1	158	B
408	Westmoreland	SIL	OH	083	BsE	2	160	B
409	Westmoreland	SIL	OH	083	BsF	2	160	B

TABLE 25:
SSSD to Soil Group Cross Reference- SOIL _MAP.dbf

410	Westmoreland	SIL	OH	083	WeD	1	160	B
411	Algiers	SIL	OH	049	Ag	1	5	D
412	Algiers	SIL	OH	089	Ak	1	5	C
413	Killbuck	SIL	OH	089	Kk	1	65	D
414	Kokomo	SICL	OH	049	Ko	1	67	D
415	Kokomo	SICL	OH	049	Ku	1	67	B
416	Milford	SICL	OH	117	Mf	1	93	D
417	Millgrove	SICL	OH	041	MgA	1	95	D
418	Pewamo	SICL	OH	049	Pm	1	112	D
419	Pewamo	SICL	OH	049	Pn	1	112	B
420	Sebring	SIL	OH	083	Se	1	130	D
421	Sebring	SIL	OH	089	Se	1	130	B
422	Sloan	SICL	OH	117	So	1	138	D
423	Wallkill	SIL	OH	089	Wa	1	154	D
424	Westland	SICL	OH	049	Wt	1	157	D
425	Westland	SICL	OH	089	Ws	1	159	D
426	Westland	SICL	OH	089	Wt	1	159	B

TABLE 26:
Soil Groups-
SOIL_GRUP.dbf

SGROUP_ID	TAGGED	COMPNAME	SURF_TEXT	STATE	SSA_ID	MUSYM	SEQNO	HYDRO	KSOIL	CONA	NUM_HORIZ	HORIZ_DEP1	HORIZ_DEP2	HORIZ_DEP3	HORIZ_DEP4
0		Brownsville	CN-SIL	OH	083	BrC	1	C	0.20	4.50	3	7.9	24.0	48.0	52.0
1		Brownsville	CN-SIL	OH	089	BrC	1	C	0.20	4.50	3	7.1	42.1	46.8	-1.0
11		Lybrand	SIL	OH	041	LyD2	1	C	0.37	4.50	4	9.0	33.1	44.9	79.9
79		Lybrand	SIL	OH	041	MpD2	1	C	0.37	4.50	4	7.1	29.9	48.0	79.9
85		Mentor	SIL	OH	041	McD2	1	B	0.37	4.50	3	7.1	61.8	79.9	-1.0
12		Mentor	SIL	OH	089	MnA	1	B	0.37	4.50	3	9.0	48.0	59.8	-1.0
88		Miamian	CL	OH	049	MmC3	1	C	0.32	4.00	3	9.0	18.9	70.1	-1.0
13		Miamian	SICL	OH	049	MlB2	1	C	0.37	4.00	3	9.0	35.8	70.1	-1.0
89		Miamian	L	OH	049	HeE2	2	C	0.37	4.50	3	5.9	24.0	70.1	-1.0
91		Miamian	SIL	OH	049	MkB	1	C	0.37	4.50	3	9.0	35.8	70.1	-1.0
106		Ockley	SIL	OH	089	OcA	1	B	0.32	4.50	4	9.8	18.9	55.9	79.9
107		Ockley	SIL	OH	117	OcB	1	B	0.37	4.50	4	9.0	22.8	46.8	79.9
116		Rigley	FSL	OH	089	RgC	1	B	0.24	3.50	3	7.9	44.1	70.1	-1.0
118		Rigley	SL	OH	083	RgB	1	B	0.24	3.50	2	7.9	59.8	-1.0	-1.0
120		Rittman	SIL	OH	083	RmB	1	C	0.43	4.50	4	7.9	27.2	40.2	70.1
121		Rittman	SIL	OH	083	RmC2	1	C	0.43	4.50	4	7.9	27.2	40.2	70.1
144		Stone	CL	OH	041	SuA	1	C	0.28	4.00	4	11.8	29.1	33.8	44.1
145		Stone	SICL	OH	041	StA	1	C	0.28	4.00	4	11.8	20.1	29.9	42.1
150		Titusville	SIL	OH	083	TvB	1	C	0.37	4.50	4	9.0	20.9	46.1	59.8
151		Titusville	SIL	OH	089	TsB	1	C	0.37	4.50	4	9.0	28.0	48.0	53.9
162		Wooster	SIL	OH	117	WsB	1	C	0.37	4.50	4	9.0	29.1	44.1	79.9
161		Wooster	SIL	OH	083	WsB	1	C	0.37	4.50	4	9.8	31.9	44.1	59.8
104		Negley	L	OH	089	NeC2	1	B	0.32	4.50	3	7.1	20.1	79.9	-1.0
155		Warsaw	SIL	OH	049	WdA	1	B	0.28	4.50	3	9.0	33.8	70.1	-1.0
57		Holly	SIL	OH	083	Ho	1	D	0.28	4.50	3	5.9	35.0	59.8	-1.0
141		Sloan	SIL	OH	041	RsA	2	D	0.28	4.50	3	15.0	35.0	79.9	-1.0
96		Millgrove	SICL	OH	041	MhA	1	D	0.28	4.00	4	9.8	27.2	33.8	79.9
135		Sloan	SICL	OH	041	SoA	1	D	0.28	4.00	4	11.8	22.0	46.8	74.8
75		Luray	SICL	OH	083	Ly	1	D	0.32	4.00	3	14.2	46.1	59.8	-1.0
113		Pewamo	SICL	OH	083	Pc	1	D	0.28	4.00	3	9.0	55.9	59.8	-1.0
4		Algiers	SIL	OH	049	Ag	1	C	0.37	4.50	2	22.8	70.1	-1.0	-1.0
45		Gilpin	SIL	OH	083	GhB	1	C	0.32	4.50	3	9.0	33.1	37.0	39.0
9		Bennington	SIL	OH	049	Uu	2	C	0.43	4.50	3	9.0	35.0	70.1	-1.0
19		Celina	SIL	OH	049	CeA	1	C	0.37	4.50	3	7.1	25.2	70.1	-1.0
35		Eel	SIL	OH	049	Ee	1	C	0.32	4.50	3	7.9	42.1	70.1	-1.0
132		Shoals	SIL	OH	049	Sh	1	C	0.24	4.50	3	13.0	35.0	70.1	-1.0
98		Millgrove	SIL	OH	041	MfA	1	D	0.28	4.50	4	11.8	38.2	50.0	79.9
139		Sloan	SIL	OH	041	LsA	2	D	0.28	4.50	4	7.9	18.9	25.2	64.2
2		Alexandria	SIL	OH	049	AdB	1	C	0.37	4.50	3	7.9	42.1	70.1	-1.0
3		Alford	SIL	OH	089	AfA	1	B	0.43	4.50	3	7.9	48.0	59.8	-1.0
6		Amanda	SIL	OH	083	AdD2	1	C	0.37	4.50	4	11.0	22.8	55.1	59.8
7		Amanda variant	SIL	OH	089	AvC2	1	B	0.37	4.50	4	7.1	53.1	59.8	79.9
8		Bennington	SIL	OH	049	BeA	1	C	0.43	4.50	3	9.0	35.0	70.1	-1.0
10		Berks	CN-SIL	OH	089	BgB	1	C	0.17	4.50	3	7.1	15.0	25.2	-1.0
11		Blount	SIL	OH	041	BoA	1	C	0.32	4.50	4	9.0	27.2	38.2	79.9
12		Blount	SIL	OH	049	BoA	1	C	0.43	4.50	3	9.8	35.0	70.1	-1.0
13		Bogart	SIL	OH	083	BoA	1	B	0.32	4.50	3	9.8	31.9	48.0	59.8
14		Brecksville	SIL	OH	041	LbF	2	C	0.43	4.50	2	3.1	22.0	31.9	-1.0
17		Canfield	SIL	OH	083	CaB	1	C	0.37	4.50	4	11.8	25.2	46.8	59.8
18		Cardington	SIL	OH	049	CaB	1	C	0.37	4.50	3	5.9	33.8	70.1	-1.0
21		Centerburg	SIL	OH	083	CdB	1	C	0.37	4.50	4	7.1	20.9	51.2	59.8
20		Centerburg	SIL	OH	041	CeB	1	C	0.37	4.50	4	5.9	11.8	50.0	79.9
22		Chili	GR-L	OH	083	ChB	1	B	0.24	4.50	4	7.9	26.0	48.0	59.8
23		Chili	L	OH	089	ChA	1	B	0.32	4.50	3	9.8	55.1	59.8	-1.0
24		Chili	SIL	OH	083	CmA	1	B	0.32	4.50	3	9.8	52.0	59.8	-1.0
25		Cincinnati	SIL	OH	089	CkB	1	C	0.43	4.50	4	7.1	33.1	51.2	59.8
26		Cincinnati	SIL	OH	089	CkC2	1	C	0.43	4.50	4	5.9	33.1	51.2	87.0
27		Clarksburg	SIL	OH	089	CmC2	1	C	0.37	4.50	4	7.1	31.1	55.9	79.9
28		Colyer Variant	SIL	OH	117	CkF	1	B	0.37	4.50	3	9.0	14.2	33.1	37.0

TABLE 26:
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29		Condit	SIL	OH	049	Cn	1	D	0.37	4.50	3	11.0	53.1	70.1	-1.0
30		Condit	SIL	OH	083	Cr	1	D	0.37	4.50	3	9.0	48.0	59.8	-1.0
31		Coshocton	CN-SIL	OH	083	RhE	2	C	0.37	4.50	4	7.9	24.0	48.0	59.8
32		Coshocton	SIL	OH	083	CvB	1	C	0.37	4.50	3	5.9	18.1	57.9	59.8
33		Crane	SIL	OH	049	CpA	1	B	0.28	4.50	4	9.0	20.9	42.9	52.0
34		Crosby	SIL	OH	049	CrA	1	C	0.43	4.50	3	9.0	35.8	70.1	-1.0
36		Eldean	SIL	OH	049	ElA	1	B	0.37	4.50	3	7.1	35.0	70.1	-1.0
37		Fairpoint	SICL	OH	089	FaD	1	C	0.43	4.00	2	5.9	59.8	-1.0	-1.0
38		Fitchville	SIL	OH	083	FcA	1	C	0.37	4.50	3	7.9	46.8	59.8	-1.0
39		Fox	GR-L	OH	083	FoA	1	B	0.28	4.50	2	9.0	39.0	59.8	-1.0
40		Frankstown variant	SIL	OH	089	FrB	1	B	0.28	4.50	3	5.9	20.1	25.2	-1.0
41		Gallman	L	OH	041	GaC2	1	B	0.32	4.50	3	7.1	50.0	79.9	-1.0
43		Gallman	SIL	OH	117	GaB	1	B	0.32	4.50	3	9.8	77.2	88.2	-1.0
42		Gallman	SIL	OH	041	GcB	1	B	0.37	4.50	4	11.8	59.8	65.0	79.9
44		Genesee	SIL	OH	049	Gn	1	B	0.37	4.50	3	9.0	37.0	70.1	-1.0
47		Glenford	SIL	OH	089	GfA	1	C	0.37	4.50	4	7.9	39.0	52.0	59.8
46		Glenford	SIL	OH	083	GnA	1	C	0.37	4.50	4	11.0	31.9	44.1	59.8
48		Glynwood	CL	OH	117	GnB2	1	C	0.43	4.00	3	7.9	22.0	79.9	-1.0
49		Glynwood	SICL	OH	041	GzC3	1	C	0.43	4.00	4	7.1	18.1	35.8	79.9
50		Glynwood	SIL	OH	049	GwB	1	C	0.43	4.50	3	7.1	26.0	70.1	-1.0
51		Gresham	SIL	OH	083	GrB	1	C	0.37	4.50	4	9.0	33.1	52.0	72.8
52		Guernsey	SIL	OH	089	GnB	1	C	0.43	4.50	4	11.0	16.1	51.2	70.9
53		Hazleton	CN-SL	OH	089	HeF	1	B	0.17	3.50	3	5.1	27.2	53.9	-1.0
54		Hennepin	L	OH	049	HeE2	1	B	0.28	4.50	3	5.9	18.1	70.1	-1.0
55		Heverlo	SIL	OH	041	HeF	1	B	0.37	4.50	2	9.8	27.2	37.0	-1.0
56		Hickory	SIL	OH	089	HkC2	1	B	0.37	4.50	3	7.1	35.0	79.9	-1.0
58		Holly	SIL	OH	083	Ho	1	B	0.28	4.50	3	5.9	35.0	59.8	-1.0
59		Homewood	SIL	OH	083	CnC	2	C	0.37	4.50	4	9.8	29.9	52.0	59.8
60		Hyatts	SIL	OH	041	HyA	1	C	0.43	4.50	3	11.0	35.0	46.1	55.9
61		Jimtown	SIL	OH	041	JmA	1	C	0.32	4.50	3	9.8	46.8	79.9	-1.0
62		Keene	SIL	OH	089	KeB	1	C	0.43	4.50	4	7.9	20.9	44.1	55.1
63		Kendallville	SIL	OH	049	KeA	1	B	0.37	4.50	3	14.2	38.2	70.1	-1.0
64		Killbuck	SIL	OH	089	Kk	1	C	0.37	4.50	4	5.9	20.1	28.0	59.8
66		Kokomo	SICL	OH	049	Ko	1	B	0.24	4.00	3	9.0	42.9	70.1	-1.0
68		Landes	FSL	OH	083	La	1	B	0.24	3.50	2	22.0	59.8	-1.0	-1.0
69		Latham	SIL	OH	041	LbF	1	D	0.43	4.50	2	3.1	29.9	40.2	-1.0
70		Leoni	GR-L	OH	041	LeE	1	B	0.24	4.50	3	7.1	37.0	79.9	-1.0
71		Lewisburg	SIL	OH	049	LeB	2	C	0.43	4.50	3	5.9	16.1	70.1	-1.0
72		Lobdell	SIL	OH	041	LoA	1	B	0.37	4.50	3	9.0	48.0	65.0	-1.0
74		Loudonville	SIL	OH	083	LvB	1	C	0.32	4.50	3	9.8	26.0	37.0	39.0
73		Loudonville	SIL	OH	041	LvB	1	C	0.32	4.50	2	11.8	33.1	33.8	-1.0
76		Luray	SICL	OH	083	Ly	1	C	0.32	4.00	3	14.2	46.1	59.8	-1.0
77		Lybrand	SICL	OH	041	LzD3	1	C	0.37	4.00	4	2.0	15.0	31.9	79.9
80		Martinsville	L	OH	041	MaB	1	B	0.28	4.50	3	7.1	40.2	79.9	-1.0
81		Martinsville	L	OH	041	MbB	1	B	0.37	4.50	4	11.0	55.1	65.0	79.9
82		Mechanicsburg	SIL	OH	089	McB	1	C	0.37	4.50	4	7.9	29.1	46.1	55.1
83		Medway	SIL	OH	049	Mh	1	B	0.28	4.50	3	15.0	29.9	70.1	-1.0
84		Melvin	SIL	OH	089	Me	1	D	0.43	4.50	3	9.0	24.0	59.8	-1.0
87		Mertz	STV-SIL	OH	089	FrB	2	C	0.28	4.50	3	5.1	51.2	68.1	-1.0
92		Milford	SICL	OH	117	Mf	1	B	0.28	4.00	3	13.0	50.0	79.9	-1.0
94		Millgrove	SICL	OH	041	MgA	1	B	0.28	4.00	4	15.0	44.9	55.1	79.9
97		Millgrove	SICL	OH	041	MhA	1	B	0.28	4.00	4	9.8	27.2	33.8	79.9
99		Millgrove	SIL	OH	041	MfA	1	B	0.28	4.50	4	11.8	38.2	50.0	79.9
100		Milton	SIL	OH	049	MoB	1	C	0.37	4.50	3	9.0	27.2	31.1	35.0
101		Mitiwanga	SIL	OH	049	MrB	1	C	0.32	4.50	3	7.1	26.0	35.0	39.0
102		Montgomery	SICL	OH	049	Ms	1	D	0.32	4.00	3	7.9	42.9	70.1	-1.0
103		Morley	SIL	OH	117	MoC	1	C	0.37	4.50	4	7.9	28.0	39.0	79.9
105		Ockley	SIL	OH	049	OcA	1	B	0.37	4.50	4	14.2	40.9	52.0	70.1
108		Orrville	SIL	OH	083	Or	1	C	0.37	4.50	3	7.9	35.8	59.8	-1.0
109		Pacer	SIL	OH	041	PaA	1	B	0.37	4.50	3	14.2	51.2	79.9	-1.0

TABLE 26:
Soil Groups-
SOIL_GRUP.dbf

110		Parke	SIL	OH	089	PaC2	1	B	0.37	4.50	3	7.1	35.0	59.8	-1.0
114		Pewamo	SICL	OH	083	Pc	1	C	0.28	4.00	3	9.0	55.9	59.8	-1.0
111		Pewamo	SICL	OH	049	Pm	1	B	0.28	4.00	3	13.0	50.0	70.1	-1.0
115		Rarden	SIL	OH	041	RdB2	1	C	0.43	4.50	2	3.1	33.1	42.9	-1.0
117		Rigley	L	OH	083	RhE	1	B	0.24	4.50	3	5.9	37.0	59.8	-1.0
119		Ritchey	SIL	OH	049	RhB	1	D	0.37	4.50	2	11.0	16.9	20.9	-1.0
122		Ross	SIL	OH	049	Rs	1	B	0.32	4.50	3	16.1	40.2	70.1	-1.0
123		Rossburg	SIL	OH	041	RoA	1	B	0.37	4.50	3	20.1	66.9	79.9	-1.0
124		Rush	SIL	OH	089	RsA	1	B	0.37	4.50	4	9.8	38.2	57.1	68.1
125		Schaffenaker	BYV-LS	OH	083	SdF	1	A	0.17	3.30	3	1.2	20.9	31.9	35.0
126		Schaffenaker	LS	OH	083	ScD	1	A	0.17	3.30	3	5.9	24.0	35.0	37.0
127		Scioto	SICL	OH	041	SdC2	1	B	0.37	4.00	4	5.1	15.0	55.1	79.9
128		Scioto	SIL	OH	041	ScA	1	B	0.37	4.50	4	9.8	16.1	51.2	79.9
129		Sebring	SIL	OH	083	Se	1	B	0.37	4.50	3	7.1	50.0	59.8	-1.0
131		Shoals	SIL	OH	041	SgA	1	C	0.24	4.50	3	9.8	29.1	59.8	-1.0
134		Sleeth	SIL	OH	089	SkA	1	C	0.32	4.50	4	11.8	24.0	55.1	59.8
133		Sleeth	SIL	OH	049	SlA	1	C	0.32	4.50	4	14.2	35.8	55.1	70.1
137		Sloan	SICL	OH	117	So	1	B	0.28	4.00	4	11.8	48.0	64.2	79.9
136		Sloan	SICL	OH	041	SoA	1	B	0.28	4.00	4	11.8	22.0	46.8	74.8
142		Sloan	SIL	OH	041	RsA	2	B	0.28	4.50	3	15.0	35.0	79.9	-1.0
140		Sloan	SIL	OH	041	LsA	2	B	0.28	4.50	4	7.9	18.9	25.2	64.2
143		Smothers	SIL	OH	041	SsA	1	C	0.37	4.50	3	9.8	22.0	29.9	31.1
146		Stonelick	L	OH	089	St	1	B	0.32	4.50	1	14.2	-1.0	-1.0	-1.0
147		Thackery	SIL	OH	049	ThA	1	B	0.37	4.50	4	9.8	20.9	48.8	53.9
148		Tioga	FSL	OH	083	Tg	1	B	0.37	3.50	3	9.0	38.2	59.8	-1.0
149		Tioga	L	OH	117	Tg	1	B	0.37	4.50	3	11.8	42.1	79.9	-1.0
152		Wadsworth	SIL	OH	083	WaB	1	C	0.43	4.50	4	9.8	20.1	39.0	59.8
153		Wallkill	SIL	OH	089	Wa	1	C	0.37	4.50	1	24.0	-1.0	-1.0	-1.0
156		Wea	SIL	OH	049	WeA	1	B	0.32	4.50	3	14.2	55.9	70.1	-1.0
158		Westland	SICL	OH	089	Ws	1	B	0.24	4.00	4	15.0	42.1	55.1	59.8
160		Westmoreland	SIL	OH	083	BsE	2	B	0.37	4.50	3	3.1	33.8	48.0	50.0
5		Algiers	SIL	OH	049	Ag	1	D	0.37	4.50	2	22.8	70.1	-1.0	-1.0
65		Killbuck	SIL	OH	089	Kk	1	D	0.37	4.50	4	5.9	20.1	28.0	59.8
67		Kokomo	SICL	OH	049	Ko	1	D	0.24	4.00	3	9.0	42.9	70.1	-1.0
93		Milford	SICL	OH	117	Mf	1	D	0.28	4.00	3	13.0	50.0	79.9	-1.0
95		Millgrove	SICL	OH	041	MgA	1	D	0.28	4.00	4	15.0	44.9	55.1	79.9
112		Pewamo	SICL	OH	049	Pm	1	D	0.28	4.00	3	13.0	50.0	70.1	-1.0
130		Sebring	SIL	OH	083	Se	1	D	0.37	4.50	3	7.1	50.0	59.8	-1.0
138		Sloan	SICL	OH	117	So	1	D	0.28	4.00	4	11.8	48.0	64.2	79.9
154		Wallkill	SIL	OH	089	Wa	1	D	0.37	4.50	1	24.0	-1.0	-1.0	-1.0
157		Westland	SICL	OH	049	Wt	1	D	0.28	4.00	1	9.0	42.9	70.1	-1.0
159		Westland	SICL	OH	089	Ws	1	D	0.24	4.00	4	15.0	42.1	55.1	59.8

TABLE 26:
Soil Groups-
SOIL_GRUP.dbf

HORIZ_DEP5	CLAY1	CLAY2	CLAY3	CLAY4	CLAY5	SILT1	SILT2	SILT3	SILT4	SILT5	SAND1	SAND2	SAND3	SAND4	SAND5
	0.13	0.13	0.13	-1.00		0.70	0.67	0.61	0.00		0.17	0.20	0.26	0.00	
	0.13	0.13	0.13	-1.00		0.70	0.67	0.61	0.00		0.17	0.20	0.26	0.00	
	0.23	0.43	0.36	0.34		0.59	0.41	0.56	0.58		0.18	0.16	0.08	0.08	
	0.23	0.43	0.36	0.34		0.59	0.41	0.56	0.58		0.18	0.16	0.08	0.08	
	0.20	0.26	0.19	-1.00		0.62	0.64	0.51	-1.00		0.18	0.10	0.30	-1.00	
	0.20	0.26	0.22	-1.00		0.62	0.64	0.46	-1.00		0.18	0.10	0.31	-1.00	
	0.30	0.42	0.24	-1.00		0.56	0.22	0.52	-1.00		0.13	0.36	0.24	-1.00	
	0.30	0.42	0.24	-1.00		0.56	0.22	0.52	-1.00		0.13	0.36	0.24	-1.00	
	0.21	0.42	0.24	-1.00		0.64	0.22	0.52	-1.00		0.15	0.36	0.24	-1.00	
	0.21	0.42	0.24	-1.00		0.64	0.22	0.52	-1.00		0.15	0.36	0.24	-1.00	
	0.17	0.28	0.28	0.04		0.58	0.53	0.34	0.12		0.24	0.18	0.38	0.85	
	0.17	0.28	0.28	0.04		0.58	0.53	0.34	0.12		0.24	0.18	0.38	0.85	
	0.13	0.13	0.24	-1.00		0.41	0.40	0.33	-1.00		0.45	0.46	0.43	-1.00	
	0.13	0.13	-1.00	-1.00		0.41	0.31	-1.00	-1.00		0.45	0.56	-1.00	-1.00	
	0.19	0.31	0.26	0.25		0.65	0.47	0.54	0.55		0.15	0.21	0.20	0.20	
	0.19	0.31	0.26	0.25		0.65	0.47	0.54	0.55		0.15	0.21	0.20	0.20	
	0.31	0.34	0.20	0.20		0.57	0.54	0.60	0.51		0.11	0.11	0.20	0.28	
	0.31	0.34	0.20	0.20		0.57	0.54	0.60	0.51		0.11	0.11	0.20	0.28	
	0.19	0.28	0.25	0.23		0.66	0.52	0.51	0.55		0.15	0.20	0.24	0.21	
	0.19	0.28	0.25	0.23		0.66	0.52	0.51	0.55		0.15	0.20	0.24	0.21	
	0.16	0.21	0.23	0.17		0.62	0.59	0.52	0.47		0.22	0.20	0.25	0.35	
	0.16	0.21	0.23	0.17		0.62	0.59	0.52	0.47		0.22	0.20	0.25	0.35	
	0.20	0.27	0.30	-1.00		0.60	0.30	0.24	-1.00		0.20	0.42	0.45	-1.00	
	0.20	0.24	0.05	-1.00		0.60	0.36	0.10	-1.00		0.20	0.39	0.85	-1.00	
	0.21	0.24	0.16	-1.00		0.65	0.50	0.32	-1.00		0.13	0.26	0.52	-1.00	
	0.21	0.29	0.20	-1.00		0.64	0.60	0.67	-1.00		0.15	0.10	0.13	-1.00	
	0.31	0.27	0.27	0.13		0.58	0.67	0.60	0.59		0.11	0.06	0.12	0.28	
	0.31	0.34	0.25	0.23		0.59	0.58	0.43	0.43		0.10	0.08	0.31	0.34	
	0.34	0.30	0.23	-1.00		0.56	0.58	0.57	-1.00		0.10	0.12	0.20	-1.00	
	0.34	0.43	0.35	-1.00		0.55	0.46	0.49	-1.00		0.11	0.10	0.15	-1.00	
	0.21	0.28	0.03	-1.00		0.66	0.59	0.37	-1.00		0.12	0.12	0.60	-1.00	
	0.21	0.27	0.25	-1.00		0.67	0.54	0.55	0.00		0.12	0.19	0.20	0.00	
	0.20	0.42	0.22	-1.00		0.64	0.52	0.63	-1.00		0.15	0.05	0.14	-1.00	
	0.20	0.42	0.22	-1.00		0.62	0.42	0.51	-1.00		0.17	0.15	0.27	-1.00	
	0.23	0.23	0.19	-1.00		0.57	0.57	0.47	-1.00		0.20	0.20	0.33	-1.00	
	0.23	0.26	0.19	-1.00		0.55	0.54	0.46	-1.00		0.22	0.20	0.35	-1.00	
	0.23	0.27	0.23	0.12		0.55	0.37	0.52	0.65		0.21	0.35	0.25	0.23	
	0.24	0.34	0.25	0.23		0.58	0.58	0.43	0.43		0.18	0.08	0.31	0.34	
	0.20	0.39	0.29	-1.00		0.67	0.50	0.56	-1.00		0.12	0.11	0.14	-1.00	
	0.19	0.26	0.14	-1.00		0.66	0.64	0.71	-1.00		0.15	0.10	0.15	-1.00	
	0.20	0.29	0.29	0.20		0.58	0.55	0.47	0.60		0.21	0.16	0.23	0.20	
	0.18	0.24	0.30	0.24		0.67	0.62	0.49	0.47		0.15	0.13	0.21	0.29	
	0.20	0.39	0.29	-1.00		0.64	0.55	0.56	-1.00		0.15	0.05	0.14	-1.00	
	0.14	0.19	0.13	-1.00		0.60	0.43	0.50	0.00		0.25	0.37	0.37	0.00	
	0.25	0.42	0.34	0.34		0.65	0.41	0.54	0.54		0.10	0.16	0.11	0.11	
	0.25	0.43	0.33	-1.00		0.65	0.50	0.51	-1.00		0.10	0.07	0.15	-1.00	
	0.16	0.24	0.19	0.10		0.58	0.45	0.54	0.33		0.26	0.30	0.27	0.57	
	0.21	0.35	-1.00	-1.00		0.60	0.58	0.00	-1.00		0.19	0.07	0.00	-1.00	
	0.16	0.23	0.21	0.20		0.67	0.55	0.58	0.59		0.17	0.21	0.21	0.21	
	0.20	0.39	0.29	-1.00		0.54	0.50	0.56	-1.00		0.26	0.11	0.14	-1.00	
	0.16	0.28	0.30	0.20		0.68	0.55	0.52	0.56		0.16	0.17	0.17	0.23	
	0.16	0.28	0.30	0.20		0.68	0.55	0.52	0.60		0.16	0.17	0.17	0.20	
	0.10	0.23	0.12	0.06		0.44	0.43	0.33	0.18		0.46	0.33	0.55	0.76	
	0.12	0.23	0.06	-1.00		0.62	0.43	0.18	-1.00		0.26	0.33	0.76	-1.00	
	0.12	0.23	0.06	-1.00		0.62	0.43	0.18	-1.00		0.26	0.33	0.76	-1.00	
	0.20	0.29	0.30	0.33		0.72	0.60	0.50	0.47		0.08	0.10	0.20	0.20	
	0.23	0.29	0.30	0.33		0.69	0.60	0.50	0.47		0.08	0.10	0.20	0.20	
	0.19	0.29	0.29	0.31		0.67	0.55	0.58	0.57		0.13	0.15	0.12	0.11	
	0.20	0.21	0.40	-1.00		0.61	0.49	0.25	0.00		0.19	0.30	0.36	0.00	

TABLE 26:
Soil Groups-
SOIL_GRUP.dbf

	0.23	0.40	0.30	-1.00		0.64	0.47	0.52	-1.00		0.13	0.13	0.17	-1.00	
	0.23	0.40	0.30	-1.00		0.64	0.46	0.53	-1.00		0.13	0.13	0.16	-1.00	
	0.19	0.24	0.33	0.33		0.58	0.59	0.55	0.52		0.22	0.16	0.12	0.15	
	0.19	0.24	0.30	-1.00		0.64	0.59	0.58	0.00		0.16	0.16	0.12	0.00	
	0.21	0.30	0.31	0.24		0.59	0.48	0.37	0.58		0.20	0.21	0.32	0.18	
	0.18	0.40	0.21	-1.00		0.62	0.35	0.45	-1.00		0.20	0.24	0.33	-1.00	
	0.20	0.40	0.05	-1.00		0.61	0.19	0.52	-1.00		0.18	0.41	0.42	-1.00	
	0.34	0.27	-1.00	-1.00		0.53	0.57	-1.00	-1.00		0.13	0.15	-1.00	-1.00	
	0.22	0.28	0.23	-1.00		0.68	0.62	0.61	-1.00		0.10	0.10	0.15	-1.00	
	0.14	0.27	0.01	-1.00		0.62	0.50	0.16	-1.00		0.24	0.23	0.85	-1.00	
	0.15	0.25	0.30	-1.00		0.65	0.60	0.51	0.00		0.20	0.14	0.18	0.00	
	0.18	0.23	0.21	-1.00		0.67	0.48	0.50	-1.00		0.14	0.28	0.29	-1.00	
	0.18	0.24	0.21	-1.00		0.70	0.39	0.50	-1.00		0.11	0.37	0.29	-1.00	
	0.21	0.23	0.06	0.31		0.64	0.60	0.37	0.53		0.15	0.17	0.57	0.16	
	0.23	0.23	0.15	-1.00		0.57	0.57	0.50	-1.00		0.20	0.20	0.35	-1.00	
	0.21	0.27	0.27	0.23		0.69	0.63	0.63	0.66		0.10	0.10	0.10	0.10	
	0.22	0.27	0.27	0.23		0.68	0.63	0.63	0.66		0.10	0.10	0.10	0.10	
	0.33	0.45	0.32	-1.00		0.51	0.21	0.55	-1.00		0.16	0.35	0.13	-1.00	
	0.33	0.45	0.34	0.34		0.51	0.41	0.58	0.58		0.15	0.13	0.08	0.08	
	0.22	0.45	0.32	-1.00		0.52	0.24	0.49	-1.00		0.25	0.31	0.19	-1.00	
	0.20	0.27	0.26	0.26		0.64	0.56	0.57	0.53		0.15	0.16	0.16	0.20	
	0.20	0.30	0.48	0.48		0.69	0.64	0.46	0.49		0.11	0.05	0.06	0.02	
	0.13	0.13	0.10	-1.00		0.51	0.43	0.50	0.00		0.35	0.44	0.40	0.00	
	0.25	0.24	0.24	-1.00		0.59	0.48	0.52	-1.00		0.16	0.27	0.23	-1.00	
	0.20	0.40	-1.00	-1.00		0.61	0.49	0.00	-1.00		0.19	0.10	0.00	-1.00	
	0.22	0.30	0.24	-1.00		0.67	0.53	0.58	-1.00		0.10	0.17	0.17	-1.00	
	0.21	0.24	0.16	-1.00		0.65	0.50	0.32	-1.00		0.13	0.26	0.52	-1.00	
	0.19	0.28	0.28	0.23		0.74	0.45	0.53	0.57		0.07	0.26	0.19	0.20	
	0.20	0.39	0.45	-1.00		0.62	0.50	0.49	0.00		0.17	0.10	0.06	0.00	
	0.17	0.25	0.19	-1.00		0.51	0.43	0.36	-1.00		0.31	0.32	0.45	-1.00	
	0.19	0.26	0.38	0.36		0.65	0.63	0.54	0.51		0.15	0.10	0.08	0.13	
	0.16	0.31	0.21	-1.00		0.70	0.48	0.51	-1.00		0.13	0.21	0.28	-1.00	
	0.20	0.25	0.35	0.31		0.60	0.65	0.54	0.58		0.20	0.10	0.10	0.10	
	0.31	0.38	0.25	-1.00		0.53	0.51	0.45	-1.00		0.16	0.10	0.30	-1.00	
	0.13	0.12	0.12	-1.00		0.23	0.30	0.29	-1.00		0.65	0.60	0.60	-1.00	
	0.24	0.45	-1.00	-1.00		0.63	0.48	0.00	-1.00		0.13	0.06	0.00	-1.00	
	0.21	0.23	0.13	-1.00		0.46	0.43	0.22	-1.00		0.33	0.34	0.65	-1.00	
	0.22	0.40	0.23	-1.00		0.65	0.44	0.49	-1.00		0.12	0.16	0.28	-1.00	
	0.21	0.24	0.20	-1.00		0.61	0.50	0.58	-1.00		0.17	0.25	0.21	-1.00	
	0.18	0.27	0.20	-1.00		0.63	0.49	0.56	0.00		0.18	0.24	0.23	0.00	
	0.18	0.27	-1.00	-1.00		0.59	0.54	0.00	-1.00		0.23	0.19	0.00	-1.00	
	0.34	0.30	0.23	-1.00		0.56	0.58	0.57	-1.00		0.10	0.12	0.20	-1.00	
	0.31	0.43	0.36	0.34		0.58	0.41	0.56	0.58		0.10	0.16	0.08	0.08	
	0.14	0.27	0.23	-1.00		0.61	0.30	0.29	-1.00		0.24	0.43	0.48	-1.00	
	0.16	0.23	0.13	0.21		0.61	0.54	0.39	0.51		0.23	0.23	0.48	0.27	
	0.21	0.28	0.25	0.15		0.60	0.56	0.60	0.48		0.19	0.15	0.15	0.36	
	0.23	0.25	0.18	-1.00		0.52	0.66	0.38	-1.00		0.25	0.09	0.43	-1.00	
	0.15	0.24	0.21	-1.00		0.78	0.69	0.66	-1.00		0.07	0.07	0.13	-1.00	
	0.14	0.25	0.25	-1.00		0.75	0.64	0.50	-1.00		0.10	0.10	0.24	-1.00	
	0.38	0.39	0.25	-1.00		0.49	0.51	0.49	-1.00		0.13	0.10	0.25	-1.00	
	0.30	0.27	0.23	0.12		0.62	0.37	0.52	0.65		0.07	0.35	0.25	0.23	
	0.31	0.27	0.27	0.13		0.58	0.67	0.60	0.59		0.11	0.06	0.12	0.28	
	0.23	0.27	0.23	0.12		0.55	0.37	0.52	0.65		0.21	0.35	0.25	0.23	
	0.21	0.43	0.35	-1.00		0.66	0.49	0.22	0.00		0.12	0.07	0.43	0.00	
	0.21	0.30	0.27	-1.00		0.57	0.52	0.40	0.00		0.22	0.18	0.33	0.00	
	0.34	0.42	0.44	-1.00		0.59	0.53	0.46	-1.00		0.07	0.05	0.10	-1.00	
	0.25	0.43	0.39	0.34		0.62	0.23	0.25	0.55		0.13	0.34	0.36	0.10	
	0.17	0.28	0.28	0.04		0.60	0.52	0.47	0.12		0.23	0.20	0.25	0.85	
	0.20	0.24	0.18	-1.00		0.54	0.53	0.36	-1.00		0.26	0.22	0.45	-1.00	
	0.21	0.28	0.21	-1.00		0.73	0.45	0.72	-1.00		0.05	0.27	0.06	-1.00	

TABLE 26:
Soil Groups-
SOIL_GRUP.dbf

	0.23	0.29	0.24	-1.00		0.62	0.63	0.27	-1.00		0.15	0.08	0.48	-1.00	
	0.34	0.43	0.35	-1.00		0.55	0.46	0.49	-1.00		0.11	0.10	0.15	-1.00	
	0.34	0.43	0.25	-1.00		0.50	0.23	0.59	-1.00		0.15	0.34	0.16	-1.00	
	0.22	0.48	-1.00	-1.00		0.70	0.46	0.00	-1.00		0.08	0.05	0.00	-1.00	
	0.13	0.13	0.24	-1.00		0.41	0.40	0.33	-1.00		0.45	0.46	0.43	-1.00	
	0.23	0.31	-1.00	-1.00		0.62	0.49	0.00	-1.00		0.15	0.20	0.00	-1.00	
	0.21	0.25	0.15	-1.00		0.63	0.56	0.49	-1.00		0.15	0.19	0.35	-1.00	
	0.20	0.21	0.19	-1.00		0.59	0.49	0.39	-1.00		0.21	0.30	0.42	-1.00	
	0.15	0.26	0.28	0.15		0.65	0.59	0.30	0.52		0.20	0.15	0.41	0.33	
	0.02	0.02	0.02	-1.00		0.21	0.21	0.22	0.00		0.78	0.77	0.78	0.00	
	0.02	0.02	0.02	-1.00		0.21	0.21	0.17	0.00		0.77	0.77	0.82	0.00	
	0.30	0.40	0.25	0.13		0.64	0.51	0.25	0.27		0.05	0.09	0.50	0.60	
	0.21	0.40	0.25	0.13		0.71	0.25	0.25	0.27		0.07	0.35	0.50	0.60	
	0.23	0.29	0.23	0.23		0.67	0.63	0.45	0.45		0.10	0.08	0.32	0.32	
	0.23	0.23	0.19	-1.00		0.57	0.59	0.44	-1.00		0.20	0.18	0.37	-1.00	
	0.17	0.28	0.28	0.04		0.55	0.50	0.54	0.11		0.28	0.22	0.17	0.85	
	0.17	0.28	0.28	0.04		0.55	0.50	0.54	0.11		0.28	0.22	0.17	0.85	
	0.30	0.28	0.20	0.05		0.53	0.49	0.48	0.08		0.16	0.22	0.31	0.88	
	0.31	0.34	0.25	0.23		0.59	0.58	0.43	0.43		0.10	0.08	0.31	0.34	
	0.21	0.29	0.20	-1.00		0.64	0.60	0.67	-1.00		0.15	0.10	0.13	-1.00	
	0.24	0.34	0.25	0.23		0.58	0.58	0.43	0.43		0.18	0.08	0.31	0.34	
	0.20	0.40	0.45	-1.00		0.67	0.45	0.39	0.00		0.13	0.14	0.16	0.00	
	0.16	0.12	-1.00	-1.00		0.61	0.14	-1.00	-1.00		0.22	0.75	-1.00	-1.00	
	0.20	0.25	0.30	0.21		0.64	0.57	0.50	0.48		0.15	0.17	0.20	0.30	
	0.12	0.12	0.09	-1.00		0.52	0.55	0.57	-1.00		0.35	0.33	0.33	-1.00	
	0.12	0.12	0.09	-1.00		0.52	0.55	0.57	-1.00		0.35	0.33	0.33	-1.00	
	0.20	0.30	0.27	0.24		0.67	0.52	0.53	0.56		0.12	0.17	0.20	0.20	
	0.19	-1.00	0.45	-1.00		0.71	0.00	0.23	-1.00		0.10	0.00	0.32	-1.00	
	0.17	0.26	0.03	-1.00		0.63	0.58	0.10	-1.00		0.20	0.16	0.87	-1.00	
	0.28	0.28	0.18	0.06		0.45	0.37	0.48	0.04		0.27	0.35	0.33	0.90	
	0.23	0.28	0.27	-1.00		0.64	0.59	0.56	0.00		0.13	0.13	0.17	0.00	
	0.21	0.28	0.03	-1.00		0.66	0.59	0.37	-1.00		0.12	0.12	0.60	-1.00	
	0.20	0.25	0.35	0.31		0.60	0.65	0.54	0.58		0.20	0.10	0.10	0.10	
	0.31	0.38	0.25	-1.00		0.53	0.51	0.45	-1.00		0.16	0.10	0.30	-1.00	
	0.38	0.39	0.25	-1.00		0.49	0.51	0.49	-1.00		0.13	0.10	0.25	-1.00	
	0.30	0.27	0.23	0.12		0.62	0.37	0.52	0.65		0.07	0.35	0.25	0.23	
	0.34	0.43	0.25	-1.00		0.50	0.23	0.59	-1.00		0.15	0.34	0.16	-1.00	
	0.23	0.29	0.23	0.23		0.67	0.63	0.45	0.45		0.10	0.08	0.32	0.32	
	0.30	0.28	0.20	0.05		0.53	0.49	0.48	0.08		0.16	0.22	0.31	0.88	
	0.19	-1.00	0.45	-1.00		0.71	0.00	0.23	-1.00		0.10	0.00	0.32	-1.00	
	0.28	-1.00	0.06	-1.00		0.57	0.74	0.09	-1.00		0.15	0.26	0.85	-1.00	
	0.28	0.28	0.18	0.06		0.45	0.37	0.48	0.04		0.27	0.35	0.33	0.90	

TABLE 27:
Soil Water Retention Values-
WRET_VAL.dbf

SGROUP_ID	OM1	OMCOMPUTED	OM_ALGFLAG	OM2	OM3	OM4	OM5	OM_RATIO	DESCRIPTIO	NUM_LAYERS	FC1	FC2	FC3	FC4	FC5
0	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Brownsville CN-SIL SSA_ID:083 MUSYM:BrC SEQNO:1	3	0.219	0.227	0.227	-1.000	
1	0.000	0	0.00	0.000	0.000	-1.000		0.00	CO TERRY FSL SSA_ID:087 MUSYM:TaE SEQNO:2	3	0.219	0.227	0.227	-1.000	
11	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Lybrand SIL SSA_ID:041 MUSYM:LyD2 SEQNO:1	4	0.285	0.321	0.291	0.264	
79	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Lybrand SIL SSA_ID:041 MUSYM:MpD2 SEQNO:1	4	0.285	0.321	0.291	0.264	
85	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Mentor SIL SSA_ID:041 MUSYM:McD2 SEQNO:1	3	0.268	0.297	0.194	-1.000	
12	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Mentor SIL SSA_ID:089 MUSYM:MnA SEQNO:1	3	0.268	0.297	0.270	-1.000	
88	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Miamian CL SSA_ID:049 MUSYM:MmC3 SEQNO:1	3	0.313	0.361	0.303	-1.000	
13	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Miamian SICL SSA_ID:049 MUSYM:MIB2 SEQNO:1	3	0.313	0.361	0.303	-1.000	
89	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Miamian L SSA_ID:049 MUSYM:HeE2 SEQNO:2	3	0.268	0.361	0.303	-1.000	
91	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Miamian SIL SSA_ID:049 MUSYM:MkB SEQNO:1	3	0.268	0.361	0.303	-1.000	
106	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Ockley SIL SSA_ID:089 MUSYM:OcA SEQNO:1	4	0.252	0.311	0.307	0.122	
107	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Ockley SIL SSA_ID:117 MUSYM:OcB SEQNO:1	4	0.252	0.311	0.307	0.122	
116	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Rigley FSL SSA_ID:089 MUSYM:RgC SEQNO:1	3	0.158	0.166	0.223	-1.000	
118	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Rigley SL SSA_ID:083 MUSYM:RgB SEQNO:1	2	0.158	0.166	-1.000	-1.000	
120	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Rittman SIL SSA_ID:083 MUSYM:RmB SEQNO:1	4	0.258	0.327	0.312	0.311	
121	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Rittman SIL SSA_ID:083 MUSYM:RmC2 SEQNO:1	4	0.258	0.327	0.312	0.311	
144	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Stone CL SSA_ID:041 MUSYM:SuA SEQNO:1	4	0.305	0.325	0.270	0.274	
145	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Stone SICL SSA_ID:041 MUSYM:StA SEQNO:1	4	0.305	0.325	0.270	0.274	
150	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Titusville SIL SSA_ID:083 MUSYM:TvB SEQNO:1	4	0.258	0.313	0.242	0.301	
151	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Titusville SIL SSA_ID:089 MUSYM:TsB SEQNO:1	4	0.258	0.313	0.242	0.301	
162	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Wooster SIL SSA_ID:117 MUSYM:WsB SEQNO:1	4	0.242	0.275	0.299	0.261	
161	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Wooster SIL SSA_ID:083 MUSYM:WsB SEQNO:1	4	0.242	0.275	0.299	0.261	
104	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Negley L SSA_ID:089 MUSYM:NeC2 SEQNO:1	3	0.268	0.302	0.310	-1.000	
155	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Warsaw SIL SSA_ID:049 MUSYM:WdA SEQNO:1	3	0.268	0.287	0.136	-1.000	
57	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Holly SIL SSA_ID:083 MUSYM:Ho SEQNO:1	3	0.261	0.278	0.174	-1.000	
141	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Sloan SIL SSA_ID:041 MUSYM:RsA SEQNO:2	3	0.261	0.302	0.265	-1.000	
96	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Millgrove SICL SSA_ID:041 MUSYM:MhA SEQNO:1	4	0.313	0.309	0.300	0.225	
135	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Sloan SICL SSA_ID:041 MUSYM:SoA SEQNO:1	4	0.313	0.328	0.292	0.283	
75	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Luray SICL SSA_ID:083 MUSYM:Ly SEQNO:1	3	0.325	0.323	0.228	-1.000	
113	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Pewamo SICL SSA_ID:083 MUSYM:Pc SEQNO:1	3	0.328	0.364	0.341	-1.000	
4	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Algiers SIL SSA_ID:049 MUSYM:Ag SEQNO:1	2	0.263	0.306	-1.000	-1.000	
45	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Gilpin SIL SSA_ID:083 MUSYM:GhB SEQNO:1	3	0.261	0.294	0.287	-1.000	
9	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Bennington SIL SSA_ID:049 MUSYM:Uu SEQNO:2	3	0.268	0.356	0.293	-1.000	
19	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Celina SIL SSA_ID:049 MUSYM:CeA SEQNO:1	3	0.268	0.356	0.293	-1.000	
35	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Eel SIL SSA_ID:049 MUSYM:Ee SEQNO:1	3	0.282	0.282	0.197	-1.000	
132	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Shoals SIL SSA_ID:049 MUSYM:Sh SEQNO:1	3	0.282	0.294	0.202	-1.000	
98	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Millgrove SIL SSA_ID:041 MUSYM:MfA SEQNO:1	4	0.282	0.309	0.283	0.218	
139	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Sloan SIL SSA_ID:041 MUSYM:LsA SEQNO:2	4	0.282	0.328	0.292	0.283	
2	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Alexandria SIL SSA_ID:049 MUSYM:AdB SEQNO:1	3	0.268	0.351	0.254	-1.000	
3	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Alford SIL SSA_ID:089 MUSYM:AfA SEQNO:1	3	0.253	0.292	0.235	-1.000	
6	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Amanda SIL SSA_ID:083 MUSYM:AdD2 SEQNO:1	4	0.265	0.313	0.315	0.286	
7	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Amanda variant SIL SSA_ID:089 MUSYM:AvC2 SEQNO:1	4	0.253	0.283	0.323	0.302	
8	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Bennington SIL SSA_ID:049 MUSYM:BeA SEQNO:1	3	0.268	0.349	0.256	-1.000	
10	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Berks CN-SIL SSA_ID:089 MUSYM:BgB SEQNO:1	3	0.234	0.258	0.224	-1.000	
11	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Lybrand SIL SSA_ID:041 MUSYM:LyD2 SEQNO:1	4	0.290	0.358	0.339	0.264	
12	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Mentor SIL SSA_ID:089 MUSYM:MnA SEQNO:1	3	0.294	0.331	0.277	-1.000	
13	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Miamian SICL SSA_ID:049 MUSYM:MIB2 SEQNO:1	3	0.242	0.283	0.197	-1.000	
14	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Brecksville SIL SSA_ID:041 MUSYM:LbF SEQNO:2	2	0.268	0.332	-1.000	-1.000	

TABLE 27:
Soil Water Retention Values-
WRET_VAL.dbf

17	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Canfield SIL SSA_ID:083 MUSYM:CaB SEQNO:1	4	0.242	0.294	0.290	0.287	
18	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Cardington SIL SSA_ID:049 MUSYM:CaB SEQNO:1	3	0.268	0.351	0.255	-1.000	
21	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Centerburg SIL SSA_ID:083 MUSYM:CdB SEQNO:1	4	0.239	0.313	0.323	0.287	
20	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Centerburg SIL SSA_ID:041 MUSYM:CeB SEQNO:1	4	0.239	0.313	0.323	0.284	
22	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Chili GR-L SSA_ID:083 MUSYM:ChB SEQNO:1	4	0.211	0.283	0.158	0.132	
23	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Chili L SSA_ID:089 MUSYM:ChA SEQNO:1	3	0.217	0.221	0.169	-1.000	
24	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Chili SIL SSA_ID:083 MUSYM:CmA SEQNO:1	3	0.217	0.283	0.133	-1.000	
25	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Cincinnati SIL SSA_ID:089 MUSYM:CkB SEQNO:1	4	0.268	0.313	0.265	0.339	
26	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Cincinnati SIL SSA_ID:089 MUSYM:CkC2 SEQNO:1	4	0.282	0.313	0.265	0.339	
27	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Clarksburg SIL SSA_ID:089 MUSYM:CmC2 SEQNO:1	4	0.252	0.302	0.313	0.313	
28	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Colyer Variant SIL SSA_ID:117 MUSYM:CkF SEQNO:1	3	0.265	0.272	0.353	-1.000	
29	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Condit SIL SSA_ID:049 MUSYM:Cn SEQNO:1	3	0.282	0.313	0.264	-1.000	
30	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Condit SIL SSA_ID:083 MUSYM:Cr SEQNO:1	3	0.282	0.313	0.264	-1.000	
31	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Coshocton CN-SIL SSA_ID:083 MUSYM:RhE SEQNO:2	4	0.258	0.285	0.330	0.334	
32	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Coshocton SIL SSA_ID:083 MUSYM:CvB SEQNO:1	3	0.258	0.285	0.319	-1.000	
33	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Crane SIL SSA_ID:049 MUSYM:CpA SEQNO:1	4	0.265	0.319	0.322	0.294	
34	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Crosby SIL SSA_ID:049 MUSYM:CrA SEQNO:1	3	0.258	0.355	0.209	-1.000	
36	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Eldean SIL SSA_ID:049 MUSYM:ElA SEQNO:1	3	0.268	0.351	0.138	-1.000	
37	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Fairpoint SICL SSA_ID:089 MUSYM:FaD SEQNO:1	2	0.333	0.319	-1.000	-1.000	
38	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Fitchville SIL SSA_ID:083 MUSYM:FcA SEQNO:1	3	0.272	0.315	0.290	-1.000	
39	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Fox GR-L SSA_ID:083 MUSYM:FoA SEQNO:1	2	0.240	0.313	-1.000	-1.000	
40	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Frankstown variant SIL SSA_ID:089 MUSYM:FrB SEQNO:1	3	0.241	0.289	0.308	-1.000	
41	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Gallman L SSA_ID:041 MUSYM:GaC2 SEQNO:1	3	0.257	0.292	0.206	-1.000	
43	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Gallman SIL SSA_ID:117 MUSYM:GaB SEQNO:1	3	0.258	0.292	0.268	-1.000	
42	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Gallman SIL SSA_ID:041 MUSYM:GcB SEQNO:1	4	0.268	0.292	0.114	0.330	
44	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Genesee SIL SSA_ID:049 MUSYM:Gn SEQNO:1	3	0.282	0.282	0.181	-1.000	
47	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Glenford SIL SSA_ID:089 MUSYM:GfA SEQNO:1	4	0.267	0.309	0.309	0.289	
46	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Glenford SIL SSA_ID:083 MUSYM:GnA SEQNO:1	4	0.272	0.310	0.310	0.227	
48	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Glynwood CL SSA_ID:117 MUSYM:GnB2 SEQNO:1	3	0.324	0.339	0.267	-1.000	
49	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Glynwood SICL SSA_ID:041 MUSYM:GzC3 SEQNO:1	4	0.324	0.337	0.283	0.264	
50	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Glynwood SIL SSA_ID:049 MUSYM:GwB SEQNO:1	3	0.272	0.337	0.267	-1.000	
51	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Gresham SIL SSA_ID:083 MUSYM:GrB SEQNO:1	4	0.268	0.309	0.241	0.311	
52	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Guernsey SIL SSA_ID:089 MUSYM:GnB SEQNO:1	4	0.268	0.313	0.372	0.339	
53	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Hazleton CN-SL SSA_ID:089 MUSYM:HeF SEQNO:1	3	0.158	0.158	0.146	-1.000	
54	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Hennepin L SSA_ID:049 MUSYM:HeE2 SEQNO:1	3	0.283	0.285	0.229	-1.000	
55	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Heverlo SIL SSA_ID:041 MUSYM:HeF SEQNO:1	2	0.265	0.353	-1.000	-1.000	
56	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Hickory SIL SSA_ID:089 MUSYM:HkC2 SEQNO:1	3	0.273	0.321	0.296	-1.000	
58	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Holly SIL SSA_ID:083 MUSYM:Ho SEQNO:1	3	0.261	0.278	0.174	-1.000	
59	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Homewood SIL SSA_ID:083 MUSYM:CnC SEQNO:2	4	0.258	0.313	0.254	0.302	
60	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Hyatts SIL SSA_ID:041 MUSYM:HyA SEQNO:1	3	0.268	0.315	0.328	-1.000	
61	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Jimtown SIL SSA_ID:041 MUSYM:JmA SEQNO:1	3	0.253	0.230	0.200	-1.000	
62	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Keene SIL SSA_ID:089 MUSYM:KeB SEQNO:1	4	0.257	0.292	0.342	0.338	
63	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Kendallville SIL SSA_ID:049 MUSYM:KeA SEQNO:1	3	0.242	0.322	0.281	-1.000	
64	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Killbuck SIL SSA_ID:089 MUSYM:Kk SEQNO:1	4	0.263	0.290	0.328	0.319	
66	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Kokomo SICL SSA_ID:049 MUSYM:Ko SEQNO:1	3	0.315	0.342	0.306	-1.000	
68	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Landes FSL SSA_ID:083 MUSYM:La SEQNO:1	2	0.169	0.172	-1.000	-1.000	
69	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Latham SIL SSA_ID:041 MUSYM:LbF SEQNO:1	2	0.282	0.359	-1.000	-1.000	
70	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Leoni GR-L SSA_ID:041 MUSYM:LeE SEQNO:1	3	0.275	0.289	0.214	-1.000	
71	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Lewisburg SIL SSA_ID:049 MUSYM:LeB SEQNO:2	3	0.274	0.355	0.223	-1.000	

TABLE 27:
Soil Water Retention Values-
WRET_VAL.dbf

72	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Lobdell SIL SSA_ID:041 MUSYM:LoA SEQNO:1	3	0.261	0.283	0.268	-1.000	
74	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Loudonville SIL SSA_ID:083 MUSYM:LvB SEQNO:1	3	0.258	0.304	0.268	-1.000	
73	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Loudonville SIL SSA_ID:041 MUSYM:LvB SEQNO:1	2	0.258	0.304	-1.000	-1.000	
76	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Luray SICL SSA_ID:083 MUSYM:Ly SEQNO:1	3	0.325	0.323	0.228	-1.000	
77	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Lybrand SICL SSA_ID:041 MUSYM:LzD3 SEQNO:1	4	0.315	0.321	0.291	0.264	
80	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Martinsville L SSA_ID:041 MUSYM:MaB SEQNO:1	3	0.240	0.306	0.290	-1.000	
81	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Martinsville L SSA_ID:041 MUSYM:MbB SEQNO:1	4	0.239	0.290	0.174	0.286	
82	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Mechanicsburg SIL SSA_ID:089 MUSYM:McB SEQNO:1	4	0.268	0.310	0.290	0.242	
83	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Medway SIL SSA_ID:049 MUSYM:Mh SEQNO:1	3	0.276	0.287	0.197	-1.000	
84	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Melvin SIL SSA_ID:089 MUSYM:Me SEQNO:1	3	0.242	0.285	0.278	-1.000	
87	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Mertz STV-SIL SSA_ID:089 MUSYM:FrB SEQNO:2	3	0.230	0.297	0.297	-1.000	
92	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Milford SICL SSA_ID:117 MUSYM:Mf SEQNO:1	3	0.333	0.345	0.243	-1.000	
94	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Millgrove SICL SSA_ID:041 MUSYM:MgA SEQNO:1	4	0.313	0.309	0.283	0.218	
97	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Millgrove SICL SSA_ID:041 MUSYM:MhA SEQNO:1	4	0.313	0.309	0.300	0.225	
99	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Millgrove SIL SSA_ID:041 MUSYM:MfA SEQNO:1	4	0.282	0.309	0.283	0.218	
100	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Milton SIL SSA_ID:049 MUSYM:MoB SEQNO:1	3	0.268	0.364	0.301	-1.000	
101	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Mitiwanga SIL SSA_ID:049 MUSYM:MrB SEQNO:1	3	0.267	0.313	0.298	-1.000	
102	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Montgomery SICL SSA_ID:049 MUSYM:Ms SEQNO:1	3	0.328	0.325	0.364	-1.000	
103	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Morley SIL SSA_ID:117 MUSYM:MoC SEQNO:1	4	0.294	0.323	0.298	0.283	
105	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Ockley SIL SSA_ID:049 MUSYM:OcA SEQNO:1	4	0.250	0.311	0.246	0.122	
108	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Orrville SIL SSA_ID:083 MUSYM:Or SEQNO:1	3	0.265	0.282	0.238	-1.000	
109	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Pacer SIL SSA_ID:041 MUSYM:PaA SEQNO:1	3	0.268	0.311	0.211	-1.000	
110	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Parke SIL SSA_ID:089 MUSYM:PaC2 SEQNO:1	3	0.276	0.301	0.296	-1.000	
114	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Pewamo SICL SSA_ID:083 MUSYM:Pc SEQNO:1	3	0.328	0.364	0.341	-1.000	
111	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Pewamo SICL SSA_ID:049 MUSYM:Pm SEQNO:1	3	0.328	0.331	0.304	-1.000	
115	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Rarden SIL SSA_ID:041 MUSYM:RdB2 SEQNO:1	2	0.273	0.348	-1.000	-1.000	
117	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Rigley L SSA_ID:083 MUSYM:RhE SEQNO:1	3	0.218	0.227	0.285	-1.000	
119	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Ritchey SIL SSA_ID:049 MUSYM:RhB SEQNO:1	2	0.275	0.319	-1.000	-1.000	
122	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Ross SIL SSA_ID:049 MUSYM:Rs SEQNO:1	3	0.263	0.287	0.247	-1.000	
123	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Rossburg SIL SSA_ID:041 MUSYM:RoA SEQNO:1	3	0.265	0.270	0.262	-1.000	
124	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Rush SIL SSA_ID:089 MUSYM:RsA SEQNO:1	4	0.237	0.292	0.307	0.185	
125	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Schaffenaker BYV-LS SSA_ID:083 MUSYM:SdF SEQNO:1	3	0.104	0.109	0.109	-1.000	
126	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Schaffenaker LS SSA_ID:083 MUSYM:ScD SEQNO:1	3	0.104	0.107	0.088	-1.000	
127	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Scioto SICL SSA_ID:041 MUSYM:SdC2 SEQNO:1	4	0.313	0.355	0.304	0.235	
128	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Scioto SIL SSA_ID:041 MUSYM:ScA SEQNO:1	4	0.268	0.322	0.304	0.174	
129	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Sebring SIL SSA_ID:083 MUSYM:Se SEQNO:1	3	0.280	0.315	0.228	-1.000	
131	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Shoals SIL SSA_ID:041 MUSYM:SgA SEQNO:1	3	0.285	0.292	0.265	-1.000	
134	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Sleeth SIL SSA_ID:089 MUSYM:SkA SEQNO:1	4	0.252	0.311	0.248	0.122	
133	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Sleeth SIL SSA_ID:049 MUSYM:SlA SEQNO:1	4	0.252	0.311	0.248	0.122	
137	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Sloan SICL SSA_ID:117 MUSYM:So SEQNO:1	4	0.308	0.302	0.206	0.168	
136	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Sloan SICL SSA_ID:041 MUSYM:SoA SEQNO:1	4	0.313	0.328	0.292	0.283	
142	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Sloan SIL SSA_ID:041 MUSYM:RsA SEQNO:2	3	0.261	0.302	0.265	-1.000	
140	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Sloan SIL SSA_ID:041 MUSYM:LsA SEQNO:2	4	0.282	0.328	0.292	0.283	
143	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Smothers SIL SSA_ID:041 MUSYM:SsA SEQNO:1	3	0.268	0.322	0.334	-1.000	
146	0.000	0	0.00	-1.000	-1.000	-1.000		0.00	OH Stonelick L SSA_ID:089 MUSYM:St SEQNO:1	1	0.237	-1.000	-1.000	-1.000	
147	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Thackery SIL SSA_ID:049 MUSYM:ThA SEQNO:1	4	0.268	0.292	0.316	0.206	
148	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Tioga FSL SSA_ID:083 MUSYM:Tg SEQNO:1	3	0.151	0.212	0.200	-1.000	
149	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Tioga L SSA_ID:117 MUSYM:Tg SEQNO:1	3	0.210	0.152	0.200	-1.000	
152	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Wadsworth SIL SSA_ID:083 MUSYM:WaB SEQNO:1	2	0.268	0.323	0.251	0.301	

TABLE 27:
Soil Water Retention Values-
WRET_VAL.dbf

153	0.000	0	0.00	-1.000	-1.000	-1.000		0.00	OH Wallkill SIL SSA_ID:089 MUSYM:Wa SEQNO:1	1	0.257	-1.000	-1.000	-1.000	
156	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Wea SIL SSA_ID:049 MUSYM:WeA SEQNO:1	3	0.252	0.297	0.110	-1.000	
158	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Westland SICL SSA_ID:089 MUSYM:Ws SEQNO:1	4	0.310	0.311	0.210	0.182	
160	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Westmoreland SIL SSA_ID:083 MUSYM:BsE SEQNO:2	3	0.275	0.298	0.294	-1.000	
5	0.000	0	0.00	0.000	-1.000	-1.000		0.00	OH Algiers SIL SSA_ID:049 MUSYM:Ag SEQNO:1	2	0.263	0.306	-1.000	-1.000	
65	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Killbuck SIL SSA_ID:089 MUSYM:Kk SEQNO:1	4	0.263	0.290	0.328	0.319	
67	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Kokomo SICL SSA_ID:049 MUSYM:Ko SEQNO:1	3	0.315	0.342	0.306	-1.000	
93	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Milford SICL SSA_ID:117 MUSYM:Mf SEQNO:1	3	0.333	0.345	0.243	-1.000	
95	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Millgrove SICL SSA_ID:041 MUSYM:MgA SEQNO:1	4	0.313	0.309	0.283	0.218	
112	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Pewamo SICL SSA_ID:049 MUSYM:Pm SEQNO:1	3	0.328	0.331	0.304	-1.000	
130	0.000	0	0.00	0.000	0.000	-1.000		0.00	OH Sebring SIL SSA_ID:083 MUSYM:Se SEQNO:1	3	0.280	0.315	0.228	-1.000	
138	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Sloan SICL SSA_ID:117 MUSYM:So SEQNO:1	4	0.308	0.302	0.206	0.168	
154	0.000	0	0.00	-1.000	-1.000	-1.000		0.00	OH Wallkill SIL SSA_ID:089 MUSYM:Wa SEQNO:1	1	0.257	-1.000	-1.000	-1.000	
157	0.000	0	0.00	-1.000	0.000	-1.000		0.00	OH Westland SICL SSA_ID:049 MUSYM:Wt SEQNO:1	1	0.310	-1.000	0.142	-1.000	
159	0.000	0	0.00	0.000	0.000	0.000		0.00	OH Westland SICL SSA_ID:089 MUSYM:Ws SEQNO:1	4	0.310	0.311	0.210	0.182	

TABLE 27:
Soil Water Retention Values- WRET_VAL.dbf

POR1	POR2	POR3	POR4	POR5	WP1	WP2	WP3	WP4	WP5	SAT_COND1	SAT_COND2	SAT_COND3	SAT_COND4	SAT_COND5	RCN_FALLOW
0.477	0.430	0.430	-1.000		0.063	0.070	0.070	-1.000		1.900	1.900	3.460	-1.000		88.2
0.477	0.430	0.430	-1.000		0.063	0.070	0.070	-1.000		1.900	1.900	3.460	-1.000		88.2
0.430	0.358	0.340	0.269		0.133	0.284	0.245	0.258		1.090	0.100	0.100	1.370		92.8
0.430	0.358	0.340	0.269		0.133	0.284	0.245	0.258		1.090	0.100	0.100	1.370		92.8
0.448	0.412	0.466	-1.000		0.112	0.150	0.097	-1.000		1.090	1.090	1.090	-1.000		87.4
0.448	0.412	0.466	-1.000		0.112	0.150	0.113	-1.000		1.090	1.090	1.090	-1.000		87.4
0.430	0.384	0.333	-1.000		0.174	0.259	0.158	-1.000		0.330	0.330	0.330	-1.000		93.2
0.430	0.384	0.333	-1.000		0.174	0.259	0.158	-1.000		0.330	0.330	0.330	-1.000		93.2
0.448	0.384	0.333	-1.000		0.112	0.259	0.158	-1.000		1.090	0.330	0.330	-1.000		91.6
0.448	0.384	0.333	-1.000		0.112	0.259	0.158	-1.000		1.090	0.330	0.330	-1.000		91.6
0.455	0.405	0.423	0.340		0.094	0.170	0.165	0.020		1.090	1.090	1.090	20.000		87.3
0.455	0.405	0.423	0.340		0.094	0.170	0.165	0.020		1.090	1.090	1.090	44.700		87.3
0.484	0.430	0.430	-1.000		0.062	0.070	0.133	-1.000		3.460	3.460	3.460	-1.000		80.6
0.484	0.430	-1.000	-1.000		0.062	0.070	-1.000	-1.000		3.460	3.460	-1.000	-1.000		80.6
0.448	0.384	0.333	0.340		0.101	0.196	0.172	0.170		1.090	1.090	0.100	0.170		91.0
0.448	0.384	0.333	0.340		0.101	0.196	0.172	0.170		1.090	1.090	0.100	0.170		91.0
0.484	0.441	0.441	0.419		0.161	0.193	0.114	0.118		0.330	0.330	1.090	1.900		90.2
0.484	0.441	0.441	0.419		0.161	0.193	0.114	0.118		0.330	0.330	1.090	1.900		90.2
0.448	0.394	0.326	0.348		0.101	0.174	0.174	0.154		1.090	0.330	0.100	0.330		90.9
0.448	0.394	0.326	0.348		0.101	0.174	0.174	0.154		1.090	0.330	0.100	0.330		90.9
0.448	0.412	0.358	0.405		0.084	0.120	0.152	0.103		1.090	1.090	0.330	0.610		90.2
0.448	0.412	0.358	0.405		0.084	0.120	0.152	0.103		1.090	1.090	0.330	0.610		90.2
0.448	0.430	0.448	-1.000		0.112	0.157	0.168	-1.000		3.460	1.900	1.900	-1.000		87.1
0.448	0.419	0.405	-1.000		0.112	0.136	0.030	-1.000		1.090	1.090	44.700	-1.000		87.1
0.484	0.466	0.484	-1.000		0.104	0.124	0.078	-1.000		1.090	0.610	1.900	-1.000		92.6
0.484	0.448	0.466	-1.000		0.104	0.157	0.108	-1.000		1.090	0.610	0.610	-1.000		92.6
0.448	0.394	0.441	0.441		0.174	0.167	0.153	0.068		1.090	1.090	1.090	1.900		94.6
0.448	0.430	0.441	0.441		0.174	0.197	0.142	0.131		1.090	0.610	0.610	1.090		94.6
0.441	0.384	0.405	-1.000		0.193	0.190	0.140	-1.000		0.330	0.330	0.610	-1.000		95.1
0.430	0.394	0.369	-1.000		0.197	0.266	0.220	-1.000		1.090	0.330	0.330	-1.000		95.4
0.477	0.430	-1.000	-1.000		0.106	0.162	-1.000	-1.000		1.090	1.090	-1.000	-1.000		89.1
0.484	0.466	0.466	-1.000		0.104	0.146	0.135	-1.000		1.090	1.090	1.090	-1.000		89.1
0.448	0.405	0.337	-1.000		0.112	0.249	0.144	-1.000		1.090	0.330	0.330	-1.000		91.4
0.448	0.405	0.337	-1.000		0.112	0.249	0.144	-1.000		1.090	0.330	0.330	-1.000		91.4
0.448	0.448	0.448	-1.000		0.129	0.129	0.101	-1.000		1.090	1.090	1.090	-1.000		90.8
0.448	0.430	0.419	-1.000		0.129	0.145	0.106	-1.000		1.090	1.090	1.090	-1.000		90.8
0.448	0.394	0.441	0.441		0.129	0.167	0.131	0.062		1.090	1.090	1.090	3.460		94.0
0.448	0.430	0.441	0.441		0.129	0.197	0.142	0.131		1.090	0.610	0.610	1.090		94.0
0.448	0.384	0.323	-1.000		0.112	0.240	0.196	-1.000		1.090	0.330	0.330	-1.000		91.5
0.477	0.441	0.455	-1.000		0.095	0.142	0.077	-1.000		1.090	1.090	1.090	-1.000		85.4
0.466	0.394	0.384	0.351		0.108	0.174	0.177	0.134		1.090	1.090	0.330	0.330		90.1
0.477	0.441	0.384	0.340		0.095	0.131	0.190	0.156		1.090	1.090	1.090	0.330		85.3
0.448	0.394	0.333	-1.000		0.112	0.236	0.193	-1.000		1.090	0.170	0.100	-1.000		91.4
0.466	0.448	0.448	-1.000		0.076	0.101	0.067	-1.000		1.900	1.900	3.460	-1.000		89.0
0.448	0.394	0.376	0.269		0.140	0.254	0.218	0.258		1.090	0.100	0.100	1.370		92.0
0.430	0.394	0.333	-1.000		0.145	0.266	0.227	-1.000		1.090	0.100	0.100	-1.000		92.6
0.448	0.441	0.448	-1.000		0.084	0.131	0.101	-1.000		1.090	1.900	1.900	-1.000		85.9
0.448	0.412	-1.000	-1.000		0.112	0.204	-1.000	-1.000		1.090	0.330	-1.000	-1.000		91.1

TABLE 27:
Soil Water Retention Values-
WRET_VAL.dbf

0.448	0.384	0.323	0.340		0.084	0.145	0.140	0.136		1.090	1.090	0.100	0.100		89.9
0.448	0.384	0.326	-1.000		0.112	0.240	0.195	-1.000		1.090	0.330	0.330	-1.000		91.5
0.466	0.394	0.384	0.340		0.081	0.174	0.190	0.136		1.090	1.090	0.330	0.330		89.8
0.466	0.394	0.384	0.358		0.081	0.174	0.190	0.132		1.090	1.090	0.330	0.330		89.9
0.441	0.441	0.441	0.466		0.057	0.131	0.062	0.027		1.090	3.460	3.460	10.950		85.4
0.448	0.441	0.455	-1.000		0.062	0.131	0.028	-1.000		1.090	3.460	10.950	-1.000		84.2
0.448	0.441	0.448	-1.000		0.062	0.131	0.028	-1.000		1.090	3.460	10.950	-1.000		85.4
0.448	0.394	0.333	0.358		0.112	0.174	0.206	0.218		1.090	1.090	0.170	0.170		91.1
0.448	0.394	0.333	0.358		0.129	0.174	0.206	0.218		1.090	1.090	0.170	0.170		91.4
0.484	0.448	0.394	0.448		0.094	0.157	0.174	0.174		1.090	1.090	0.170	0.170		89.1
0.466	0.430	0.405	-1.000		0.108	0.116	0.243	-1.000		1.090	1.090	1.090	-1.000		87.0
0.448	0.376	0.326	-1.000		0.129	0.256	0.209	-1.000		1.090	0.100	0.170	-1.000		94.0
0.448	0.376	0.326	-1.000		0.129	0.256	0.209	-1.000		1.090	0.100	0.170	-1.000		94.0
0.448	0.430	0.405	0.384		0.101	0.133	0.201	0.208		1.090	0.610	0.170	0.170		90.4
0.448	0.430	0.405	-1.000		0.101	0.133	0.182	-1.000		1.090	0.610	0.170	-1.000		90.4
0.466	0.405	0.405	0.384		0.108	0.182	0.188	0.145		1.090	0.330	0.330	0.330		87.4
0.448	0.394	0.287	-1.000		0.101	0.248	0.148	-1.000		1.090	0.100	0.170	-1.000		91.2
0.448	0.412	0.369	-1.000		0.112	0.240	0.032	-1.000		1.090	0.610	10.950	-1.000		88.7
0.405	0.340	-1.000	-1.000		0.207	0.184	-1.000	-1.000		0.330	0.330	-1.000	-1.000		94.5
0.455	0.384	0.405	-1.000		0.116	0.177	0.140	-1.000		1.090	0.330	0.610	-1.000		91.0
0.430	0.376	-1.000	-1.000		0.081	0.173	-1.000	-1.000		1.090	1.090	-1.000	-1.000		88.6
0.455	0.455	0.455	-1.000		0.083	0.138	0.166	-1.000		1.090	1.090	1.090	-1.000		85.4
0.455	0.394	0.448	-1.000		0.099	0.142	0.112	-1.000		1.090	3.460	3.460	-1.000		87.3
0.448	0.394	0.448	-1.000		0.101	0.142	0.112	-1.000		1.090	3.460	3.460	-1.000		87.6
0.448	0.394	0.405	0.369		0.112	0.142	0.030	0.201		1.090	3.460	3.460	0.170		87.4
0.448	0.448	0.448	-1.000		0.129	0.129	0.084	-1.000		1.090	1.090	1.090	-1.000		86.6
0.455	0.394	0.394	0.412		0.110	0.167	0.167	0.138		1.090	0.610	0.330	0.610		90.8
0.455	0.391	0.391	0.412		0.116	0.168	0.168	0.138		1.090	0.610	0.330	0.610		90.6
0.430	0.376	0.323	-1.000		0.191	0.282	0.217	-1.000		0.330	0.100	0.100	-1.000		93.6
0.430	0.384	0.340	0.269		0.191	0.278	0.231	0.258		0.330	0.100	0.100	1.370		93.5
0.455	0.384	0.323	-1.000		0.116	0.278	0.217	-1.000		1.090	0.100	0.100	-1.000		91.4
0.448	0.394	0.323	0.340		0.112	0.167	0.175	0.170		1.090	0.610	0.100	0.610		91.1
0.448	0.430	0.412	0.412		0.112	0.174	0.282	0.282		1.090	0.610	0.170	0.170		90.7
0.484	0.484	0.484	-1.000		0.062	0.062	0.052	-1.000		3.460	6.320	6.320	-1.000		79.2
0.484	0.430	0.312	-1.000		0.130	0.133	0.164	-1.000		1.090	0.610	0.330	-1.000		86.0
0.466	0.405	-1.000	-1.000		0.108	0.243	-1.000	-1.000		1.090	1.090	-1.000	-1.000		88.2
0.448	0.394	0.376	-1.000		0.118	0.186	0.147	-1.000		1.090	1.090	1.090	-1.000		88.4
0.484	0.466	0.484	-1.000		0.104	0.124	0.078	-1.000		1.090	0.610	1.900	-1.000		84.5
0.448	0.394	0.323	0.340		0.101	0.174	0.196	0.156		1.090	1.090	0.100	0.100		90.9
0.448	0.394	0.419	-1.000		0.112	0.236	0.260	-1.000		1.090	0.170	0.100	-1.000		90.9
0.448	0.441	0.430	-1.000		0.095	0.142	0.104	-1.000		1.090	1.090	3.460	-1.000		89.9
0.455	0.441	0.412	0.412		0.099	0.142	0.222	0.216		1.090	0.610	0.170	0.170		90.1
0.448	0.405	0.376	-1.000		0.084	0.188	0.128	-1.000		1.090	1.090	0.330	-1.000		86.2
0.477	0.448	0.430	0.419		0.106	0.140	0.197	0.184		1.090	0.610	0.330	0.610		89.5
0.441	0.412	0.369	-1.000		0.176	0.222	0.162	-1.000		1.090	1.090	0.330	-1.000		89.7
0.412	0.340	-1.000	-1.000		0.072	0.075	-1.000	-1.000		3.460	10.950	-1.000	-1.000		83.6
0.448	0.430	-1.000	-1.000		0.129	0.255	-1.000	-1.000		1.090	0.100	-1.000	-1.000		94.0
0.412	0.412	0.466	-1.000		0.120	0.138	0.065	-1.000		1.900	1.900	6.320	-1.000		88.6
0.441	0.394	0.287	-1.000		0.119	0.248	0.170	-1.000		1.090	0.610	0.100	-1.000		91.8

TABLE 27:
Soil Water Retention Values-
WRET_VAL.dbf

0.484	0.441	0.448	-1.000		0.104	0.131	0.112	-1.000		1.090	1.090	1.900	-1.000		85.2
0.448	0.419	0.448	-1.000		0.101	0.160	0.112	-1.000		1.090	1.090	1.090	-1.000		90.6
0.448	0.419	-1.000	-1.000		0.101	0.160	-1.000	-1.000		1.090	1.090	-1.000	-1.000		90.3
0.441	0.384	0.405	-1.000		0.193	0.190	0.140	-1.000		0.330	0.330	0.610	-1.000		92.5
0.441	0.358	0.340	0.269		0.176	0.284	0.245	0.258		0.330	0.100	0.100	1.370		93.1
0.430	0.412	0.405	-1.000		0.081	0.162	0.140	-1.000		1.090	1.090	1.090	-1.000		87.5
0.466	0.405	0.376	0.351		0.081	0.140	0.077	0.134		1.090	1.090	1.900	0.170		86.0
0.448	0.412	0.448	0.448		0.112	0.168	0.140	0.084		1.090	1.090	3.460	3.460		91.0
0.477	0.466	0.448	-1.000		0.121	0.135	0.101	-1.000		1.090	1.090	1.900	-1.000		84.9
0.448	0.430	0.394	-1.000		0.084	0.133	0.124	-1.000		1.090	1.090	1.090	-1.000		93.2
0.484	0.412	0.412	-1.000		0.073	0.150	0.150	-1.000		1.090	0.330	0.330	-1.000		88.8
0.448	0.412	0.376	-1.000		0.207	0.228	0.160	-1.000		1.090	0.330	0.330	-1.000		89.7
0.430	0.394	0.441	0.441		0.174	0.167	0.131	0.062		1.090	1.090	1.090	3.460		89.2
0.448	0.394	0.441	0.441		0.174	0.167	0.153	0.068		1.090	1.090	1.090	1.900		89.2
0.448	0.394	0.441	0.441		0.129	0.167	0.131	0.062		1.090	1.090	1.090	3.460		88.0
0.448	0.394	0.394	-1.000		0.112	0.266	0.211	-1.000		1.090	0.610	0.610	-1.000		91.5
0.455	0.430	0.448	-1.000		0.110	0.174	0.151	-1.000		1.090	1.090	1.900	-1.000		90.6
0.430	0.394	0.394	-1.000		0.197	0.254	0.266	-1.000		0.330	0.100	0.100	-1.000		95.4
0.430	0.369	0.340	0.340		0.145	0.279	0.258	0.231		1.090	0.330	0.170	0.170		92.8
0.466	0.405	0.423	0.340		0.092	0.170	0.165	0.020		1.090	1.090	1.090	44.700		85.6
0.466	0.448	0.484	-1.000		0.108	0.129	0.094	-1.000		1.090	1.090	1.900	-1.000		89.8
0.448	0.405	0.298	-1.000		0.112	0.170	0.146	-1.000		1.090	1.090	0.170	-1.000		86.9
0.477	0.455	0.376	-1.000		0.121	0.154	0.147	-1.000		1.090	1.090	1.090	-1.000		85.7
0.430	0.394	0.369	-1.000		0.197	0.266	0.220	-1.000		1.090	0.330	0.330	-1.000		93.6
0.430	0.394	0.376	-1.000		0.197	0.266	0.160	-1.000		1.090	0.330	0.330	-1.000		90.6
0.448	0.376	-1.000	-1.000		0.118	0.301	-1.000	-1.000		1.090	0.100	-1.000	-1.000		91.9
0.484	0.430	0.430	-1.000		0.062	0.070	0.133	-1.000		3.460	3.460	3.460	-1.000		83.6
0.484	0.419	-1.000	-1.000		0.120	0.184	-1.000	-1.000		1.090	1.090	-1.000	-1.000		92.8
0.477	0.466	0.419	-1.000		0.106	0.135	0.089	-1.000		1.090	1.090	1.900	-1.000		84.4
0.466	0.441	0.430	-1.000		0.108	0.114	0.104	-1.000		1.090	1.090	1.900	-1.000		84.9
0.477	0.441	0.423	0.423		0.079	0.142	0.165	0.088		1.090	1.090	1.090	1.090		85.1
0.502	0.430	0.430	-1.000		0.005	0.006	0.006	-1.000		10.950	10.950	10.950	-1.000		77.4
0.502	0.466	0.430	-1.000		0.005	0.005	0.006	-1.000		10.950	10.950	10.950	-1.000		76.5
0.430	0.394	0.376	0.376		0.174	0.248	0.160	0.077		1.090	0.610	1.900	1.900		90.6
0.448	0.394	0.376	0.376		0.112	0.248	0.160	0.077		1.090	0.610	1.900	1.900		88.8
0.455	0.384	0.405	-1.000		0.127	0.177	0.140	-1.000		1.090	0.330	0.610	-1.000		88.5
0.430	0.394	0.412	-1.000		0.133	0.142	0.108	-1.000		1.090	1.090	1.090	-1.000		92.0
0.455	0.405	0.412	0.340		0.094	0.170	0.168	0.020		1.090	1.090	1.090	20.000		89.9
0.455	0.405	0.412	0.340		0.094	0.170	0.168	0.020		1.090	1.090	1.090	44.700		89.7
0.455	0.448	0.448	0.466		0.166	0.157	0.112	0.027		1.090	0.610	0.610	10.950		87.3
0.448	0.430	0.441	0.441		0.174	0.197	0.142	0.131		1.090	0.610	0.610	1.090		88.5
0.484	0.448	0.466	-1.000		0.104	0.157	0.108	-1.000		1.090	0.610	0.610	-1.000		84.4
0.448	0.430	0.441	0.441		0.129	0.197	0.142	0.131		1.090	0.610	0.610	1.090		87.9
0.448	0.394	0.394	-1.000		0.112	0.248	0.273	-1.000		1.090	0.170	0.100	-1.000		91.3
0.477	-1.000	-1.000	-1.000		0.079	-1.000	-1.000	-1.000		1.090	-1.000	-1.000	-1.000		86.8
0.448	0.441	0.419	0.448		0.112	0.142	0.178	0.112		1.090	1.090	1.090	3.460		86.6
0.495	0.484	0.448	-1.000		0.056	0.057	0.050	-1.000		1.900	1.900	3.460	-1.000		79.9
0.495	0.484	0.448	-1.000		0.056	0.057	0.050	-1.000		1.900	1.900	3.460	-1.000		80.4
0.448	0.384	0.326	0.348		0.112	0.190	0.188	0.154		1.090	0.610	0.000	0.170		91.2

TABLE 27:
Soil Water Retention Values- WRET_VAL.dbf

0.455	-1.000	-1.000	-1.000		0.099	-1.000	-1.000	-1.000		1.090	-1.000	-1.000	-1.000		89.8
0.455	0.412	0.340	-1.000		0.094	0.150	0.014	-1.000		1.090	1.090	44.700	-1.000		85.9
0.412	0.405	0.369	0.305		0.168	0.170	0.117	0.036		1.090	1.090	1.090	20.000		89.8
0.484	0.466	0.466	-1.000		0.120	0.151	0.146	-1.000		1.090	1.090	1.090	-1.000		85.2
0.477	0.430	-1.000	-1.000		0.106	0.162	-1.000	-1.000		1.090	1.090	-1.000	-1.000		92.8
0.477	0.448	0.430	0.419		0.106	0.140	0.197	0.184		1.090	0.610	0.330	0.610		92.8
0.441	0.412	0.369	-1.000		0.176	0.222	0.162	-1.000		1.090	1.090	0.330	-1.000		94.9
0.448	0.412	0.376	-1.000		0.207	0.228	0.160	-1.000		1.090	0.330	0.330	-1.000		95.1
0.430	0.394	0.441	0.441		0.174	0.167	0.131	0.062		1.090	1.090	1.090	3.460		95.1
0.430	0.394	0.376	-1.000		0.197	0.266	0.160	-1.000		1.090	0.330	0.330	-1.000		95.4
0.455	0.384	0.405	-1.000		0.127	0.177	0.140	-1.000		1.090	0.330	0.610	-1.000		93.8
0.455	0.448	0.448	0.466		0.166	0.157	0.112	0.027		1.090	0.610	0.610	10.950		94.3
0.455	-1.000	-1.000	-1.000		0.099	-1.000	-1.000	-1.000		1.090	-1.000	-1.000	-1.000		93.3
0.412	-1.000	0.305	-1.000		0.168	-1.000	0.036	-1.000		1.090	-1.000	44.700	-1.000		95.5
0.412	0.405	0.369	0.305		0.168	0.170	0.117	0.036		1.090	1.090	1.090	20.000		95.5

TABLE 28:
Crop, Tillage, Soil Climate Scenario- SCENARIO.dbf

SCEN_ID	COMMENT	CLIMATE_ID	WATMAN_ID	SGROUP_ID	DATEFACTID	CONSTANTID	COMPUTE_OM	OM1	OM2	OM3	OM4	OM5
1	Conv./Corn after Corn/Event Date Set #1	1	1	21	1	1	TRUE	0.0100				
2	Conv./Corn after Corn/Event Date Set #2	1	1	21	2	1	TRUE	0.0100				
3	Conv./Corn after Corn/Event Date Set #3	1	1	21	3	1	TRUE	0.0100				
4	Conv./Corn after Corn/Event Date Set #4	1	1	21	4	1	TRUE	0.0100				
5	Conv./Corn after Corn/Event Date Set #5	1	1	21	5	1	TRUE	0.0100				
6	Conv./Corn after Beans/Event Date Set #1	1	1	21	6	1	TRUE	0.0100				
7	Conv./Corn after Beans/Event Date Set #2	1	1	21	7	1	TRUE	0.0100				
8	Conv./Corn after Beans/Event Date Set #3	1	1	21	8	1	TRUE	0.0100				
9	Conv./Corn after Beans/Event Date Set #4	1	1	21	9	1	TRUE	0.0100				
10	Conv./Corn after Beans/Event Date Set #5	1	1	21	10	1	TRUE	0.0100				
11	Conv./Corn after Small Grain/Event Date Set #1	1	1	21	11	1	TRUE	0.0100				
12	Conv./Corn after Small Grain/Event Date Set #2	1	1	21	12	1	TRUE	0.0100				
13	Conv./Corn after Small Grain/Event Date Set #3	1	1	21	13	1	TRUE	0.0100				
14	Conv./Corn after Small Grain/Event Date Set #4	1	1	21	14	1	TRUE	0.0100				
15	Conv./Corn after Small Grain/Event Date Set #5	1	1	21	15	1	TRUE	0.0100				
16	Cons./Corn after Corn/Event Date Set #1	1	1	21	16	1	TRUE	0.0100				
17	Cons./Corn after Corn/Event Date Set #2	1	1	21	17	1	TRUE	0.0100				
18	Cons./Corn after Corn/Event Date Set #3	1	1	21	18	1	TRUE	0.0100				
19	Cons./Corn after Corn/Event Date Set #4	1	1	21	19	1	TRUE	0.0100				
20	Cons./Corn after Corn/Event Date Set #5	1	1	21	20	1	TRUE	0.0100				
21	Cons./Corn after Beans/Event Date Set #1	1	1	21	21	1	TRUE	0.0100				
22	Cons./Corn after Beans/Event Date Set #2	1	1	21	22	1	TRUE	0.0100				
23	Cons./Corn after Beans/Event Date Set #3	1	1	21	23	1	TRUE	0.0100				
24	Cons./Corn after Beans/Event Date Set #4	1	1	21	24	1	TRUE	0.0100				
25	Cons./Corn after Beans/Event Date Set #5	1	1	21	25	1	TRUE	0.0100				
26	Cons./Corn after Small Grain/Event Date Set #1	1	1	21	26	1	TRUE	0.0100				
27	Cons./Corn after Small Grain/Event Date Set #2	1	1	21	27	1	TRUE	0.0100				
28	Cons./Corn after Small Grain/Event Date Set #3	1	1	21	28	1	TRUE	0.0100				
29	Cons./Corn after Small Grain/Event Date Set #4	1	1	21	29	1	TRUE	0.0100				
30	Cons./Corn after Small Grain/Event Date Set #5	1	1	21	30	1	TRUE	0.0100				
31	No-Till/Corn after Corn/Event Date Set #1	1	1	21	21	1	TRUE	0.0100				
32	No-Till/Corn after Corn/Event Date Set #2	1	1	21	32	1	TRUE	0.0100				
33	No-Till/Corn after Corn/Event Date Set #3	1	1	21	33	1	TRUE	0.0100				
34	No-Till/Corn after Corn/Event Date Set #4	1	1	21	34	1	TRUE	0.0100				
35	No-Till/Corn after Corn/Event Date Set #5	1	1	21	35	1	TRUE	0.0100				
36	No-Till/Corn after Beans/Event Date Set #1	1	1	21	36	1	TRUE	0.0100				
37	No-Till/Corn after Beans/Event Date Set #2	1	1	21	37	1	TRUE	0.0100				
38	No-Till/Corn after Beans/Event Date Set #3	1	1	21	38	1	TRUE	0.0100				
39	No-Till/Corn after Beans/Event Date Set #4	1	1	21	39	1	TRUE	0.0100				
40	No-Till/Corn after Beans/Event Date Set #5	1	1	21	40	1	TRUE	0.0100				
41	No-Till/Corn after Small Grain/Event Date Set #1	1	1	21	41	1	TRUE	0.0100				
42	No-Till/Corn after Small Grain/Event Date Set #2	1	1	21	42	1	TRUE	0.0100				
43	No-Till/Corn after Small Grain/Event Date Set #3	1	1	21	43	1	TRUE	0.0100				
44	No-Till/Corn after Small Grain/Event Date Set #4	1	1	21	44	1	TRUE	0.0100				
45	No-Till/Corn after Small Grain/Event Date Set #5	1	1	21	45	1	TRUE	0.0100				

TABLE 29:
Scenario Combinations for GLEAMS-RUN_COMB.dbf

SLOPE	SLOPELEN	SCEN_ID	NUM_CHEM	C_USAGE1	C_USAGE2	C_USAGE3	C_USAGE4	C_USAGE5	DONE	DATE_DONE	TIME_DONE	STATUS
	100	1	1	1	0	0	0	0	TRUE	4/4/2005	10:05:36	
	100	2	1	28	0	0	0	0	TRUE	4/4/2005	10:05:38	
	100	3	1	55	0	0	0	0	TRUE	4/4/2005	10:05:41	
	100	4	1	82	0	0	0	0	TRUE	4/4/2005	10:05:44	
	100	5	1	109	0	0	0	0	TRUE	4/4/2005	10:05:47	
	100	6	1	2	0	0	0	0	TRUE	4/4/2005	10:05:50	
	100	7	1	29	0	0	0	0	TRUE	4/4/2005	10:05:53	
	100	8	1	56	0	0	0	0	TRUE	4/4/2005	10:05:56	
	100	9	1	83	0	0	0	0	TRUE	4/4/2005	10:06:00	
	100	10	1	110	0	0	0	0	TRUE	4/4/2005	10:06:02	
	100	11	1	3	0	0	0	0	TRUE	4/4/2005	10:06:05	
	100	12	1	30	0	0	0	0	TRUE	4/4/2005	10:06:08	
	100	13	1	57	0	0	0	0	TRUE	4/4/2005	10:06:11	
	100	14	1	84	0	0	0	0	TRUE	4/4/2005	10:06:14	
	100	15	1	111	0	0	0	0	TRUE	4/4/2005	10:06:17	
	100	16	1	4	0	0	0	0	TRUE	4/4/2005	10:06:20	
	100	17	1	31	0	0	0	0	TRUE	4/4/2005	10:06:23	
	100	18	1	58	0	0	0	0	TRUE	4/4/2005	10:06:26	
	100	19	1	85	0	0	0	0	TRUE	4/4/2005	10:06:29	
	100	20	1	112	0	0	0	0	TRUE	4/4/2005	10:06:32	
	100	21	1	5	0	0	0	0	TRUE	4/4/2005	10:06:35	
	100	22	1	32	0	0	0	0	TRUE	4/4/2005	10:06:38	
	100	23	1	59	0	0	0	0	TRUE	4/4/2005	10:06:41	
	100	24	1	86	0	0	0	0	TRUE	4/4/2005	10:06:44	
	100	25	1	113	0	0	0	0	TRUE	4/4/2005	10:06:47	
	100	26	1	6	0	0	0	0	TRUE	4/4/2005	10:06:50	
	100	27	1	33	0	0	0	0	TRUE	4/4/2005	10:06:53	
	100	28	1	60	0	0	0	0	TRUE	4/4/2005	10:06:56	
	100	29	1	87	0	0	0	0	TRUE	4/4/2005	10:06:59	
	100	30	1	114	0	0	0	0	TRUE	4/4/2005	10:07:02	
	100	31	1	7	0	0	0	0	TRUE	4/4/2005	10:07:05	
	100	32	1	34	0	0	0	0	TRUE	4/4/2005	10:07:08	
	100	33	1	61	0	0	0	0	TRUE	4/4/2005	10:07:11	
	100	34	1	88	0	0	0	0	TRUE	4/4/2005	10:07:14	
	100	35	1	115	0	0	0	0	TRUE	4/4/2005	10:07:17	
	100	36	1	8	0	0	0	0	TRUE	4/4/2005	10:07:20	
	100	37	1	35	0	0	0	0	TRUE	4/4/2005	10:07:23	
	100	38	1	62	0	0	0	0	TRUE	4/4/2005	10:07:26	
	100	39	1	89	0	0	0	0	TRUE	4/4/2005	10:07:29	
	100	40	1	116	0	0	0	0	TRUE	4/4/2005	10:07:32	
	100	41	1	9	0	0	0	0	TRUE	4/4/2005	10:07:35	
	100	42	1	36	0	0	0	0	TRUE	4/4/2005	10:07:38	
	100	43	1	63	0	0	0	0	TRUE	4/4/2005	10:07:42	
	100	44	1	90	0	0	0	0	TRUE	4/4/2005	10:07:44	
	100	45	1	117	0	0	0	0	TRUE	4/4/2005	10:07:47	
	100	1	1	10	0	0	0	0	TRUE	4/4/2005	10:07:51	
	100	2	1	37	0	0	0	0	TRUE	4/4/2005	10:07:53	

TABLE 29:
Scenario Combinations for GLEAMS-RUN_COMB.dbf

	100	3	1	64	0	0	0	0	TRUE	4/4/2005	10:07:57	
	100	4	1	91	0	0	0	0	TRUE	4/4/2005	10:08:00	
	100	5	1	118	0	0	0	0	TRUE	4/4/2005	10:08:02	
	100	6	1	11	0	0	0	0	TRUE	4/4/2005	10:08:06	
	100	7	1	38	0	0	0	0	TRUE	4/4/2005	10:08:08	
	100	8	1	65	0	0	0	0	TRUE	4/4/2005	10:08:12	
	100	9	1	92	0	0	0	0	TRUE	4/4/2005	10:08:14	
	100	10	1	119	0	0	0	0	TRUE	4/4/2005	10:08:17	
	100	11	1	12	0	0	0	0	TRUE	4/4/2005	10:08:21	
	100	12	1	39	0	0	0	0	TRUE	4/4/2005	10:08:23	
	100	13	1	66	0	0	0	0	TRUE	4/4/2005	10:08:26	
	100	14	1	93	0	0	0	0	TRUE	4/4/2005	10:08:30	
	100	15	1	120	0	0	0	0	TRUE	4/4/2005	10:08:32	
	100	16	1	13	0	0	0	0	TRUE	4/4/2005	10:08:36	
	100	17	1	40	0	0	0	0	TRUE	4/4/2005	10:08:38	
	100	18	1	67	0	0	0	0	TRUE	4/4/2005	10:08:41	
	100	19	1	94	0	0	0	0	TRUE	4/4/2005	10:08:44	
	100	20	1	121	0	0	0	0	TRUE	4/4/2005	10:08:47	
	100	21	1	14	0	0	0	0	TRUE	4/4/2005	10:08:51	
	100	22	1	41	0	0	0	0	TRUE	4/4/2005	10:08:53	
	100	23	1	68	0	0	0	0	TRUE	4/4/2005	10:08:56	
	100	24	1	95	0	0	0	0	TRUE	4/4/2005	10:09:00	
	100	25	1	122	0	0	0	0	TRUE	4/4/2005	10:09:02	
	100	26	1	15	0	0	0	0	TRUE	4/4/2005	10:09:05	
	100	27	1	42	0	0	0	0	TRUE	4/4/2005	10:09:08	
	100	28	1	69	0	0	0	0	TRUE	4/4/2005	10:09:11	
	100	29	1	96	0	0	0	0	TRUE	4/4/2005	10:09:15	
	100	30	1	123	0	0	0	0	TRUE	4/4/2005	10:09:17	
	100	31	1	16	0	0	0	0	TRUE	4/4/2005	10:09:20	
	100	32	1	43	0	0	0	0	TRUE	4/4/2005	10:09:23	
	100	33	1	70	0	0	0	0	TRUE	4/4/2005	10:09:26	
	100	34	1	97	0	0	0	0	TRUE	4/4/2005	10:09:29	
	100	35	1	124	0	0	0	0	TRUE	4/4/2005	10:09:32	
	100	36	1	17	0	0	0	0	TRUE	4/4/2005	10:09:35	
	100	37	1	44	0	0	0	0	TRUE	4/4/2005	10:09:38	
	100	38	1	71	0	0	0	0	TRUE	4/4/2005	10:09:41	
	100	39	1	98	0	0	0	0	TRUE	4/4/2005	10:09:44	
	100	40	1	125	0	0	0	0	TRUE	4/4/2005	10:09:47	
	100	41	1	18	0	0	0	0	TRUE	4/4/2005	10:09:50	
	100	42	1	45	0	0	0	0	TRUE	4/4/2005	10:09:53	
	100	43	1	72	0	0	0	0	TRUE	4/4/2005	10:09:57	
	100	44	1	99	0	0	0	0	TRUE	4/4/2005	10:10:00	
	100	45	1	126	0	0	0	0	TRUE	4/4/2005	10:10:02	
	100	1	1	19	0	0	0	0	TRUE	4/4/2005	10:10:05	
	100	2	1	46	0	0	0	0	TRUE	4/4/2005	10:10:08	
	100	3	1	73	0	0	0	0	TRUE	4/4/2005	10:10:12	
	100	4	1	100	0	0	0	0	TRUE	4/4/2005	10:10:14	
	100	5	1	127	0	0	0	0	TRUE	4/4/2005	10:10:17	

TABLE 29:
Scenario Combinations for GLEAMS-RUN_COMB.dbf

	100	6	1	20	0	0	0	0	TRUE	4/4/2005	10:10:21	
	100	7	1	47	0	0	0	0	TRUE	4/4/2005	10:10:23	
	100	8	1	74	0	0	0	0	TRUE	4/4/2005	10:10:27	
	100	9	1	101	0	0	0	0	TRUE	4/4/2005	10:10:29	
	100	10	1	128	0	0	0	0	TRUE	4/4/2005	10:10:32	
	100	11	1	21	0	0	0	0	TRUE	4/4/2005	10:10:36	
	100	12	1	48	0	0	0	0	TRUE	4/4/2005	10:10:38	
	100	13	1	75	0	0	0	0	TRUE	4/4/2005	10:10:42	
	100	14	1	102	0	0	0	0	TRUE	4/4/2005	10:10:44	
	100	15	1	129	0	0	0	0	TRUE	4/4/2005	10:10:47	
	100	16	1	22	0	0	0	0	TRUE	4/4/2005	10:10:51	
	100	17	1	49	0	0	0	0	TRUE	4/4/2005	10:10:53	
	100	18	1	76	0	0	0	0	TRUE	4/4/2005	10:10:56	
	100	19	1	103	0	0	0	0	TRUE	4/4/2005	10:10:59	
	100	20	1	130	0	0	0	0	TRUE	4/4/2005	10:11:02	
	100	21	1	23	0	0	0	0	TRUE	4/4/2005	10:11:06	
	100	22	1	50	0	0	0	0	TRUE	4/4/2005	10:11:08	
	100	23	1	77	0	0	0	0	TRUE	4/4/2005	10:11:11	
	100	24	1	104	0	0	0	0	TRUE	4/4/2005	10:11:15	
	100	25	1	131	0	0	0	0	TRUE	4/4/2005	10:11:17	
	100	26	1	24	0	0	0	0	TRUE	4/4/2005	10:11:21	
	100	27	1	51	0	0	0	0	TRUE	4/4/2005	10:11:23	
	100	28	1	78	0	0	0	0	TRUE	4/4/2005	10:11:26	
	100	29	1	105	0	0	0	0	TRUE	4/4/2005	10:11:29	
	100	30	1	132	0	0	0	0	TRUE	4/4/2005	10:11:32	
	100	31	1	25	0	0	0	0	TRUE	4/4/2005	10:11:35	
	100	32	1	52	0	0	0	0	TRUE	4/4/2005	10:11:38	
	100	33	1	79	0	0	0	0	TRUE	4/4/2005	10:11:41	
	100	34	1	106	0	0	0	0	TRUE	4/4/2005	10:11:45	
	100	35	1	133	0	0	0	0	TRUE	4/4/2005	10:11:47	
	100	36	1	26	0	0	0	0	TRUE	4/4/2005	10:11:50	
	100	37	1	53	0	0	0	0	TRUE	4/4/2005	10:11:53	
	100	38	1	80	0	0	0	0	TRUE	4/4/2005	10:11:56	
	100	39	1	107	0	0	0	0	TRUE	4/4/2005	10:11:59	
	100	40	1	134	0	0	0	0	TRUE	4/4/2005	10:12:02	
	100	41	1	27	0	0	0	0	TRUE	4/4/2005	10:12:05	
	100	42	1	54	0	0	0	0	TRUE	4/4/2005	10:12:08	
	100	43	1	81	0	0	0	0	TRUE	4/4/2005	10:12:11	
	100	44	1	108	0	0	0	0	TRUE	4/4/2005	10:12:14	
	100	45	1	135	0	0	0	0	TRUE	4/4/2005	10:12:17	

Attachment B
Model Sensitivity Analysis

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Soil Hydrologic condtion
Base Value (Condition A) Poor
Test Value (Condition B) Good

			SSL					ASL					SLL					Total		
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	16.31	7.00	77.39	5.01	0.12	0.05	-0.07	-60.74	0.04	46.76	21.40	-25.37	-55.72	17.45	56.19	37.75	-18.44	-31.14	15.32
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	15.86	7.52	96.66	4.90	0.24	0.10	-0.14	-57.03	0.09	44.04	18.42	-25.62	-59.94	18.85	52.61	34.38	-18.23	-31.68	16.95
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	16.30	11.41	265.79	6.64	0.22	0.11	-0.11	-46.43	0.16	68.22	26.49	-41.74	-62.52	28.25	73.34	42.89	-30.44	-38.57	24.74
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	13.30	6.19	93.92	4.35	0.16	0.04	-0.12	-72.98	0.09	34.00	14.63	-19.37	-59.06	13.69	41.27	27.97	-13.30	-28.52	11.89
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	13.00	5.92	89.71	4.19	0.39	0.11	-0.28	-69.27	0.21	29.49	12.38	-17.11	-60.10	12.74	36.95	25.48	-11.47	-26.91	11.12
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	13.30	6.20	94.22	4.35	0.51	0.10	-0.41	-79.08	0.31	33.98	14.63	-19.36	-59.05	13.68	41.59	28.03	-13.57	-29.06	11.95
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	14.24	4.46	48.64	3.15	0.39	0.05	-0.33	-85.21	0.26	16.23	7.21	-9.03	-57.45	6.83	26.41	21.50	-4.90	-15.13	5.93
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	14.32	4.51	49.32	3.18	0.74	0.12	-0.62	-82.81	0.45	16.66	7.41	-9.25	-57.33	6.96	27.21	21.85	-5.36	-16.30	6.06
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	14.32	4.50	49.26	3.18	0.63	0.09	-0.53	-84.47	0.36	16.67	7.42	-9.25	-57.34	6.96	27.10	21.83	-5.28	-16.10	6.05
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	11.94	2.36	40.97	1.70	0.11	0.02	-0.09	-72.70	0.12	64.53	28.83	-35.69	-56.61	25.41	74.22	40.80	-33.42	-44.16	24.56
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	12.33	2.77	49.14	1.81	0.25	0.05	-0.19	-71.72	0.25	47.21	19.57	-27.64	-60.01	21.80	57.02	31.95	-25.07	-42.40	20.91
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	11.94	4.41	142.60	2.22	0.35	0.06	-0.29	-67.41	0.50	75.64	28.83	-46.80	-62.74	33.56	83.52	40.83	-42.69	-49.43	32.16
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	9.58	1.30	46.38	2.08	0.18	0.02	-0.16	-82.52	0.24	36.81	15.90	-20.92	-58.80	15.74	45.28	25.50	-19.78	-41.79	14.88
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	9.72	1.23	43.31	2.18	0.42	0.05	-0.37	-79.97	0.53	31.54	13.30	-18.23	-59.81	14.43	40.45	23.08	-17.37	-40.79	13.63
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	9.58	1.33	46.67	2.02	0.54	0.05	-0.49	-86.12	0.74	36.80	15.89	-20.91	-58.79	15.73	45.59	25.52	-20.06	-42.17	14.92
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	12.52	5.65	81.01	3.92	0.09	0.03	-0.05	-61.18	0.03	43.59	20.81	-22.77	-54.38	13.85	50.56	33.37	-17.18	-32.35	12.92
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	12.48	6.15	97.73	3.93	0.18	0.07	-0.10	-58.37	0.05	34.03	14.74	-19.29	-58.79	13.09	40.53	27.29	-13.24	-28.98	12.40
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	12.52	9.08	272.16	5.13	0.15	0.08	-0.07	-46.18	0.05	50.93	20.81	-30.11	-60.96	18.77	54.53	33.42	-21.11	-35.65	16.82
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	10.44	5.01	94.90	3.30	0.12	0.03	-0.09	-72.65	0.07	26.43	11.63	-14.80	-58.21	9.82	31.98	22.10	-9.88	-25.91	8.87
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	10.28	4.81	90.32	3.19	0.29	0.08	-0.21	-68.96	0.14	23.15	9.91	-13.25	-59.43	9.32	28.91	20.27	-8.64	-24.58	8.45
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	10.43	5.02	95.25	3.30	0.35	0.07	-0.28	-78.29	0.20	26.42	11.63	-14.79	-58.20	9.82	32.19	22.14	-10.05	-26.39	8.89
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	11.37	3.63	49.15	2.37	0.30	0.04	-0.26	-84.79	0.20	12.86	5.79	-7.07	-56.90	5.10	20.91	17.20	-3.70	-13.71	4.58
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	11.44	3.67	49.75	2.39	0.57	0.09	-0.48	-82.97	0.36	13.18	5.95	-7.23	-56.78	5.19	21.51	17.47	-4.04	-14.89	4.64
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	11.44	3.67	49.67	2.38	0.49	0.08	-0.42	-84.14	0.29	13.18	5.95	-7.23	-56.78	5.19	21.44	17.46	-3.98	-14.68	4.65
Min Average Difference (g/ha)			**1.23**					**0.05**					**7.07**					**3.70**		
Max Average Difference (g/ha)			**11.41**					**0.62**					**46.80**					**42.69**		
Range			**10.18**					**0.56**					**39.73**					**38.99**		
Average Difference (g/ha)			**4.91**					**-0.26**					**-20.12**					**-15.47**		
Average Standard Deviation (g/ha)					**3.37**					**0.24**					**14.26**					**13.05**
Average Percent Difference				**88.08**					**-72.33**					**-58.57**					**-29.64**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Table 1-20 Soil Group 20
Sensitivity Test Parameter Soil Hydrologic Condition
Base Value (Condition A) Poor
Test Value (Condition B) Good

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	4.66	-4.15	-50.98	1.95	0.03	0.02	-0.01	-46.33	0.01	79.47	90.53	11.06	13.28	9.00	88.31	95.21	6.89	6.29	8.01
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	4.49	-3.16	-44.09	1.63	0.06	0.04	-0.02	-40.88	0.01	79.93	90.04	10.11	12.01	8.61	87.64	94.57	6.93	6.53	7.76
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	4.66	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	112.26	112.26	0.00	0.00	0.00	116.96	116.96	0.00	0.00	0.00
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	6.92	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	82.26	82.26	0.00	0.00	0.00	89.22	89.22	0.00	0.00	0.00
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	6.76	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	74.63	74.63	0.00	0.00	0.00	81.49	81.49	0.00	0.00	0.00
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	6.92	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	82.26	82.26	0.00	0.00	0.00	89.27	89.27	0.00	0.00	0.00
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	9.79	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	55.65	55.65	0.00	0.00	0.00	65.52	65.52	0.00	0.00	0.00
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	9.84	0.00	0.00	0.00	0.18	0.18	0.00	0.00	0.00	56.69	56.69	0.00	0.00	0.00	66.71	66.71	0.00	0.00	0.00
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	9.84	0.00	0.00	0.00	0.13	0.13	0.00	0.00	0.00	56.69	56.69	0.00	0.00	0.00	66.66	66.66	0.00	0.00	0.00
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	8.02	-1.94	-36.07	0.82	0.02	0.02	-0.01	-38.08	0.00	111.51	127.05	15.54	13.25	12.19	121.49	135.09	13.59	9.94	11.70
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	8.04	-1.61	-31.15	0.74	0.05	0.04	-0.01	-32.82	0.01	86.88	98.10	11.22	12.09	9.42	96.58	106.18	9.61	8.65	8.98
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	8.01	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	127.05	127.05	0.00	0.00	0.00	135.12	135.12	0.00	0.00	0.00
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	8.44	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	89.85	89.85	0.00	0.00	0.00	98.32	98.32	0.00	0.00	0.00
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	8.55	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	80.37	80.37	0.00	0.00	0.00	89.01	89.01	0.00	0.00	0.00
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	8.44	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00	89.84	89.84	0.00	0.00	0.00	98.36	98.36	0.00	0.00	0.00
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	3.11	-3.20	-52.30	1.46	0.02	0.01	-0.01	-47.43	0.00	73.12	82.45	9.34	12.49	7.60	79.45	85.58	6.13	6.68	6.98
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	3.12	-2.49	-45.69	1.28	0.04	0.03	-0.02	-42.53	0.01	61.13	68.40	7.27	11.48	6.25	66.79	71.55	4.76	5.93	5.56
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	3.11	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	82.45	82.45	0.00	0.00	0.00	85.60	85.60	0.00	0.00	0.00
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	5.11	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	63.90	63.90	0.00	0.00	0.00	69.04	69.04	0.00	0.00	0.00
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	5.06	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	58.52	58.52	0.00	0.00	0.00	63.66	63.66	0.00	0.00	0.00
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	5.11	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	63.90	63.90	0.00	0.00	0.00	69.07	69.07	0.00	0.00	0.00
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	7.61	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	44.28	44.28	0.00	0.00	0.00	51.95	51.95	0.00	0.00	0.00
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	7.65	0.00	0.00	0.00	0.13	0.13	0.00	0.00	0.00	45.01	45.01	0.00	0.00	0.00	52.80	52.80	0.00	0.00	0.00
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	7.65	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	45.02	45.02	0.00	0.00	0.00	52.77	52.77	0.00	0.00	0.00
Min Average Difference (g/ha)			**0.00**					**0.00**					**0.00**					**0.00**		
Max Average Difference (g/ha)			**4.15**					**0.02**					**15.54**					**13.59**		
Range			**4.15**					**0.02**					**15.54**					**13.59**		
Average Difference (g/ha)			**-0.69**					**0.00**					**2.69**					**2.00**		
Average Standard Deviation (g/ha)					**0.33**					**0.00**					**2.21**					**2.04**
Average Percent Difference				**-10.85**					**-10.34**					**3.11**					**1.83**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Smoothness Factors
Base Value (Condition A) Base Conditions
Test Value (Condition B) One Half Base Conditions

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	29.32	20.01	236.02	12.43	0.12	0.14	0.02	21.81	0.05	46.76	17.06	-29.71	-64.35	21.03	56.19	46.51	-9.67	-10.65	18.02
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	28.34	20.00	263.77	9.82	0.24	0.33	0.10	46.31	0.10	44.04	13.48	-30.56	-70.82	22.84	52.61	42.15	-10.47	-10.70	19.05
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	29.08	24.18	585.84	12.01	0.22	0.32	0.10	77.53	0.14	68.22	20.38	-47.84	-71.13	32.63	73.34	49.78	-23.56	-23.47	26.65
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	30.51	23.39	387.55	12.18	0.16	0.17	0.01	20.06	0.06	34.00	10.03	-23.96	-71.85	17.33	41.27	40.71	-0.56	19.65	13.63
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	29.79	22.72	376.85	11.79	0.39	0.48	0.09	44.02	0.15	29.49	8.30	-21.19	-73.16	16.14	36.95	38.57	1.62	27.14	12.97
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	30.50	23.40	388.27	12.18	0.51	0.30	-0.21	-13.43	0.26	33.98	10.03	-23.95	-71.84	17.32	41.59	40.83	-0.76	18.78	13.60
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	31.17	21.39	256.51	10.79	0.39	0.21	-0.18	-35.68	0.20	16.23	4.74	-11.49	-72.01	8.87	26.41	36.12	9.72	57.98	8.90
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	31.32	21.51	257.76	10.84	0.74	0.49	-0.24	-18.65	0.28	16.66	4.89	-11.77	-71.87	9.03	27.21	36.70	9.49	55.66	8.87
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	31.33	21.51	257.68	10.85	0.63	0.23	-0.40	-50.68	0.33	16.67	4.90	-11.77	-71.87	9.03	27.10	36.45	9.34	55.18	8.84
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	17.04	7.46	131.84	3.35	0.11	0.07	-0.04	-18.46	0.09	64.53	22.38	-42.15	-66.34	30.32	74.22	39.48	-34.73	-43.28	28.29
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	17.66	8.10	144.15	3.75	0.25	0.17	-0.08	-4.71	0.19	47.21	14.41	-32.81	-70.63	26.22	57.02	32.24	-24.79	-38.48	24.06
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	17.04	9.50	313.94	4.05	0.35	0.14	-0.21	1.30	0.49	75.64	22.38	-53.26	-70.98	38.53	83.52	39.55	-43.97	-48.22	35.89
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	15.73	7.44	201.83	4.06	0.18	0.07	-0.11	-26.61	0.22	36.81	11.04	-25.77	-71.27	19.82	45.28	26.84	-18.44	-29.83	17.35
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	15.93	7.44	193.65	4.22	0.42	0.21	-0.21	-11.76	0.48	31.54	9.02	-22.52	-72.61	18.21	40.45	25.16	-15.29	-26.11	15.75
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	15.73	7.48	202.33	4.03	0.54	0.12	-0.42	-52.11	0.74	36.80	11.04	-25.76	-71.26	19.81	45.59	26.89	-18.70	-30.23	17.37
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	22.65	15.77	235.30	7.84	0.09	0.11	0.02	19.82	0.02	43.59	16.09	-27.50	-65.06	16.97	50.56	38.85	-11.71	-16.71	14.72
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	22.50	16.17	265.98	7.69	0.18	0.26	0.08	46.29	0.07	34.03	10.84	-23.20	-70.13	16.04	40.53	33.59	-6.94	-6.94	14.27
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	22.65	19.20	601.33	9.19	0.15	0.23	0.08	77.29	0.04	50.93	16.09	-34.84	-70.01	21.92	54.53	38.97	-15.56	-19.45	18.46
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	24.17	18.75	410.95	9.24	0.12	0.13	0.01	30.25	0.02	26.43	8.04	-18.39	-71.08	12.56	31.98	32.34	0.36	32.66	10.77
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	23.74	18.28	399.55	8.97	0.29	0.37	0.08	60.37	0.07	23.15	6.70	-16.46	-72.51	11.90	28.91	30.81	1.90	39.98	10.38
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	24.17	18.76	411.83	9.24	0.35	0.22	-0.14	0.16	0.19	26.42	8.04	-18.39	-71.07	12.55	32.19	32.42	0.23	31.89	10.72
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	24.97	17.23	271.40	8.22	0.30	0.16	-0.14	-26.09	0.14	12.86	3.84	-9.03	-71.62	6.67	20.91	28.97	8.06	66.15	7.19
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	25.09	17.33	272.64	8.26	0.57	0.36	-0.21	-12.49	0.25	13.18	3.95	-9.23	-71.49	6.78	21.51	29.40	7.89	63.96	7.16
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	25.10	17.33	272.51	8.26	0.49	0.19	-0.31	-40.03	0.28	13.18	3.95	-9.23	-71.49	6.78	21.44	29.23	7.79	63.66	7.15
Min Average Difference (g/ha)			**7.44**					**0.01**					**9.03**					**0.23**		
Max Average Difference (g/ha)			**24.18**					**0.42**					**53.26**					**43.97**		
Range			**16.75**					**0.41**					**44.23**					**43.73**		
Average Difference (g/ha)			**16.85**					**-0.10**					**-24.20**					**-7.45**		
Average Standard Deviation (g/ha)					**8.47**					**0.20**					**17.47**					**15.42**
Average Percent Difference				**305.81**					**5.60**					**-70.69**					**9.53**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Smoothness Factors
Base Value (Condition A) Base Conditions
Test Value (Condition B) One Half Base Conditions

Soil Group: #8 Bennington
Sensitivity Test: Coefficient of Uptake
Condition A: 0.3
Condition B: 0.9

	SSL					**ASL**					**SLL**					**Total**				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	8.81	0.00	-0.01	0.00	0.03	0.06	0.03	117.01	0.02	79.47	79.69	0.22	0.31	0.16	88.31	88.57	0.25	0.31	0.17
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	8.51	0.86	14.03	0.59	0.06	0.15	0.09	157.02	0.05	79.93	77.49	-2.45	-3.15	1.96	87.64	86.15	-1.49	-1.50	1.84
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	8.81	4.15	110.91	1.95	0.04	0.13	0.09	251.06	0.04	112.26	98.61	-13.65	-11.30	10.98	116.96	107.55	-9.41	-6.41	9.99
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	16.58	9.66	171.11	5.01	0.04	0.18	0.15	483.77	0.08	82.26	68.82	-13.44	-15.83	10.52	89.22	85.59	-3.63	-1.56	8.23
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	16.16	9.39	169.58	4.87	0.10	0.52	0.42	512.36	0.23	74.63	61.91	-12.72	-16.53	10.18	81.49	78.59	-2.91	-0.79	7.96
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	16.58	9.66	171.12	5.01	0.10	0.28	0.18	330.54	0.08	82.26	68.82	-13.44	-15.83	10.52	89.27	85.67	-3.60	-1.48	8.24
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	21.83	12.04	146.43	6.24	0.08	0.31	0.23	393.08	0.14	55.65	45.68	-9.97	-17.67	7.59	65.52	67.82	2.30	7.53	5.83
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	21.94	12.10	146.30	6.26	0.18	0.71	0.54	413.60	0.27	56.69	46.55	-10.14	-17.64	7.68	66.71	69.20	2.50	7.73	5.90
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	21.95	12.11	146.37	6.27	0.13	0.29	0.17	218.95	0.06	56.69	46.57	-10.12	-17.61	7.67	66.66	68.81	2.15	7.17	5.84
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	9.96	-0.01	-0.02	0.02	0.02	0.06	0.04	146.86	0.06	111.51	111.51	0.00	0.00	0.00	121.49	121.52	0.03	0.03	0.04
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	10.07	0.43	8.62	0.23	0.05	0.14	0.09	165.71	0.10	86.88	84.19	-2.69	-3.13	2.31	96.58	94.41	-2.17	-2.12	2.16
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	9.95	1.94	70.85	0.82	0.06	0.10	0.04	180.44	0.02	127.05	111.50	-15.55	-11.26	12.20	135.12	121.56	-13.56	-8.58	11.70
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	12.28	3.84	103.29	1.81	0.03	0.11	0.08	394.09	0.05	89.85	75.36	-14.49	-15.43	11.57	98.32	87.75	-10.57	-8.96	10.38
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	12.43	3.88	101.82	1.86	0.09	0.31	0.23	395.63	0.16	80.37	66.82	-13.55	-16.16	11.12	89.01	79.56	-9.44	-8.73	9.87
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	12.28	3.84	103.31	1.81	0.08	0.15	0.07	196.52	0.03	89.84	75.36	-14.49	-15.43	11.57	98.36	87.79	-10.57	-8.94	10.39
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	6.31	0.00	-0.01	0.00	0.02	0.05	0.03	117.39	0.01	73.12	73.11	0.00	0.00	0.00	79.45	79.47	0.02	0.03	0.01
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	6.26	0.64	12.94	0.44	0.04	0.11	0.07	157.00	0.03	61.13	59.40	-1.73	-2.97	1.27	66.79	65.77	-1.02	-1.38	1.26
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	6.31	3.20	116.07	1.46	0.03	0.09	0.06	256.59	0.02	82.45	73.11	-9.34	-10.75	7.60	85.60	79.51	-6.08	-5.77	6.98
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	12.66	7.55	188.67	3.80	0.03	0.14	0.11	546.19	0.06	63.90	53.98	-9.93	-15.28	7.55	69.04	66.77	-2.26	-0.88	6.18
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	12.44	7.38	187.02	3.73	0.07	0.38	0.31	601.19	0.16	58.52	49.02	-9.50	-15.97	7.37	63.66	61.84	-1.81	-0.08	6.03
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	12.66	7.55	188.70	3.80	0.07	0.20	0.13	398.54	0.05	63.90	53.97	-9.93	-15.28	7.55	69.07	66.83	-2.25	-0.82	6.19
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	17.13	9.52	156.20	4.75	0.06	0.24	0.18	466.05	0.12	44.28	36.63	-7.66	-17.22	5.53	51.95	54.00	2.05	8.01	4.64
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	17.23	9.57	156.36	4.77	0.13	0.50	0.37	470.11	0.16	45.01	37.25	-7.77	-17.19	5.60	52.80	54.98	2.18	8.28	4.71
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	17.23	9.58	156.42	4.77	0.10	0.24	0.14	278.66	0.04	45.02	37.26	-7.76	-17.17	5.60	52.77	54.73	1.96	7.81	4.67
Min Average Difference (g/ha)			**0.00**					**0.03**					**0.00**					**0.02**		
Max Average Difference (g/ha)			**12.11**					**0.54**					**15.55**					**13.56**		
Range			**12.11**					**0.51**					**15.54**					**13.54**		
Average Difference (g/ha)			**5.79**					**0.16**					**-8.75**					**-2.81**		
Average Standard Deviation (g/ha)					**2.93**					**0.09**					**6.84**					**5.80**
Average Percent Difference				**109.42**					**318.68**					**-12.02**					**-0.46**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Soil Loss Ratio Values
Base Value (Condition A) Base Condtions
Test Value (Condition B) One Half Base Conditions

BMP SCENARIO	SSL					ASL					SLL					Total				
	A	B	Average Difference			A	B	Average Difference			A	B	Average Difference			A	B	Average Difference		
	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*	(g/ha)	(g/ha)	(b/ha)	Percent	*SD*	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	29.09	19.79	227.48	10.21	0.12	0.04	-0.08	-62.09	0.05	46.76	16.80	-29.96	-65.13	20.79	56.19	45.93	-10.25	-11.73	16.72
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	29.09	20.75	269.67	10.72	0.24	0.11	-0.13	-53.76	0.09	44.04	20.39	-23.65	-54.44	19.43	52.61	49.58	-3.03	2.78	15.85
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	29.09	24.19	585.98	12.02	0.22	0.11	-0.11	-41.19	0.16	68.22	20.39	-47.84	-71.12	32.63	73.34	49.58	-23.76	-23.83	26.67
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	30.51	23.40	387.61	12.18	0.16	0.05	-0.11	-62.46	0.09	34.00	10.04	-23.96	-71.85	17.33	41.27	40.60	-0.67	19.30	13.62
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	29.60	22.53	369.64	13.21	0.39	0.15	-0.24	-56.02	0.20	29.49	9.92	-19.57	-67.61	15.18	36.95	39.67	2.72	27.66	13.07
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	30.51	23.41	388.35	12.19	0.51	0.13	-0.38	-66.69	0.31	33.98	10.03	-23.95	-71.84	17.32	41.59	40.67	-0.92	18.17	13.60
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	31.12	21.33	255.42	10.79	0.39	0.09	-0.30	-72.48	0.25	16.23	5.99	-10.24	-64.15	8.06	26.41	37.20	10.79	61.86	8.56
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	31.33	21.52	257.88	10.85	0.74	0.13	-0.60	-79.06	0.45	16.66	4.90	-11.77	-71.86	9.03	27.21	36.36	9.15	54.13	8.78
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	31.33	21.52	257.72	10.85	0.63	0.11	-0.51	-77.84	0.36	16.67	4.90	-11.77	-71.87	9.03	27.10	36.34	9.23	54.58	8.83
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	21.60	12.02	231.83	6.47	0.11	0.04	-0.07	-42.89	0.12	64.53	18.76	-45.76	-71.91	32.63	74.22	40.40	-33.82	-39.49	30.55
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	17.04	7.48	133.02	3.56	0.25	0.05	-0.20	-75.16	0.25	47.21	22.38	-24.84	-53.18	21.78	57.02	39.46	-17.56	-25.90	20.12
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	17.04	9.51	314.02	4.05	0.35	0.05	-0.30	-65.85	0.52	75.64	22.38	-53.26	-70.98	38.53	83.52	39.47	-44.05	-48.36	35.90
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	15.80	7.51	204.12	4.06	0.18	0.03	-0.15	-70.33	0.24	36.81	13.39	-23.42	-64.44	18.33	45.28	29.22	-16.06	-24.18	15.82
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	15.73	7.24	189.62	4.03	0.42	0.06	-0.37	-76.40	0.54	31.54	11.04	-20.49	-66.12	17.00	40.45	26.83	-13.62	-21.86	14.71
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	15.73	7.48	202.39	4.03	0.54	0.05	-0.49	-80.91	0.76	36.80	11.04	-25.76	-71.26	19.81	45.59	26.82	-18.76	-30.47	17.38
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	20.26	13.39	196.44	7.83	0.09	0.03	-0.06	-62.00	0.03	43.59	13.70	-29.89	-70.43	18.24	50.56	34.00	-16.55	-27.55	15.87
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	22.65	16.33	266.43	8.24	0.18	0.07	-0.11	-60.51	0.06	34.03	16.09	-17.94	-53.90	13.77	40.53	38.82	-1.72	5.18	12.31
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	22.65	19.21	601.46	9.19	0.15	0.09	-0.07	-39.06	0.06	50.93	16.09	-34.84	-70.00	21.92	54.53	38.83	-15.70	-19.80	18.47
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	23.75	18.33	405.91	8.96	0.12	0.05	-0.07	-48.03	0.06	26.43	9.80	-16.63	-63.62	11.59	31.98	33.61	1.63	37.05	9.86
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	24.17	18.71	408.11	9.39	0.29	0.10	-0.19	-56.73	0.14	23.15	8.04	-15.12	-66.53	11.21	28.91	32.31	3.40	44.13	9.93
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	24.17	18.76	411.91	9.24	0.35	0.09	-0.26	-63.36	0.21	26.42	8.04	-18.39	-71.07	12.55	32.19	32.30	0.11	31.18	10.72
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	24.90	17.15	271.13	8.15	0.30	0.07	-0.24	-69.93	0.19	12.86	4.84	-8.02	-63.60	6.03	20.91	29.81	8.90	69.99	6.91
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	25.10	17.34	272.74	8.27	0.57	0.10	-0.47	-76.48	0.36	13.18	3.95	-9.23	-71.48	6.78	21.51	29.15	7.64	62.47	7.10
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	25.10	17.33	272.55	8.27	0.49	0.09	-0.40	-75.24	0.30	13.18	3.95	-9.23	-71.48	6.78	21.44	29.14	7.70	62.93	7.14
Min Average Difference (g/ha)			**7.24**					**0.06**					**8.02**					**0.11**		
Max Average Difference (g/ha)			**24.19**					**0.60**					**53.26**					**44.05**		
Range			**16.95**					**0.55**					**45.24**					**43.94**		
Average Difference (g/ha)			**16.93**					**-0.25**					**-23.15**					**-6.47**		
Average Standard Deviation (g/ha)					**8.62**					**0.24**					**16.91**					**14.94**
Average Percent Difference				**307.56**					**-63.94**					**-67.08**					**11.59**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Soil Loss Ratio Values
Base Value (Condition A) Base Conditions
Test Value (Condition B) One Half Base Conditions

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	8.81	0.00	0.00	0.00	0.03	0.02	-0.01	-31.91	0.00	79.47	79.69	0.22	0.31	0.16	88.31	88.53	0.21	0.26	0.15
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	8.81	1.16	17.01	0.99	0.06	0.05	-0.01	-17.72	0.01	79.93	98.62	18.69	25.91	10.86	87.64	107.48	19.84	24.58	11.16
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	8.81	4.15	110.94	1.95	0.04	0.05	0.01	35.37	0.01	112.26	98.62	-13.64	-11.29	10.98	116.96	107.48	-9.48	-6.49	10.00
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	16.58	9.67	171.15	5.01	0.04	0.06	0.02	86.11	0.01	82.26	68.83	-13.43	-15.82	10.51	89.22	85.47	-3.75	-1.71	8.24
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	16.58	9.82	176.20	5.24	0.10	0.17	0.07	100.78	0.03	74.63	68.82	-5.81	-6.36	8.78	81.49	85.57	4.08	8.36	7.58
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	16.58	9.67	171.17	5.01	0.10	0.12	0.03	71.51	0.02	82.26	68.83	-13.43	-15.82	10.51	89.27	85.53	-3.74	-1.69	8.25
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	21.95	12.16	147.58	6.31	0.08	0.20	0.12	204.20	0.09	55.65	46.57	-9.08	-15.97	7.34	65.52	68.73	3.21	8.88	5.82
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	21.95	12.11	146.41	6.27	0.18	0.27	0.10	80.98	0.05	56.69	46.57	-10.12	-17.60	7.67	66.71	68.79	2.09	7.00	5.84
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	21.96	12.11	146.41	6.27	0.13	0.13	0.01	36.72	0.03	56.69	46.58	-10.11	-17.60	7.67	66.66	68.66	2.00	6.88	5.83
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	9.96	0.00	0.00	0.00	0.02	0.02	-0.01	-29.51	0.00	111.51	111.51	0.00	0.00	0.00	121.49	121.49	0.00	0.00	0.00
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	9.96	0.31	4.61	1.60	0.05	0.04	-0.01	-21.20	0.01	86.88	111.51	24.63	30.10	16.38	96.58	121.51	24.93	27.03	16.37
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	9.96	1.95	70.88	0.82	0.06	0.04	-0.02	11.22	0.05	127.05	111.51	-15.54	-11.26	12.19	135.12	121.51	-13.61	-8.63	11.71
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	12.29	3.85	103.33	1.81	0.03	0.04	0.01	55.65	0.01	89.85	75.36	-14.48	-15.42	11.56	98.32	87.69	-10.63	-9.03	10.39
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	12.28	3.73	98.89	1.91	0.09	0.11	0.02	60.54	0.01	80.37	75.36	-5.01	-4.86	8.82	89.01	87.75	-1.26	0.94	8.18
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	12.28	3.85	103.35	1.81	0.08	0.07	-0.01	24.07	0.05	89.84	75.36	-14.48	-15.42	11.56	98.36	87.71	-10.65	-9.03	10.40
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	6.31	0.00	0.00	0.00	0.02	0.01	-0.01	-32.22	0.00	73.12	73.12	0.00	0.00	0.00	79.45	79.44	-0.01	-0.01	0.00
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	6.31	0.69	13.23	0.65	0.04	0.03	-0.01	-20.44	0.01	61.13	73.12	11.98	22.52	5.92	66.79	79.46	12.67	21.20	6.08
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	6.31	3.20	116.10	1.46	0.03	0.04	0.01	36.63	0.01	82.45	73.12	-9.34	-10.75	7.60	85.60	79.46	-6.13	-5.84	6.98
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	12.66	7.55	188.72	3.80	0.03	0.05	0.02	108.56	0.01	63.90	53.98	-9.92	-15.27	7.55	69.04	66.69	-2.35	-1.02	6.19
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	12.66	7.60	192.68	3.96	0.07	0.13	0.06	128.53	0.03	58.52	53.98	-4.55	-6.43	6.82	63.66	66.77	3.11	8.33	6.08
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	12.66	7.55	188.75	3.80	0.07	0.09	0.02	91.90	0.02	63.90	53.98	-9.92	-15.27	7.54	69.07	66.73	-2.35	-1.01	6.19
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	17.24	9.63	157.84	4.82	0.06	0.09	0.03	100.65	0.02	44.28	37.26	-7.02	-15.67	5.38	51.95	54.59	2.64	9.18	4.62
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	17.23	9.58	156.47	4.77	0.13	0.20	0.07	99.07	0.03	45.01	37.26	-7.76	-17.16	5.59	52.80	54.69	1.89	7.61	4.66
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	17.24	9.58	156.47	4.77	0.10	0.11	0.01	57.63	0.03	45.02	37.26	-7.75	-17.15	5.59	52.77	54.61	1.84	7.50	4.65
Min Average Difference (g/ha)			**0.00**					**0.01**					**0.00**					**0.00**		
Max Average Difference (g/ha)			**12.16**					**0.12**					**24.63**					**24.93**		
Range			**12.16**					**0.12**					**24.63**					**24.93**		
Average Difference (g/ha)			**5.83**					**0.02**					**-5.24**					**0.61**		
Average Standard Deviation (g/ha)					**3.04**					**0.02**					**7.79**					**6.89**
Average Percent Difference				**109.92**					**51.55**					**-6.93**					**3.89**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Percent Organic Matter
Base Value (Condition A) Base Values
Test Value (Condition B) 2 x Base Values

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	37.13	27.83	337.37	15.64	0.12	0.18	0.06	59.53	0.06	46.76	3.97	-42.79	-91.60	29.52	56.19	41.28	-14.91	-16.09	25.02
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	36.13	27.80	382.47	15.06	0.24	0.39	0.15	79.05	0.14	44.04	2.55	-41.50	-94.64	31.01	52.61	39.06	-13.55	-12.27	26.64
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	37.12	32.22	812.44	17.15	0.22	0.46	0.24	152.41	0.24	68.22	4.30	-63.92	-94.04	43.05	73.34	41.88	-31.46	-31.33	35.85
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	24.98	17.86	307.22	10.30	0.16	0.13	-0.03	-3.59	0.07	34.00	1.43	-32.57	-96.07	23.49	41.27	26.53	-14.74	-18.66	19.90
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	24.38	17.31	295.82	10.06	0.39	0.35	-0.04	9.39	0.17	29.49	1.12	-28.37	-96.44	21.50	36.95	25.85	-11.10	-11.85	18.20
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	24.97	17.87	307.83	10.30	0.51	0.33	-0.17	-16.29	0.22	33.98	1.42	-32.56	-96.06	23.48	41.59	26.73	-14.86	-19.03	19.92
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	30.95	21.16	257.09	11.47	0.39	0.20	-0.18	-35.45	0.20	16.23	0.39	-15.84	-97.88	12.10	26.41	31.55	5.14	40.91	11.54
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	31.09	21.28	258.68	11.52	0.74	0.46	-0.28	-25.44	0.29	16.66	0.42	-16.24	-97.78	12.34	27.21	31.97	4.76	38.60	11.65
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	31.09	21.28	258.54	11.53	0.63	0.35	-0.28	-32.62	0.25	16.67	0.42	-16.25	-97.78	12.34	27.10	31.86	4.75	38.66	11.64
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	16.37	6.79	148.24	5.84	0.11	0.06	-0.05	-12.99	0.11	64.53	4.79	-59.74	-92.92	42.63	74.22	21.22	-53.00	-66.68	39.89
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	16.87	7.31	158.87	5.87	0.25	0.15	-0.10	-9.24	0.23	47.21	2.77	-44.45	-94.48	35.23	57.02	19.78	-37.24	-58.67	32.55
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	16.36	8.83	351.09	6.19	0.35	0.17	-0.18	20.16	0.48	75.64	4.79	-70.85	-93.87	50.57	83.52	21.32	-62.20	-69.45	47.24
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	10.07	1.78	111.54	6.96	0.18	0.04	-0.13	-51.62	0.24	36.81	1.60	-35.21	-95.88	26.80	45.28	11.71	-33.57	-66.02	25.14
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	10.12	1.63	103.46	7.02	0.42	0.12	-0.30	-45.57	0.53	31.54	1.25	-30.29	-96.25	24.18	40.45	11.49	-28.96	-62.83	22.72
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	10.06	1.82	111.88	6.88	0.54	0.11	-0.43	-58.48	0.74	36.80	1.60	-35.20	-95.88	26.79	45.59	11.77	-33.81	-66.14	25.22
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	29.77	22.89	355.13	12.07	0.09	0.14	0.05	62.04	0.04	43.59	3.47	-40.12	-92.65	25.03	50.56	33.38	-17.18	-23.01	22.98
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	29.41	23.09	390.45	11.87	0.18	0.30	0.12	77.59	0.09	34.03	2.08	-31.95	-94.40	22.44	40.53	31.79	-8.74	-5.78	21.03
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	29.76	26.31	841.51	13.20	0.15	0.36	0.21	158.22	0.14	50.93	3.47	-47.46	-93.67	29.74	54.53	33.59	-20.93	-25.26	26.21
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	20.20	14.78	320.97	7.82	0.12	0.10	-0.02	3.02	0.04	26.43	1.16	-25.28	-95.92	17.36	31.98	21.46	-10.52	-7.47	15.38
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	19.81	14.34	309.37	7.68	0.29	0.27	-0.02	19.37	0.09	23.15	0.91	-22.24	-96.32	16.12	28.91	20.99	-7.91	-0.92	14.29
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	20.20	14.79	321.69	7.82	0.35	0.25	-0.10	-8.37	0.13	26.42	1.16	-25.27	-95.92	17.35	32.19	21.60	-10.58	-7.81	15.38
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	25.10	17.35	267.15	9.01	0.30	0.17	-0.14	-27.83	0.13	12.86	0.23	-12.63	-98.52	9.32	20.91	25.49	4.58	48.95	9.53
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	25.21	17.44	268.25	9.04	0.57	0.35	-0.22	-20.36	0.22	13.18	0.24	-12.94	-98.47	9.49	21.51	25.80	4.29	46.58	9.60
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	25.21	17.44	268.07	9.05	0.49	0.28	-0.21	-25.96	0.20	13.18	0.24	-12.94	-98.47	9.49	21.44	25.73	4.29	46.74	9.61
Min Average Difference (g/ha)			**1.63**					**0.02**					**12.63**					**4.29**		
Max Average Difference (g/ha)			**32.22**					**0.43**					**70.85**					**62.20**		
Range			**30.59**					**0.41**					**58.21**					**57.91**		
Average Difference (g/ha)			**16.72**					**-0.09**					**-33.19**					**-16.56**		
Average Standard Deviation (g/ha)					**9.97**					**0.21**					**23.81**					**21.55**
Average Percent Difference				**314.38**					**11.12**					**-95.66**					**-12.87**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Percent Organic Matter
Base Value (Condition A) Base Values
Test Value (Condition B) 2 x Base Values

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	20.08	11.27	138.16	6.69	0.03	0.13	0.11	369.92	0.06	79.47	52.44	-27.04	-33.04	20.05	88.31	72.65	-15.66	-15.17	17.05
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	19.43	11.78	171.95	6.58	0.06	0.30	0.24	431.53	0.14	79.93	50.26	-29.68	-37.05	21.83	87.64	69.99	-17.65	-17.68	18.89
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	20.08	15.42	401.00	8.36	0.04	0.38	0.34	866.96	0.19	112.26	65.20	-47.06	-40.12	33.92	116.96	85.66	-31.30	-22.98	29.30
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	23.06	16.14	284.26	9.43	0.04	0.23	0.20	650.63	0.12	82.26	32.37	-49.90	-61.25	31.12	89.22	55.66	-33.56	-34.99	26.68
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	22.49	15.73	280.48	9.19	0.10	0.63	0.53	652.93	0.32	74.63	28.55	-46.08	-62.41	29.90	81.49	51.68	-29.82	-33.58	25.59
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	23.05	16.13	284.18	9.42	0.10	0.59	0.50	663.92	0.29	82.26	32.36	-49.90	-61.27	31.12	89.27	56.00	-33.28	-34.61	26.63
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	18.80	9.01	114.78	5.30	0.08	0.29	0.21	339.54	0.14	55.65	16.45	-39.20	-71.70	24.36	65.52	35.54	-29.98	-43.08	21.96
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	18.39	8.54	106.62	5.83	0.18	0.61	0.43	307.68	0.29	56.69	16.67	-40.02	-71.91	24.59	66.71	35.66	-31.04	-44.37	22.13
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	18.89	9.04	114.96	5.33	0.13	0.47	0.34	345.68	0.19	56.69	16.82	-39.87	-71.59	24.61	66.66	36.18	-30.49	-43.04	22.20
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	16.23	6.27	137.67	4.30	0.02	0.15	0.13	886.04	0.07	111.51	60.35	-51.16	-44.97	35.14	121.49	76.73	-44.76	-34.21	33.79
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	13.90	4.26	88.56	2.58	0.05	0.15	0.10	239.92	0.07	86.88	57.23	-29.65	-32.78	24.09	96.58	71.28	-25.29	-23.58	22.73
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	13.81	5.79	220.31	3.02	0.06	0.22	0.16	524.61	0.11	127.05	67.84	-59.21	-44.15	41.85	135.12	81.87	-53.25	-35.70	39.93
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	11.72	3.28	133.20	4.72	0.03	0.11	0.08	495.18	0.05	89.85	42.82	-47.03	-51.89	31.92	98.32	54.65	-43.66	-42.33	30.35
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	11.87	3.32	130.65	4.76	0.09	0.24	0.16	317.70	0.09	80.37	31.96	-48.41	-60.35	33.44	89.01	44.06	-44.94	-48.62	31.93
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	11.81	3.37	135.82	4.77	0.08	0.25	0.17	386.60	0.09	89.84	34.52	-55.33	-61.72	36.25	98.36	46.58	-51.78	-50.96	34.67
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	13.52	7.21	115.77	5.03	0.02	0.11	0.09	416.77	0.05	73.12	44.00	-29.11	-40.36	17.68	79.45	57.63	-21.81	-26.49	16.42
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	15.15	9.54	177.85	5.23	0.04	0.20	0.16	367.15	0.09	61.13	42.80	-18.33	-30.02	14.08	66.79	58.16	-8.64	-10.10	13.09
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	15.50	12.39	435.29	6.47	0.03	0.28	0.25	885.52	0.14	82.45	48.70	-33.75	-40.44	22.78	85.60	64.48	-21.12	-21.77	20.43
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	17.64	12.53	294.84	6.72	0.03	0.21	0.18	842.73	0.10	63.90	31.61	-32.29	-51.07	19.74	69.04	49.46	-19.58	-25.40	17.59
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	18.05	12.99	304.66	7.10	0.07	0.42	0.35	615.33	0.22	58.52	23.88	-34.65	-60.19	21.38	63.66	42.35	-21.31	-30.21	19.22
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	18.33	13.22	307.62	7.18	0.07	0.45	0.38	758.07	0.20	63.90	25.41	-38.49	-61.35	22.17	69.07	44.18	-24.90	-33.37	19.89
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	15.88	8.27	133.24	4.27	0.06	0.29	0.23	561.48	0.14	44.28	16.09	-28.19	-65.05	16.70	51.95	32.26	-19.69	-34.70	15.34
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	15.24	7.59	122.14	4.01	0.13	0.41	0.28	287.03	0.17	45.01	13.65	-31.36	-71.26	18.16	52.80	29.30	-23.50	-41.77	16.66
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	15.24	7.59	122.11	4.01	0.10	0.37	0.27	372.68	0.14	45.02	13.65	-31.36	-71.26	18.16	52.77	29.27	-23.50	-41.77	16.67
Min Average Difference (g/ha)			**3.28**					**0.08**					**18.33**					**8.64**		
Max Average Difference (g/ha)			**16.14**					**0.53**					**59.21**					**53.25**		
Range			**12.86**					**0.45**					**40.88**					**44.62**		
Average Difference (g/ha)			**9.61**					**0.25**					**-39.04**					**-29.19**		
Average Standard Deviation (g/ha)					**5.85**					**0.14**					**25.63**					**23.30**
Average Percent Difference				**198.17**					**524.40**					**-54.05**					**-32.94**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Soil Incorporation Depth
Base Value (Condition A) 1, 5
Test Value (Condition B) 2, 10

BMP SCENARIO	SSL					ASL					SLL					Total				
	A	B	Average Difference			A	B	Average Difference			A	B	Average Difference			A	B	Average Difference		
	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*	(g/ha)	(g/ha)	(b/ha)	Percent	*SD*	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	29.09	19.78	227.47	10.21	0.12	0.07	-0.05	-38.13	0.04	46.76	16.80	-29.96	-65.14	20.79	56.19	45.96	-10.23	-11.68	16.72
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	28.34	20.01	263.85	9.83	0.24	0.16	-0.08	-30.25	0.08	44.04	13.48	-30.56	-70.82	22.83	52.61	41.98	-10.63	-11.07	19.06
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	29.08	24.19	585.93	12.01	0.22	0.18	-0.04	-4.99	0.15	68.22	20.39	-47.84	-71.12	32.63	73.34	49.65	-23.69	-23.73	26.66
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	30.51	23.40	387.59	12.18	0.16	0.08	-0.08	-40.66	0.08	34.00	10.04	-23.96	-71.85	17.33	41.27	40.62	-0.65	19.40	13.63
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	29.80	22.73	376.98	11.80	0.39	0.22	-0.17	-31.80	0.18	29.49	8.30	-21.19	-73.15	16.14	36.95	38.32	1.37	26.29	12.95
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	29.37	22.27	355.04	13.74	0.51	0.20	-0.31	-52.76	0.27	33.98	9.83	-24.16	-72.59	17.32	41.59	39.40	-2.20	10.36	12.91
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	30.96	21.18	253.78	10.70	0.39	0.14	-0.25	-56.14	0.23	16.23	5.84	-10.39	-65.09	8.15	26.41	36.94	10.54	60.90	8.58
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	31.33	21.52	257.86	10.85	0.74	0.19	-0.54	-68.96	0.42	16.66	4.90	-11.77	-71.86	9.03	27.21	36.41	9.20	54.39	8.79
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	31.33	21.51	257.69	10.85	0.63	0.19	-0.43	-63.54	0.32	16.67	4.90	-11.77	-71.87	9.03	27.10	36.41	9.31	54.90	8.85
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	16.87	7.29	177.81	7.83	0.11	0.06	-0.05	-8.76	0.13	64.53	21.58	-42.95	-67.65	30.53	74.22	38.51	-35.71	-43.08	29.19
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	12.30	2.74	78.41	4.78	0.25	0.05	-0.20	-71.58	0.26	47.21	18.61	-28.60	-61.53	23.40	57.02	30.96	-26.07	-42.11	22.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	11.84	4.30	206.41	5.07	0.35	0.06	-0.29	-60.24	0.52	75.64	23.93	-51.70	-69.06	37.03	83.52	35.83	-47.69	-54.03	35.28
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	10.73	2.44	116.91	5.64	0.18	0.03	-0.15	-66.65	0.24	36.81	15.88	-20.94	-57.79	16.46	45.28	26.63	-18.65	-33.05	15.42
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	10.88	2.39	110.01	5.73	0.42	0.06	-0.37	-75.24	0.55	31.54	11.38	-20.15	-65.26	16.45	40.45	22.32	-18.13	-36.32	15.52
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	10.70	2.45	115.92	5.59	0.54	0.06	-0.48	-78.04	0.76	36.80	12.75	-24.05	-66.84	18.36	45.59	23.51	-22.08	-40.82	17.35
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	19.57	12.69	185.97	7.44	0.09	0.05	-0.04	-41.82	0.02	43.59	13.98	-29.60	-69.84	18.04	50.56	33.60	-16.95	-28.65	15.64
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	22.37	16.05	263.39	7.70	0.18	0.10	-0.08	-40.74	0.05	34.03	12.08	-21.95	-66.17	15.54	40.53	34.55	-5.98	-4.75	13.82
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	22.78	19.34	607.60	9.19	0.15	0.13	-0.02	-6.06	0.04	50.93	14.85	-36.08	-72.50	22.44	54.53	37.76	-16.76	-21.52	18.97
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	23.75	18.33	405.89	8.96	0.12	0.08	-0.04	-17.49	0.05	26.43	9.80	-16.63	-63.62	11.59	31.98	33.63	1.65	37.19	9.87
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	23.78	18.32	399.74	9.00	0.29	0.14	-0.15	-34.18	0.13	23.15	7.02	-16.13	-71.03	11.74	28.91	30.95	2.04	39.56	10.22
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	24.14	18.73	411.92	9.21	0.35	0.16	-0.20	-40.14	0.18	26.42	7.71	-18.71	-72.32	12.72	32.19	32.01	-0.18	30.95	10.87
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	24.77	17.02	269.28	8.08	0.30	0.11	-0.20	-51.71	0.18	12.86	4.73	-8.13	-64.48	6.10	20.91	29.61	8.70	69.04	6.92
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	25.10	17.33	272.72	8.26	0.57	0.15	-0.42	-65.13	0.33	13.18	3.95	-9.23	-71.48	6.78	21.51	29.20	7.69	62.73	7.11
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	25.10	17.33	272.52	8.26	0.49	0.15	-0.34	-59.80	0.27	13.18	3.95	-9.23	-71.49	6.78	21.44	29.20	7.76	63.27	7.16
Min Average Difference (g/ha)			**2.39**					**0.02**					**8.13**					**0.18**		
Max Average Difference (g/ha)			**24.19**					**0.54**					**51.70**					**47.69**		
Range			**21.80**					**0.52**					**43.57**					**47.51**		
Average Difference (g/ha)			**15.56**					**-0.21**					**-23.57**					**-8.22**		
Average Standard Deviation (g/ha)					**8.87**					**0.23**					**16.97**					**15.15**
Average Percent Difference				**285.86**					**-46.03**					**-68.52**					**7.42**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Soil Incorporation Depth
Base Value (Condition A) 1, 5
Test Value (Condition B) 2, 10

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	8.81	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	79.47	79.69	0.22	0.31	0.16	88.31	88.53	0.22	0.27	0.16
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	8.51	0.86	14.05	0.59	0.06	0.07	0.01	13.35	0.00	79.93	77.49	-2.44	-3.15	1.96	87.64	86.07	-1.57	-1.60	1.84
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	8.81	4.15	110.92	1.95	0.04	0.08	0.04	105.89	0.02	112.26	98.62	-13.64	-11.30	10.98	116.96	107.51	-9.45	-6.47	9.99
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	16.58	9.66	171.14	5.01	0.04	0.08	0.05	171.45	0.02	82.26	68.83	-13.44	-15.82	10.51	89.22	85.49	-3.72	-1.68	8.24
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	16.17	9.40	169.67	4.87	0.10	0.23	0.13	175.08	0.07	74.63	61.93	-12.70	-16.51	10.17	81.49	78.32	-3.17	-1.16	7.98
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	16.58	9.66	171.14	5.01	0.10	0.22	0.12	187.44	0.06	82.26	68.82	-13.44	-15.82	10.51	89.27	85.62	-3.65	-1.58	8.24
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	21.84	12.05	146.47	6.24	0.08	0.17	0.09	152.87	0.05	55.65	45.68	-9.97	-17.66	7.59	65.52	67.69	2.17	7.27	5.81
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	21.95	12.11	146.38	6.27	0.18	0.37	0.19	152.48	0.10	56.69	46.57	-10.12	-17.61	7.67	66.71	68.88	2.18	7.16	5.85
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	21.95	12.11	146.38	6.27	0.13	0.25	0.12	146.94	0.05	56.69	46.57	-10.12	-17.61	7.67	66.66	68.78	2.11	7.07	5.85
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	6.00	-3.96	-36.05	5.18	0.02	0.01	-0.01	-35.61	0.01	111.51	127.02	15.51	13.53	10.51	121.49	133.03	11.54	8.69	11.36
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	6.27	-3.38	-28.06	4.75	0.05	0.04	-0.02	-27.83	0.02	86.88	94.88	8.00	9.04	6.22	96.58	101.18	4.60	4.27	7.79
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	5.99	-2.02	11.25	5.05	0.06	0.05	-0.01	13.88	0.04	127.05	127.01	-0.03	0.52	6.67	135.12	133.06	-2.06	-0.89	9.16
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	7.42	-1.02	30.49	4.86	0.03	0.03	0.00	41.43	0.02	89.85	90.04	0.20	0.85	6.26	98.32	97.50	-0.82	0.22	8.62
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	7.62	-0.92	31.11	4.81	0.09	0.08	0.00	40.69	0.05	80.37	79.44	-0.93	-0.40	5.87	89.01	87.15	-1.85	-0.88	8.19
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	7.42	-1.01	30.48	4.86	0.08	0.08	0.00	38.27	0.04	89.84	90.04	0.20	0.85	6.26	98.36	97.54	-0.82	0.22	8.63
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	6.31	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	73.12	73.12	0.00	0.00	0.00	79.45	79.45	0.00	0.00	0.00
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	6.26	0.64	12.97	0.45	0.04	0.05	0.00	12.40	0.00	61.13	59.41	-1.73	-2.96	1.26	66.79	65.71	-1.08	-1.48	1.27
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	6.31	3.20	116.08	1.46	0.03	0.06	0.03	112.43	0.01	82.45	73.11	-9.34	-10.75	7.60	85.60	79.48	-6.11	-5.82	6.98
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	12.66	7.55	188.71	3.80	0.03	0.07	0.04	204.49	0.02	63.90	53.98	-9.92	-15.27	7.55	69.04	66.71	-2.33	-1.00	6.19
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	12.45	7.39	187.13	3.73	0.07	0.17	0.10	217.07	0.05	58.52	49.03	-9.49	-15.95	7.36	63.66	61.65	-2.00	-0.44	6.04
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	12.66	7.55	188.72	3.80	0.07	0.16	0.09	218.53	0.04	63.90	53.97	-9.92	-15.28	7.55	69.07	66.79	-2.28	-0.91	6.19
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	17.13	9.53	156.24	4.76	0.06	0.13	0.07	188.00	0.04	44.28	36.63	-7.65	-17.21	5.53	51.95	53.90	1.95	7.79	4.64
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	17.23	9.58	156.44	4.77	0.13	0.28	0.15	181.44	0.07	45.01	37.26	-7.76	-17.17	5.60	52.80	54.76	1.97	7.77	4.68
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	17.23	9.58	156.43	4.77	0.10	0.20	0.10	177.18	0.04	45.02	37.26	-7.76	-17.16	5.59	52.77	54.69	1.92	7.70	4.67
Min Average Difference (g/ha)			**0.00**					**0.00**					**0.00**					**0.00**		
Max Average Difference (g/ha)			**12.11**					**0.19**					**15.51**					**11.54**		
Range			**12.11**					**0.19**					**15.51**					**11.54**		
Average Difference (g/ha)			**4.70**					**0.05**					**-5.26**					**-0.51**		
Average Standard Deviation (g/ha)					**3.89**					**0.03**					**6.54**					**6.18**
Average Percent Difference				**94.92**					**103.66**					**-8.44**					**1.44**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Percent Foliar Interception
Base Value (Condition A) 0, 24
Test Value (Condition B) 25, 48

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	24.09	14.78	170.94	8.00	0.12	0.06	-0.06	-48.87	0.04	46.76	13.85	-32.91	-71.31	22.82	56.19	38.00	-18.19	-27.01	19.21
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	23.46	15.12	200.89	7.72	0.24	0.13	-0.11	-42.37	0.09	44.04	11.09	-32.95	-76.19	24.59	52.61	34.67	-17.94	-26.65	21.29
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	24.08	19.19	467.41	9.75	0.22	0.15	-0.07	-21.46	0.15	68.22	16.77	-51.45	-76.38	34.92	73.34	41.00	-32.33	-37.10	29.81
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	25.24	18.13	302.97	9.62	0.16	0.07	-0.10	-51.09	0.08	34.00	8.26	-25.73	-76.81	18.60	41.27	33.57	-7.70	-1.35	14.80
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	24.66	17.58	294.26	9.34	0.39	0.18	-0.21	-43.82	0.19	29.49	6.84	-22.66	-77.89	17.23	36.95	31.67	-5.28	4.29	13.83
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	25.24	18.14	303.57	9.62	0.51	0.17	-0.33	-57.52	0.29	33.98	8.26	-25.72	-76.81	18.59	41.59	33.68	-7.91	-2.18	14.82
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	25.78	15.99	194.42	8.11	0.39	0.08	-0.30	-73.55	0.25	16.23	3.90	-12.34	-77.13	9.49	26.41	29.76	3.35	29.93	7.97
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	25.90	16.09	195.54	8.15	0.74	0.19	-0.54	-68.64	0.42	16.66	4.02	-12.64	-77.01	9.68	27.21	30.12	2.91	27.54	7.99
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	25.91	16.09	195.42	8.15	0.63	0.15	-0.48	-71.94	0.34	16.67	4.02	-12.65	-77.01	9.68	27.10	30.07	2.97	27.76	8.01
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	17.06	7.48	125.57	3.76	0.11	0.03	-0.08	-58.93	0.12	64.53	18.73	-45.80	-71.88	32.84	74.22	35.82	-38.40	-48.49	30.73
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	17.30	7.73	132.24	3.92	0.25	0.08	-0.17	-57.30	0.24	47.21	12.06	-35.16	-75.57	28.00	57.02	29.43	-27.60	-44.03	25.90
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	17.06	9.52	300.87	4.48	0.35	0.09	-0.26	-45.89	0.49	75.64	18.72	-56.91	-75.76	40.98	83.52	35.87	-47.65	-52.98	38.25
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	15.90	7.62	198.16	4.30	0.18	0.03	-0.14	-64.32	0.24	36.81	9.23	-27.58	-75.98	21.15	45.28	25.17	-20.11	-34.02	18.56
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	15.95	7.46	187.31	4.34	0.42	0.09	-0.33	-59.41	0.52	31.54	7.54	-23.99	-77.09	19.34	40.45	23.59	-16.86	-30.77	16.79
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	15.90	7.65	198.66	4.29	0.54	0.09	-0.45	-69.37	0.74	36.80	9.23	-27.57	-75.97	21.14	45.59	25.22	-20.37	-34.46	18.56
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	18.05	11.17	166.29	5.70	0.09	0.04	-0.05	-51.02	0.02	43.59	12.81	-30.78	-72.31	18.97	50.56	30.90	-19.66	-33.96	16.89
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	17.92	11.59	190.48	5.66	0.18	0.09	-0.09	-45.94	0.05	34.03	8.63	-25.40	-76.26	17.59	40.53	26.64	-13.89	-26.42	15.83
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	18.05	14.60	456.88	7.05	0.15	0.11	-0.05	-23.87	0.05	50.93	12.80	-38.12	-76.23	23.85	54.53	30.96	-23.57	-36.23	20.77
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	19.25	13.82	307.19	6.78	0.12	0.05	-0.07	-47.89	0.06	26.43	6.40	-20.03	-77.02	13.67	31.98	25.70	-6.28	5.28	11.33
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	18.89	13.43	297.73	6.59	0.29	0.13	-0.16	-38.97	0.13	23.15	5.33	-17.82	-78.13	12.86	28.91	24.36	-4.55	10.42	10.72
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	19.24	13.83	307.89	6.78	0.35	0.12	-0.23	-53.98	0.19	26.42	6.40	-20.03	-77.01	13.66	32.19	25.76	-6.42	4.54	11.32
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	19.87	12.13	196.22	5.65	0.30	0.07	-0.24	-70.55	0.19	12.86	3.05	-9.82	-77.55	7.23	20.91	22.99	2.08	31.70	6.06
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	19.97	12.21	197.21	5.68	0.57	0.14	-0.43	-66.86	0.34	13.18	3.14	-10.04	-77.43	7.35	21.51	23.25	1.74	29.48	6.07
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	19.97	12.20	197.07	5.68	0.49	0.11	-0.38	-69.19	0.29	13.18	3.14	-10.04	-77.43	7.35	21.44	23.22	1.78	29.74	6.09
Min Average Difference (g/ha)			**7.46**					**0.05**					**9.82**					**1.74**		
Max Average Difference (g/ha)			**19.19**					**0.54**					**56.91**					**47.65**		
Range			**11.73**					**0.50**					**47.09**					**45.92**		
Average Difference (g/ha)			**13.07**					**-0.22**					**-26.17**					**-13.33**		
Average Standard Deviation (g/ha)					**6.63**					**0.23**					**18.82**					**16.32**
Average Percent Difference				**241.05**					**-54.28**					**-76.17**					**-9.79**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:
Percent Soil Interception + Percent Foliar Interception + Percent Drift = 100%

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Percent Foliar Interception
Base Value (Condition A) 0, 24
Test Value (Condition B) 25, 48

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	7.26	-1.56	-17.61	1.11	0.03	0.02	-0.01	-17.50	0.00	79.47	65.51	-13.97	-17.56	8.87	88.31	72.79	-15.53	-17.60	9.34
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	7.00	-0.65	-6.12	0.89	0.06	0.05	0.00	-6.60	0.01	79.93	63.69	-16.24	-20.44	10.68	87.64	70.74	-16.90	-19.15	10.94
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	7.26	2.60	73.69	1.48	0.04	0.07	0.02	69.55	0.01	112.26	81.03	-31.23	-27.13	20.61	116.96	88.36	-28.60	-23.16	19.93
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	13.68	6.76	123.44	3.58	0.04	0.07	0.03	122.82	0.02	82.26	56.54	-25.72	-30.86	17.03	89.22	70.30	-18.92	-19.16	15.00
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	13.34	6.57	122.21	3.51	0.10	0.19	0.09	125.73	0.05	74.63	50.88	-23.75	-31.43	16.36	81.49	64.40	-17.09	-18.73	14.41
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	13.68	6.76	123.44	3.58	0.10	0.18	0.08	135.84	0.04	82.26	56.54	-25.72	-30.87	17.03	89.27	70.40	-18.88	-19.08	14.99
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	18.01	8.22	102.93	4.23	0.08	0.14	0.06	108.01	0.03	55.65	37.52	-18.13	-32.39	12.17	65.52	55.67	-9.85	-11.80	9.95
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	18.10	8.26	102.89	4.24	0.18	0.31	0.13	107.42	0.06	56.69	38.25	-18.44	-32.34	12.31	66.71	56.66	-10.05	-11.87	10.04
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	18.10	8.26	102.89	4.24	0.13	0.21	0.08	102.46	0.03	56.69	38.25	-18.44	-32.34	12.30	66.66	56.57	-10.10	-11.94	10.05
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	9.97	0.01	-3.75	1.29	0.02	0.02	0.00	-4.77	0.00	111.51	93.21	-18.30	-16.38	12.06	121.49	103.20	-18.29	-14.98	12.04
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	9.90	0.26	2.16	1.30	0.05	0.05	0.00	2.38	0.01	86.88	70.43	-16.45	-18.93	11.52	96.58	80.38	-16.19	-16.62	11.43
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	9.97	1.96	62.33	1.67	0.06	0.08	0.02	66.21	0.02	127.05	93.20	-33.85	-25.79	23.02	135.12	103.25	-31.87	-22.27	22.50
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	12.36	3.92	96.63	2.62	0.03	0.05	0.02	114.67	0.01	89.85	62.91	-26.93	-29.36	18.77	98.32	75.32	-23.00	-21.78	17.53
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	12.40	3.85	93.36	2.58	0.09	0.14	0.05	111.21	0.03	80.37	55.81	-24.56	-29.95	17.80	89.01	68.34	-20.67	-21.58	16.56
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	12.35	3.92	96.63	2.62	0.08	0.13	0.05	112.97	0.03	89.84	62.91	-26.93	-29.36	18.78	98.36	75.39	-22.97	-21.74	17.53
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	5.00	-1.31	-20.99	0.65	0.02	0.02	0.00	-21.05	0.00	73.12	57.93	-15.19	-20.93	8.20	79.45	62.95	-16.50	-20.93	8.52
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	4.96	-0.66	-10.89	0.57	0.04	0.04	-0.01	-11.42	0.00	61.13	47.10	-14.04	-23.25	8.24	66.79	52.09	-14.70	-22.08	8.47
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	5.00	1.89	70.57	0.86	0.03	0.05	0.02	67.53	0.01	82.45	57.93	-24.52	-29.43	14.84	85.60	62.98	-22.62	-25.53	14.38
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	10.05	4.94	129.10	2.44	0.03	0.05	0.02	141.46	0.01	63.90	42.77	-21.13	-32.98	12.77	69.04	52.87	-16.17	-21.66	11.51
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	9.87	4.81	127.73	2.42	0.07	0.14	0.07	151.11	0.03	58.52	38.86	-19.66	-33.52	12.44	63.66	48.87	-14.79	-21.22	11.22
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	10.05	4.94	129.11	2.44	0.07	0.12	0.06	152.48	0.02	63.90	42.77	-21.13	-32.99	12.77	69.07	52.94	-16.14	-21.60	11.51
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	13.58	5.98	103.49	2.89	0.06	0.10	0.04	128.82	0.02	44.28	29.03	-15.25	-34.51	9.40	51.95	42.72	-9.24	-14.72	8.00
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	13.66	6.01	103.61	2.89	0.13	0.22	0.09	123.41	0.04	45.01	29.52	-15.49	-34.47	9.49	52.80	43.40	-9.40	-14.73	8.07
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	13.66	6.01	103.60	2.89	0.10	0.16	0.06	120.00	0.02	45.02	29.53	-15.49	-34.47	9.49	52.77	43.35	-9.42	-14.79	8.08
Min Average Difference (g/ha)			**0.01**					**0.00**					**13.97**					**9.24**		
Max Average Difference (g/ha)			**8.26**					**0.13**					**33.85**					**31.87**		
Range			**8.25**					**0.13**					**19.88**					**22.64**		
Average Difference (g/ha)			**3.82**					**0.04**					**-20.86**					**-16.99**		
Average Standard Deviation (g/ha)					**2.38**					**0.02**					**13.62**					**12.58**
Average Percent Difference				**75.44**					**83.45**					**-28.40**					**-18.70**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:
Percent Soil Interception + Percent Foliar Interception + Percent Drift = 100%

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Percent Slope
Base Value (Condition A) 2.2
Test Value (Condition B) 4.4

BMP SCENARIO	SSL					ASL					SLL					Total				
	A	B	Average Difference			A	B	Average Difference			A	B	Average Difference			A	B	Average Difference		
	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*	(g/ha)	(g/ha)	(b/ha)	Percent	*SD*	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	29.08	19.78	227.44	10.21	0.12	0.15	0.03	30.42	0.04	46.76	16.82	-29.94	-64.98	20.88	56.19	46.05	-10.13	-11.43	16.82
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	28.34	20.00	263.77	9.82	0.24	0.33	0.10	49.11	0.09	44.04	13.48	-30.56	-70.82	22.83	52.61	42.15	-10.46	-10.68	19.05
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	29.07	24.18	585.71	12.01	0.22	0.46	0.24	142.37	0.20	68.22	20.38	-47.84	-71.13	32.63	73.34	49.91	-23.42	-23.28	26.62
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	30.51	23.39	387.54	12.18	0.16	0.18	0.02	34.59	0.06	34.00	10.03	-23.96	-71.85	17.33	41.27	40.72	-0.55	19.71	13.63
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	29.79	22.72	376.84	11.79	0.39	0.49	0.10	49.15	0.15	29.49	8.30	-21.19	-73.16	16.14	36.95	38.57	1.62	27.19	12.97
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	30.49	23.39	388.16	12.18	0.51	0.51	0.00	27.96	0.16	33.98	10.03	-23.95	-71.85	17.32	41.59	41.03	-0.56	19.30	13.62
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	31.17	21.38	256.48	10.79	0.39	0.26	-0.13	-21.98	0.17	16.23	4.74	-11.49	-72.01	8.87	26.41	36.17	9.76	58.18	8.94
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	31.31	21.50	257.73	10.84	0.74	0.56	-0.18	-9.49	0.23	16.66	4.89	-11.77	-71.87	9.03	27.21	36.77	9.56	55.92	8.93
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	31.32	21.50	257.61	10.85	0.63	0.41	-0.21	-18.94	0.22	16.67	4.89	-11.77	-71.87	9.03	27.10	36.62	9.52	55.91	8.91
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	17.04	7.46	131.84	3.35	0.11	0.07	-0.04	-10.04	0.09	64.53	22.38	-42.15	-66.34	30.32	74.22	39.49	-34.73	-43.27	28.29
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	17.66	8.10	144.14	3.75	0.25	0.17	-0.07	-2.71	0.19	47.21	14.41	-32.81	-70.63	26.22	57.02	32.24	-24.79	-38.47	24.06
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	17.03	9.49	313.84	4.05	0.35	0.24	-0.11	45.49	0.40	75.64	22.37	-53.26	-70.98	38.54	83.52	39.64	-43.88	-48.11	35.88
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	15.73	7.44	201.82	4.06	0.18	0.08	-0.10	-16.82	0.21	36.81	11.04	-25.77	-71.27	19.82	45.28	26.85	-18.43	-29.80	17.35
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	15.93	7.44	193.64	4.22	0.42	0.22	-0.20	-7.97	0.45	31.54	9.02	-22.52	-72.62	18.21	40.45	25.17	-15.28	-26.07	15.75
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	15.72	7.47	202.25	4.03	0.54	0.22	-0.32	-23.23	0.67	36.80	11.04	-25.76	-71.27	19.81	45.59	26.98	-18.61	-30.00	17.35
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	22.65	15.77	235.30	7.84	0.09	0.12	0.03	32.22	0.02	43.59	16.09	-27.50	-65.06	16.97	50.56	38.86	-11.70	-16.69	14.72
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	22.50	16.17	265.97	7.69	0.18	0.26	0.08	48.31	0.06	34.03	10.84	-23.20	-70.13	16.04	40.53	33.59	-6.94	-6.93	14.26
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	22.64	19.20	601.19	9.18	0.15	0.36	0.20	147.29	0.11	50.93	16.09	-34.84	-70.01	21.92	54.53	39.09	-15.44	-19.22	18.46
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	24.17	18.75	410.94	9.24	0.12	0.15	0.02	47.63	0.02	26.43	8.04	-18.39	-71.08	12.56	31.98	32.35	0.38	32.73	10.77
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	23.74	18.28	399.53	8.97	0.29	0.38	0.09	68.23	0.06	23.15	6.70	-16.46	-72.51	11.90	28.91	30.82	1.91	40.06	10.38
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	24.16	18.75	411.73	9.23	0.35	0.37	0.02	42.37	0.09	26.42	8.03	-18.39	-71.08	12.56	32.19	32.57	0.38	32.40	10.75
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	24.97	17.23	271.37	8.22	0.30	0.21	-0.09	-11.10	0.10	12.86	3.84	-9.03	-71.62	6.67	20.91	29.01	8.11	66.37	7.23
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	25.09	17.32	272.59	8.26	0.57	0.44	-0.13	-0.50	0.17	13.18	3.95	-9.23	-71.49	6.78	21.51	29.47	7.96	64.32	7.22
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	25.09	17.32	272.44	8.26	0.49	0.34	-0.16	-6.65	0.19	13.18	3.95	-9.23	-71.49	6.78	21.44	29.38	7.94	64.42	7.21
Min Average Difference (g/ha)			**7.44**					**0.00**					**9.03**					**0.38**		
Max Average Difference (g/ha)			**24.18**					**0.32**					**53.26**					**43.88**		
Range			**16.74**					**0.32**					**44.24**					**43.50**		
Average Difference (g/ha)			**16.84**					**-0.03**					**-24.21**					**-7.41**		
Average Standard Deviation (g/ha)					**8.38**					**0.17**					**17.47**					**15.38**
Average Percent Difference				**305.41**					**26.49**					**-70.71**					**9.69**	

Notes:

1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Percent Slope
Base Value (Condition A) 5.1
Test Value (Condition B) 10.2

BMP SCENARIO	SSL					ASL					SLL					Total				
	A	B	Average Difference			A	B	Average Difference			A	B	Average Difference			A	B	Average Difference		
	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*	(g/ha)	(g/ha)	(b/ha)	Percent	*SD*	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*	(g/ha)	(g/ha)	(g/ha)	Percent	*SD*
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	8.81	0.00	-0.01	0.00	0.03	0.07	0.04	140.91	0.02	79.47	79.69	0.22	0.31	0.16	88.31	88.57	0.26	0.31	0.17
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	8.51	0.86	14.03	0.59	0.06	0.15	0.10	167.86	0.05	79.93	77.49	-2.45	-3.15	1.96	87.64	86.15	-1.49	-1.49	1.83
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	8.81	4.15	110.87	1.95	0.04	0.21	0.17	429.48	0.09	112.26	98.60	-13.66	-11.31	10.99	116.96	107.63	-9.34	-6.35	9.96
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	16.58	9.66	171.09	5.01	0.04	0.21	0.17	576.47	0.09	82.26	68.82	-13.44	-15.83	10.52	89.22	85.61	-3.61	-1.53	8.23
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	16.16	9.39	169.55	4.87	0.10	0.54	0.44	550.95	0.24	74.63	61.91	-12.72	-16.53	10.18	81.49	78.61	-2.89	-0.76	7.95
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	16.57	9.65	171.00	5.00	0.10	0.60	0.50	670.91	0.28	82.26	68.79	-13.46	-15.85	10.53	89.27	85.96	-3.31	-1.14	8.21
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	21.83	12.04	146.37	6.23	0.08	0.45	0.37	591.38	0.23	55.65	45.67	-9.98	-17.68	7.60	65.52	67.95	2.43	7.73	5.85
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	21.93	12.09	146.22	6.26	0.18	0.90	0.72	524.01	0.40	56.69	46.54	-10.14	-17.65	7.69	66.71	69.37	2.67	8.02	5.95
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	21.94	12.09	146.24	6.26	0.13	0.68	0.55	552.60	0.29	56.69	46.55	-10.14	-17.64	7.69	66.66	69.17	2.51	7.77	5.91
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	9.96	0.00	-0.02	0.01	0.02	0.06	0.04	159.54	0.04	111.51	111.51	0.00	0.00	0.00	121.49	121.52	0.03	0.03	0.03
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	10.08	0.43	8.63	0.23	0.05	0.14	0.09	173.84	0.09	86.88	84.19	-2.69	-3.13	2.31	96.58	94.41	-2.17	-2.12	2.16
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	9.93	1.92	70.77	0.83	0.06	0.23	0.17	390.19	0.20	127.05	111.49	-15.56	-11.27	12.20	135.12	121.66	-13.46	-8.51	11.67
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	12.28	3.84	103.26	1.80	0.03	0.13	0.10	490.02	0.09	89.85	75.36	-14.49	-15.43	11.57	98.32	87.77	-10.55	-8.93	10.37
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	12.43	3.88	101.79	1.86	0.09	0.35	0.26	443.35	0.20	80.37	66.81	-13.56	-16.16	11.12	89.01	79.59	-9.41	-8.69	9.87
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	12.26	3.82	103.16	1.80	0.08	0.38	0.30	513.04	0.27	89.84	75.34	-14.50	-15.44	11.58	98.36	87.98	-10.38	-8.73	10.33
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	6.31	0.00	-0.01	0.00	0.02	0.05	0.03	139.05	0.02	73.12	73.11	0.00	0.00	0.00	79.45	79.47	0.03	0.04	0.01
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	6.26	0.64	12.94	0.44	0.04	0.11	0.07	163.29	0.03	61.13	59.40	-1.73	-2.97	1.27	66.79	65.77	-1.02	-1.38	1.26
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	6.31	3.19	116.02	1.46	0.03	0.16	0.13	454.01	0.06	82.45	73.11	-9.35	-10.76	7.61	85.60	79.57	-6.03	-5.70	6.97
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	12.66	7.55	188.65	3.80	0.03	0.16	0.13	655.43	0.07	63.90	53.97	-9.93	-15.28	7.55	69.04	66.79	-2.24	-0.85	6.19
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	12.44	7.38	186.99	3.73	0.07	0.41	0.33	646.72	0.17	58.52	49.02	-9.50	-15.97	7.37	63.66	61.86	-1.79	-0.04	6.03
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	12.65	7.54	188.56	3.79	0.07	0.42	0.35	750.57	0.18	63.90	53.96	-9.94	-15.30	7.56	69.07	67.03	-2.05	-0.51	6.18
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	17.13	9.52	156.13	4.75	0.06	0.36	0.30	674.35	0.19	44.28	36.62	-7.66	-17.23	5.54	51.95	54.11	2.15	8.24	4.69
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	17.22	9.56	156.26	4.76	0.13	0.69	0.56	604.68	0.31	45.01	37.24	-7.78	-17.20	5.61	52.80	55.15	2.35	8.62	4.78
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	17.22	9.57	156.28	4.77	0.10	0.54	0.44	632.63	0.22	45.02	37.24	-7.77	-17.19	5.61	52.77	55.01	2.24	8.41	4.74
Min Average Difference (g/ha)			**0.00**					**0.03**					**0.00**					**0.03**		
Max Average Difference (g/ha)			**12.09**					**0.72**					**15.56**					**13.46**		
Range			**12.09**					**0.69**					**15.55**					**13.44**		
Average Difference (g/ha)			**5.78**					**0.27**					**-8.76**					**-2.71**		
Average Standard Deviation (g/ha)					**2.92**					**0.16**					**6.84**					**5.81**
Average Percent Difference				**109.37**					**462.30**					**-12.03**					**-0.32**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Effective Rooting Depth
Base Value (Condition A) 24 inches
Test Value (Condition B) 36 inches

			SSL					ASL					SLL					Total		
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	37.61	28.31	329.06	13.48	0.12	0.09	-0.03	-24.15	0.04	46.76	4.97	-41.79	-89.76	28.56	56.19	42.66	-13.52	-13.32	23.16
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	36.95	28.62	380.55	13.14	0.24	0.19	-0.05	-13.14	0.08	44.04	2.78	-41.26	-94.40	30.61	52.61	39.92	-12.69	-9.84	25.56
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	37.60	32.71	804.26	15.31	0.22	0.22	0.00	22.37	0.15	68.22	5.44	-62.78	-92.57	42.06	73.34	43.27	-30.07	-27.97	34.53
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	37.75	30.64	512.26	16.57	0.16	0.09	-0.07	-29.59	0.08	34.00	2.02	-31.98	-94.68	22.89	41.27	39.86	-1.41	25.59	18.92
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	38.10	31.02	524.66	15.32	0.39	0.22	-0.16	-29.15	0.18	29.49	1.64	-27.85	-95.07	20.98	36.95	39.96	3.01	41.75	16.96
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	38.63	31.52	534.79	15.36	0.51	0.26	-0.25	-32.93	0.26	33.98	1.91	-32.07	-94.97	22.96	41.59	40.80	-0.80	28.94	18.29
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	38.84	29.05	355.62	13.91	0.39	0.16	-0.22	-45.84	0.22	16.23	0.84	-15.40	-95.65	11.65	26.41	39.84	13.43	82.68	11.72
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	39.12	29.31	358.46	14.00	0.74	0.23	-0.50	-61.60	0.40	16.66	0.52	-16.15	-97.58	12.14	27.21	39.87	12.66	77.27	11.82
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	39.12	29.31	358.24	14.00	0.63	0.23	-0.40	-55.12	0.31	16.67	0.52	-16.15	-97.58	12.14	27.10	39.86	12.76	77.84	11.87
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	26.19	16.61	312.95	7.78	0.11	0.08	-0.03	19.59	0.12	64.53	4.83	-59.70	-92.99	42.42	74.22	31.10	-43.12	-49.19	39.61
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	21.22	11.66	204.13	5.18	0.25	0.08	-0.17	-52.31	0.24	47.21	3.69	-43.53	-92.80	34.44	57.02	24.99	-32.03	-48.69	31.71
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	20.85	13.31	432.79	5.45	0.35	0.10	-0.25	-31.06	0.49	75.64	5.34	-70.29	-93.23	50.01	83.52	26.29	-57.23	-62.16	46.68
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	18.94	10.65	280.32	5.10	0.18	0.05	-0.13	-42.34	0.23	36.81	3.12	-33.69	-92.16	25.57	45.28	22.11	-23.16	-34.94	22.48
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	18.99	10.49	264.86	5.25	0.42	0.10	-0.33	-57.22	0.53	31.54	1.80	-29.74	-94.85	23.65	40.45	20.88	-19.57	-31.59	20.63
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	18.83	10.58	277.46	5.06	0.54	0.10	-0.43	-61.43	0.74	36.80	2.15	-34.65	-94.67	26.25	45.59	21.09	-24.50	-38.10	23.22
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	26.28	19.40	287.29	10.31	0.09	0.07	-0.02	-23.62	0.02	43.59	3.43	-40.16	-92.95	24.83	50.56	29.77	-20.78	-31.90	21.62
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	29.37	23.05	380.31	10.46	0.18	0.13	-0.05	-26.22	0.04	34.03	2.74	-31.29	-92.84	21.81	40.53	32.24	-8.30	-4.86	19.38
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	29.74	26.29	836.19	11.88	0.15	0.17	0.01	20.73	0.04	50.93	3.77	-47.16	-93.30	29.29	54.53	33.67	-20.85	-23.70	24.95
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	30.49	25.07	569.97	11.65	0.12	0.10	-0.03	4.65	0.04	26.43	2.22	-24.21	-92.46	16.45	31.98	32.81	0.83	51.04	14.20
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	30.50	25.03	561.69	11.71	0.29	0.18	-0.11	-17.68	0.12	23.15	1.25	-21.90	-95.30	15.73	28.91	31.93	3.02	59.84	13.86
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	30.85	25.44	575.74	11.88	0.35	0.19	-0.16	-23.19	0.17	26.42	1.49	-24.93	-95.07	16.95	32.19	32.53	0.35	49.28	14.69
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	31.21	23.47	381.04	10.67	0.30	0.13	-0.17	-39.34	0.17	12.86	0.62	-12.24	-95.94	8.92	20.91	31.96	11.05	94.69	9.74
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	31.46	23.69	382.89	10.79	0.57	0.18	-0.39	-56.36	0.32	13.18	0.35	-12.83	-97.98	9.30	21.51	31.99	10.48	89.59	9.80
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	31.46	23.69	382.63	10.79	0.49	0.18	-0.31	-49.19	0.26	13.18	0.35	-12.83	-97.98	9.30	21.44	31.99	10.55	90.22	9.85
Min Average Difference (g/ha)			**10.49**					**0.00**					**12.24**					**0.35**		
Max Average Difference (g/ha)			**32.71**					**0.50**					**70.29**					**57.23**		
Range			**22.21**					**0.50**					**58.05**					**56.88**		
Average Difference (g/ha)			**23.29**					**-0.18**					**-32.69**					**-9.58**		
Average Standard Deviation (g/ha)					**11.04**					**0.22**					**23.29**					**20.63**
Average Percent Difference				**428.67**					**-29.34**					**-94.45**					**16.35**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Effective Rooting Depth
Base Value (Condition A) 24 inches
Test Value (Condition B) 36 inches

	SSL					**ASL**					**SLL**					**Total**				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	12.30	3.49	43.34	1.55	0.03	0.04	0.01	36.26	0.00	79.47	43.32	-36.15	-46.78	22.55	88.31	55.66	-32.65	-36.69	21.78
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	12.00	4.35	65.07	1.97	0.06	0.09	0.03	57.17	0.01	79.93	37.41	-42.52	-55.49	26.36	87.64	49.50	-38.14	-43.77	25.42
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	12.30	7.64	206.37	3.46	0.04	0.11	0.07	192.75	0.03	112.26	53.59	-58.67	-52.06	37.34	116.96	66.00	-50.96	-41.73	35.50
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	22.13	15.21	275.33	7.55	0.04	0.11	0.07	261.52	0.04	82.26	36.65	-45.61	-57.75	27.41	89.22	58.88	-30.33	-32.38	23.42
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	21.64	14.87	274.84	7.42	0.10	0.30	0.20	269.94	0.10	74.63	31.36	-43.27	-60.43	26.80	81.49	53.29	-28.20	-32.66	22.88
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	22.12	15.21	275.33	7.55	0.10	0.28	0.18	290.46	0.09	82.26	36.64	-45.62	-57.76	27.41	89.27	59.05	-30.23	-32.21	23.41
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	28.28	18.49	230.12	9.21	0.08	0.21	0.13	230.55	0.07	55.65	22.95	-32.70	-61.90	19.54	65.52	51.44	-14.08	-17.24	15.36
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	28.42	18.57	229.68	9.24	0.18	0.46	0.29	229.56	0.14	56.69	23.55	-33.13	-61.59	19.67	66.71	52.43	-14.27	-17.26	15.43
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	28.42	18.58	229.69	9.24	0.13	0.31	0.18	217.15	0.07	56.69	23.56	-33.13	-61.59	19.67	66.66	52.29	-14.37	-17.42	15.44
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	12.00	2.04	32.23	1.21	0.02	0.03	0.01	30.95	0.00	111.51	60.06	-51.44	-46.93	32.03	121.49	72.09	-49.40	-40.25	31.65
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	12.19	2.54	44.41	1.34	0.05	0.07	0.02	44.76	0.01	86.88	40.46	-46.42	-55.07	29.76	96.58	52.72	-43.86	-45.44	29.16
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	11.99	3.98	132.80	1.86	0.06	0.09	0.04	141.15	0.02	127.05	60.06	-66.99	-51.60	43.08	135.12	72.15	-62.97	-44.24	42.21
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	14.79	6.35	165.37	2.95	0.03	0.06	0.03	185.83	0.01	89.85	40.10	-49.74	-57.10	31.25	98.32	54.95	-43.37	-43.39	29.55
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	14.98	6.43	163.88	3.00	0.09	0.17	0.08	184.10	0.04	80.37	33.86	-46.51	-59.81	30.09	89.01	49.01	-39.99	-44.22	28.29
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	14.78	6.34	165.36	2.95	0.08	0.15	0.07	180.36	0.03	89.84	40.10	-49.74	-57.10	31.25	98.36	55.03	-43.33	-43.31	29.54
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	9.08	2.77	45.58	1.26	0.02	0.03	0.01	37.43	0.00	73.12	40.14	-32.98	-47.17	19.61	79.45	49.25	-30.20	-38.73	19.22
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	9.04	3.42	65.18	1.58	0.04	0.07	0.02	56.99	0.01	61.13	28.86	-32.27	-55.54	19.08	66.79	37.97	-28.82	-43.78	18.56
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	9.08	5.97	218.32	2.70	0.03	0.09	0.05	206.86	0.03	82.45	40.14	-42.32	-51.98	26.50	85.60	49.30	-36.29	-41.44	25.54
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	17.12	12.01	309.34	5.85	0.03	0.08	0.06	312.76	0.03	63.90	28.84	-35.06	-57.64	19.91	69.04	46.04	-22.99	-31.91	17.81
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	16.88	11.82	309.24	5.81	0.07	0.23	0.15	335.48	0.07	58.52	24.90	-33.62	-60.35	19.70	63.66	42.00	-21.65	-32.08	17.60
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	17.12	12.01	309.35	5.85	0.07	0.20	0.13	343.68	0.05	63.90	28.83	-35.07	-57.64	19.91	69.07	46.15	-22.92	-31.75	17.80
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	22.35	14.74	249.19	7.14	0.06	0.17	0.11	285.29	0.06	44.28	18.41	-25.87	-61.85	14.46	51.95	40.93	-11.02	-16.80	12.34
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	22.45	14.80	249.14	7.15	0.13	0.35	0.22	276.90	0.10	45.01	18.85	-26.16	-61.55	14.53	52.80	41.66	-11.14	-16.68	12.39
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	22.46	14.80	249.13	7.15	0.10	0.25	0.15	266.16	0.06	45.02	18.86	-26.16	-61.54	14.53	52.77	41.56	-11.21	-16.82	12.39
Min Average Difference (g/ha)			**2.04**					**0.01**					**25.87**					**11.02**		
Max Average Difference (g/ha)			**18.58**					**0.29**					**66.99**					**62.97**		
Range			**16.54**					**0.28**					**41.12**					**51.95**		
Average Difference (g/ha)			**9.85**					**0.10**					**-40.46**					**-30.52**		
Average Standard Deviation (g/ha)					**4.79**					**0.05**					**24.68**					**22.61**
Average Percent Difference				**189.10**					**194.75**					**-56.59**					**-33.43**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Coefficient of Pesticide Uptake
Base Value (Condition A) 1
Test Value (Condition B) 0.5

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	30.07	20.77	241.25	10.31	0.12	0.07	-0.05	-36.74	0.04	46.76	20.29	-26.47	-57.40	18.97	56.19	50.44	-5.75	-2.90	15.37
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	29.56	21.22	282.40	9.98	0.24	0.16	-0.08	-28.39	0.08	44.04	16.52	-27.52	-63.84	20.92	52.61	46.24	-6.38	-1.93	17.58
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	30.07	25.17	614.27	12.11	0.22	0.18	-0.04	-2.69	0.15	68.22	24.72	-43.50	-64.70	30.30	73.34	54.97	-18.37	-15.75	24.63
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	31.39	24.28	404.61	12.28	0.16	0.08	-0.08	-39.48	0.08	34.00	11.78	-22.22	-66.73	16.22	41.27	43.25	1.98	26.91	12.97
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	30.74	23.67	394.73	11.90	0.39	0.22	-0.17	-30.40	0.18	29.49	9.77	-19.72	-68.15	15.16	36.95	40.74	3.78	34.18	12.42
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	31.38	24.28	405.37	12.28	0.51	0.21	-0.30	-47.40	0.27	33.98	11.77	-22.21	-66.73	16.21	41.59	43.37	1.78	25.85	12.94
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	31.95	22.16	267.26	10.89	0.39	0.10	-0.28	-67.38	0.24	16.23	5.46	-10.77	-67.50	8.37	26.41	37.51	11.10	64.49	8.88
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	32.09	22.28	268.49	10.95	0.74	0.23	-0.50	-61.28	0.40	16.66	5.63	-11.03	-67.35	8.53	27.21	37.95	10.75	61.39	8.79
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	32.09	22.28	268.34	10.95	0.63	0.18	-0.45	-65.32	0.33	16.67	5.63	-11.04	-67.35	8.53	27.10	37.90	10.80	61.68	8.83
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	17.75	8.17	145.10	3.42	0.11	0.03	-0.08	-56.81	0.12	64.53	26.43	-38.09	-59.84	28.09	74.22	44.21	-30.00	-36.26	26.19
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	18.36	8.80	157.17	3.79	0.25	0.07	-0.18	-59.61	0.24	47.21	19.23	-27.99	-59.92	23.52	57.02	37.66	-19.37	-27.97	21.59
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	17.96	10.43	344.69	4.19	0.35	0.09	-0.26	-43.12	0.50	75.64	24.46	-51.17	-68.09	37.35	83.52	42.52	-41.01	-43.99	34.77
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	16.44	8.15	219.74	4.08	0.18	0.04	-0.13	-51.88	0.23	36.81	15.52	-21.29	-58.45	17.07	45.28	32.01	-13.27	-16.85	14.67
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	16.56	8.06	208.09	4.23	0.42	0.08	-0.34	-63.65	0.53	31.54	10.91	-20.62	-66.47	17.04	40.45	27.56	-12.90	-19.05	14.74
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	16.41	8.16	218.87	4.08	0.54	0.09	-0.45	-67.73	0.74	36.80	12.18	-24.62	-68.13	19.04	45.59	28.68	-16.91	-25.33	16.70
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	21.23	14.35	212.63	7.94	0.09	0.06	-0.03	-35.38	0.02	43.59	16.98	-26.61	-62.79	16.40	50.56	38.26	-12.30	-18.53	14.31
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	23.63	17.31	285.91	7.88	0.18	0.11	-0.07	-38.58	0.05	34.03	15.12	-18.91	-57.02	13.71	40.53	38.86	-1.68	6.98	12.45
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	23.93	20.48	647.47	9.34	0.15	0.14	-0.02	-2.73	0.04	50.93	18.55	-32.38	-65.11	20.42	54.53	42.62	-11.91	-11.70	17.22
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	24.75	19.32	429.31	9.10	0.12	0.08	-0.04	-15.02	0.05	26.43	11.88	-14.56	-55.67	10.32	31.98	36.70	4.72	48.51	9.14
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	24.78	19.31	422.64	9.15	0.29	0.15	-0.14	-32.38	0.13	23.15	8.41	-14.75	-65.10	10.83	28.91	33.33	4.42	49.56	9.73
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	25.11	19.70	434.72	9.36	0.35	0.16	-0.19	-38.49	0.17	26.42	9.22	-17.20	-66.67	11.74	32.19	34.49	2.30	40.27	10.28
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	25.62	17.88	283.74	8.22	0.30	0.11	-0.19	-50.48	0.17	12.86	5.56	-7.30	-57.91	5.55	20.91	31.29	10.39	78.68	6.91
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	25.91	18.15	286.50	8.41	0.57	0.15	-0.42	-64.33	0.33	13.18	4.61	-8.57	-66.43	6.33	21.51	30.67	9.16	71.08	7.10
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	25.91	18.15	286.29	8.41	0.49	0.15	-0.34	-58.88	0.26	13.18	4.61	-8.57	-66.43	6.33	21.44	30.68	9.24	71.63	7.15
Min Average Difference (g/ha)			**8.06**					**0.02**					**7.30**					**1.68**		
Max Average Difference (g/ha)			**25.17**					**0.50**					**51.17**					**41.01**		
Range			**17.11**					**0.48**					**43.87**					**39.33**		
Average Difference (g/ha)			**17.61**					**-0.20**					**-21.96**					**-4.56**		
Average Standard Deviation (g/ha)					**8.47**					**0.22**					**16.12**					**14.39**
Average Percent Difference				**322.07**					**-44.09**					**-63.91**					**17.54**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Coefficient of Pesticide Uptake
Base Value (Condition A) 1
Test Value (Condition B) 0.5

			SSL					ASL					SLL					Total		
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	9.24	0.43	6.50	0.39	0.03	0.03	0.00	3.19	0.00	79.47	103.96	24.49	33.89	11.12	88.31	113.23	24.92	30.80	11.03
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	9.07	1.42	23.43	0.82	0.06	0.07	0.01	18.00	0.00	79.93	103.93	24.00	32.58	12.33	87.64	113.07	25.43	31.52	12.29
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	9.24	4.58	124.51	2.01	0.04	0.08	0.04	113.28	0.02	112.26	129.05	16.79	18.57	11.00	116.96	138.37	21.41	22.65	11.19
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	17.26	10.34	185.44	5.07	0.04	0.09	0.05	178.92	0.03	82.26	85.87	3.61	6.02	7.19	89.22	103.22	14.00	19.47	7.38
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	16.90	10.14	185.01	4.95	0.10	0.23	0.14	183.14	0.07	74.63	77.78	3.15	5.87	6.67	81.49	94.92	13.42	20.52	6.83
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	17.25	10.34	185.43	5.07	0.10	0.22	0.13	195.11	0.06	82.26	85.86	3.60	6.01	7.19	89.27	103.34	14.07	19.56	7.40
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	22.58	12.79	157.24	6.31	0.08	0.17	0.09	159.89	0.05	55.65	55.37	-0.28	0.51	4.52	65.52	78.12	12.60	24.13	5.66
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	22.68	12.84	157.02	6.34	0.18	0.38	0.20	158.53	0.10	56.69	56.40	-0.29	0.49	4.60	66.71	79.45	12.75	23.94	5.74
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	22.69	12.84	157.02	6.34	0.13	0.26	0.13	152.55	0.05	56.69	56.40	-0.29	0.49	4.60	66.66	79.34	12.68	23.86	5.71
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	10.26	0.30	5.90	0.31	0.02	0.02	0.00	2.89	0.00	111.51	139.40	27.89	28.49	12.68	121.49	149.68	28.19	26.22	12.61
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	10.50	0.85	16.76	0.46	0.05	0.06	0.00	13.35	0.00	86.88	108.64	21.76	28.20	11.41	96.58	119.19	22.62	26.30	11.36
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	10.25	2.24	82.09	0.86	0.06	0.08	0.02	81.38	0.01	127.05	139.40	12.35	14.06	11.15	135.12	149.73	14.61	15.41	10.96
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	12.77	4.33	116.24	1.84	0.03	0.05	0.02	129.39	0.01	89.85	91.38	1.53	3.85	7.87	98.32	104.19	5.88	9.21	7.11
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	12.98	4.43	115.48	1.90	0.09	0.14	0.06	127.12	0.03	80.37	81.74	1.37	3.82	7.30	89.01	94.87	5.86	9.87	6.53
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	12.76	4.32	116.24	1.84	0.08	0.13	0.05	125.74	0.02	89.84	91.37	1.53	3.85	7.87	98.36	104.26	5.90	9.24	7.11
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	6.81	0.50	9.47	0.39	0.02	0.02	0.00	5.00	0.00	73.12	100.91	27.79	40.04	12.63	79.45	107.74	28.30	37.27	12.54
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	6.88	1.26	25.69	0.75	0.04	0.05	0.01	19.19	0.00	61.13	83.35	22.21	38.19	11.48	66.79	90.27	23.48	36.88	11.41
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	6.81	3.70	136.00	1.54	0.03	0.06	0.03	124.14	0.01	82.45	100.90	18.45	24.96	9.73	85.60	107.78	22.18	29.22	9.89
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	13.42	8.31	208.76	3.89	0.03	0.07	0.04	216.33	0.02	63.90	69.27	5.37	9.45	5.71	69.04	82.76	13.72	23.18	6.12
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	13.26	8.20	208.33	3.83	0.07	0.18	0.11	230.11	0.05	58.52	63.23	4.71	9.16	5.27	63.66	76.67	13.01	24.13	5.64
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	13.42	8.31	208.77	3.89	0.07	0.16	0.09	231.12	0.04	63.90	69.27	5.37	9.45	5.71	69.07	82.84	13.77	23.25	6.13
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	17.94	10.33	170.60	4.87	0.06	0.14	0.08	198.05	0.04	44.28	45.22	0.94	2.80	3.27	51.95	63.30	11.35	26.58	4.58
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	18.03	10.38	170.63	4.89	0.13	0.29	0.15	190.76	0.07	45.01	45.97	0.96	2.79	3.35	52.80	64.29	11.49	26.51	4.64
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	18.03	10.38	170.63	4.89	0.10	0.21	0.11	185.63	0.04	45.02	45.98	0.96	2.80	3.35	52.77	64.22	11.45	26.43	4.62
Min Average Difference (g/ha)			**0.30**					**0.00**					**0.28**					**5.86**		
Max Average Difference (g/ha)			**12.84**					**0.20**					**27.89**					**28.30**		
Range			**12.54**					**0.20**					**27.61**					**22.44**		
Average Difference (g/ha)			**6.40**					**0.06**					**9.50**					**15.96**		
Average Standard Deviation (g/ha)					**3.06**					**0.03**					**7.83**					**8.10**
Average Percent Difference				**122.63**					**126.78**					**13.60**					**23.59**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Evapotranspiration Method
Base Value (Condition A) PT
Test Value (Condition B) PM

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	9.30	32.09	22.79	270.99	10.95	0.12	0.07	-0.05	-36.36	0.04	46.76	50.37	3.60	17.47	13.32	56.19	82.53	26.34	62.08	13.97
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	8.33	30.49	22.16	300.61	10.54	0.24	0.15	-0.08	-29.43	0.09	44.04	52.20	8.16	32.08	15.07	52.61	82.84	30.23	75.99	16.36
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.90	32.09	27.19	680.10	12.63	0.22	0.19	-0.03	4.84	0.15	68.22	60.87	-7.35	-3.86	21.96	73.34	93.15	19.81	45.07	19.15
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	7.11	35.67	28.55	497.89	13.29	0.16	0.09	-0.08	-33.37	0.08	34.00	30.90	-3.10	0.74	11.75	41.27	66.65	25.38	100.14	12.86
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.07	35.15	28.08	486.29	13.31	0.39	0.24	-0.15	-23.04	0.18	29.49	28.77	-0.72	9.82	10.83	36.95	64.16	27.21	113.33	13.25
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	7.10	35.66	28.56	498.80	13.29	0.51	0.23	-0.28	-39.29	0.27	33.98	30.89	-3.09	0.76	11.74	41.59	66.78	25.19	98.38	12.76
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	37.53	27.75	353.46	12.17	0.39	0.11	-0.27	-62.72	0.24	16.23	15.80	-0.43	10.07	5.93	26.41	53.45	27.05	142.96	11.01
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.81	37.52	27.71	353.60	12.06	0.74	0.26	-0.47	-54.81	0.39	16.66	15.99	-0.67	8.38	6.06	27.21	53.77	26.56	137.78	10.65
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.81	37.52	27.71	353.40	12.06	0.63	0.19	-0.44	-60.57	0.33	16.67	15.99	-0.67	8.37	6.06	27.10	53.70	26.60	138.19	10.68
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.58	13.79	4.21	79.22	2.63	0.11	0.02	-0.09	-69.85	0.12	64.53	66.79	2.26	13.93	19.27	74.22	80.60	6.38	18.50	17.75
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.56	13.95	4.39	88.96	2.67	0.25	0.06	-0.19	-67.53	0.25	47.21	56.06	8.84	33.54	16.44	57.02	70.06	13.04	35.36	15.26
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	7.53	13.79	6.25	218.00	3.13	0.35	0.07	-0.28	-58.96	0.50	75.64	66.78	-8.85	-3.31	25.66	83.52	80.64	-2.88	6.93	23.65
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.29	13.36	5.07	151.17	3.37	0.18	0.03	-0.15	-72.44	0.24	36.81	34.62	-2.19	5.51	13.17	45.28	48.00	2.73	23.97	11.50
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.49	13.41	4.92	144.49	3.58	0.42	0.07	-0.35	-67.83	0.53	31.54	31.93	0.40	14.94	11.96	40.45	45.42	4.97	31.58	10.58
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.25	13.35	5.11	151.60	3.33	0.54	0.07	-0.47	-76.00	0.74	36.80	34.62	-2.18	5.54	13.16	45.59	48.04	2.45	23.17	11.55
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.88	34.27	27.39	428.91	11.02	0.09	0.07	-0.02	-17.77	0.02	43.59	43.36	-0.23	6.51	12.37	50.56	77.70	27.14	74.37	13.73
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	6.32	34.14	27.82	472.39	11.37	0.18	0.16	-0.02	-7.54	0.05	34.03	36.88	2.85	19.55	11.51	40.53	71.18	30.64	101.71	14.28
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.45	34.27	30.82	1018.68	12.27	0.15	0.20	0.04	44.74	0.05	50.93	43.35	-7.58	-9.53	16.18	54.53	77.81	23.29	69.03	15.39
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.42	36.37	30.95	752.03	12.42	0.12	0.08	-0.04	-7.21	0.05	26.43	22.37	-4.06	-6.90	9.15	31.98	58.83	26.85	170.89	11.79
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.46	36.26	30.79	737.44	12.56	0.29	0.23	-0.06	10.31	0.10	23.15	20.79	-2.36	0.17	8.57	28.91	57.28	28.37	184.34	11.94
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.41	36.37	30.96	753.46	12.42	0.35	0.20	-0.15	-10.60	0.17	26.42	22.37	-4.05	-6.89	9.14	32.19	58.95	26.76	168.71	11.72
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.74	36.91	29.17	507.86	11.25	0.30	0.11	-0.19	-46.73	0.17	12.86	11.57	-1.29	0.92	4.72	20.91	48.59	27.68	210.23	10.18
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.76	36.93	29.17	508.35	11.21	0.57	0.24	-0.33	-38.10	0.30	13.18	11.71	-1.47	-0.48	4.81	21.51	48.88	27.37	204.12	10.02
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.77	36.94	29.17	508.04	11.21	0.49	0.18	-0.31	-43.48	0.27	13.18	11.71	-1.47	-0.49	4.82	21.44	48.83	27.39	204.66	10.04
Min Average Difference (g/ha)			**4.21**					**0.02**					**0.23**					**2.45**		
Max Average Difference (g/ha)			**30.96**					**0.47**					**8.85**					**30.64**		
Range			**26.75**					**0.45**					**8.62**					**28.19**		
Average Difference (g/ha)			**22.36**					**-0.19**					**-1.07**					**21.11**		
Average Standard Deviation (g/ha)					**9.78**					**0.22**					**11.82**					**13.34**
Average Percent Difference				**429.82**					**-35.99**					**6.53**					**101.73**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

NAPRA/ GLEAMS Model
Model Parameter Sensitivity Analysis

Sensitivity Test Parameter Evapotranspiration Method
Base Value (Condition A) PT
Test Value (Condition B) PM

	SSL					ASL					SLL					Total				
BMP SCENARIO	**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**			**A**	**B**	**Average Difference**		
	(g/ha)	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(b/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***	**(g/ha)**	**(g/ha)**	**(g/ha)**	**Percent**	***SD***
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS1	8.81	8.91	0.10	2.15	1.15	0.03	0.03	0.00	-3.56	0.00	79.47	213.97	134.49	191.91	70.94	88.31	222.91	134.59	168.54	70.54
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	7.65	8.48	0.83	12.87	2.42	0.06	0.06	0.00	4.93	0.01	79.93	244.15	164.21	240.60	91.05	87.64	252.69	165.05	213.97	91.13
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	4.66	8.91	4.25	116.91	2.16	0.04	0.08	0.04	106.39	0.02	112.26	261.17	148.91	151.30	80.08	116.96	270.16	153.20	148.47	80.60
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	6.92	18.44	11.52	216.97	5.61	0.04	0.09	0.05	202.46	0.03	82.26	158.99	76.72	110.04	42.12	89.22	177.52	88.30	115.36	44.02
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	6.76	18.21	11.44	216.23	6.07	0.10	0.24	0.14	210.64	0.07	74.63	153.96	79.33	126.77	44.42	81.49	172.41	90.92	130.11	46.77
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	6.92	18.44	11.52	216.97	5.61	0.10	0.23	0.14	230.66	0.07	82.26	158.97	76.71	110.03	42.11	89.27	177.64	88.36	115.38	44.02
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application EDS 1	9.79	25.55	15.76	206.13	7.46	0.08	0.18	0.10	205.15	0.06	55.65	102.92	47.27	104.36	25.04	65.52	128.66	63.14	115.28	28.18
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application EDS 1	9.84	25.45	15.61	204.38	7.21	0.18	0.41	0.24	208.95	0.11	56.69	103.48	46.79	101.46	24.81	66.71	129.34	62.64	112.80	27.59
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application EDS 1	9.84	25.46	15.61	204.38	7.21	0.13	0.27	0.14	185.73	0.06	56.69	103.49	46.80	101.48	24.81	66.66	129.21	62.55	112.73	27.57
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	9.96	8.54	-1.43	-22.19	1.20	0.02	0.02	0.00	-27.62	0.00	111.51	281.97	170.46	178.15	88.40	121.49	290.52	169.03	159.35	87.83
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	9.65	8.41	-1.24	-15.97	1.28	0.05	0.04	-0.01	-20.35	0.01	86.88	257.65	170.77	232.60	93.55	96.58	266.10	169.53	203.16	93.09
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.01	8.53	0.52	29.67	1.18	0.06	0.06	0.00	28.47	0.01	127.05	281.96	154.91	144.23	81.10	135.12	290.55	155.43	135.07	80.94
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation EDS 1	8.44	10.40	1.96	62.33	1.46	0.03	0.04	0.01	65.69	0.01	89.85	175.79	85.95	114.03	46.46	98.32	186.23	87.91	104.96	46.49
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation EDS 1	8.55	10.43	1.88	61.59	1.49	0.09	0.11	0.02	68.21	0.02	80.37	168.49	88.12	131.32	48.75	89.01	179.03	90.02	118.73	48.83
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation EDS 1	8.44	10.39	1.95	62.33	1.46	0.08	0.10	0.02	68.06	0.02	89.84	175.78	85.94	114.03	46.46	98.36	186.28	87.92	104.93	46.49
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	6.31	10.27	3.96	72.90	2.23	0.02	0.03	0.01	51.50	0.01	73.12	174.99	101.87	157.28	56.92	79.45	185.29	105.85	147.29	56.86
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.62	10.17	4.55	92.57	2.22	0.04	0.07	0.03	71.66	0.02	61.13	163.46	102.33	197.62	58.81	66.79	173.70	106.91	182.33	59.14
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	3.11	10.27	7.16	282.84	3.08	0.03	0.09	0.06	248.73	0.03	82.45	174.98	92.53	127.00	52.38	85.60	185.34	99.75	131.46	52.89
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	5.11	19.89	14.79	429.24	6.26	0.03	0.09	0.06	397.44	0.03	63.90	110.51	46.61	87.75	26.05	69.04	130.50	61.46	106.39	27.79
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	5.06	19.81	14.75	427.98	6.35	0.07	0.25	0.18	431.08	0.08	58.52	106.93	48.41	100.96	27.35	63.66	127.00	63.34	119.16	29.37
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	5.11	19.89	14.78	429.26	6.26	0.07	0.22	0.15	438.75	0.06	63.90	110.50	46.60	87.74	26.04	69.07	130.61	61.53	106.47	27.79
No Tillage/ Corn after Corn/ Post-Emergence Surface Application EDS 1	7.61	26.09	18.48	347.79	7.56	0.06	0.19	0.13	380.52	0.07	44.28	73.53	29.25	83.04	15.70	51.95	99.81	47.86	114.35	18.30
No Tillage/ Corn after Beans/ Post-Emergence Surface Application EDS 1	7.65	26.11	18.46	346.67	7.52	0.13	0.40	0.27	385.40	0.11	45.01	73.90	28.89	80.71	15.55	52.80	100.41	47.61	112.37	18.09
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application EDS 1	7.65	26.12	18.46	346.66	7.52	0.10	0.27	0.17	328.45	0.06	45.02	73.91	28.89	80.73	15.55	52.77	100.29	47.52	112.22	18.06
Min Average Difference (g/ha)			**0.10**					**0.00**					**28.89**					**47.52**		
Max Average Difference (g/ha)			**18.48**					**0.27**					**170.77**					**169.53**		
Range			**18.38**					**0.27**					**141.89**					**122.00**		
Average Difference (g/ha)			**8.57**					**0.08**					**87.62**					**96.27**		
Average Standard Deviation (g/ha)					**4.25**					**0.04**					**47.69**					**48.85**
Average Percent Difference				**181.28**					**177.81**					**131.46**					**132.95**	

Notes:
1) If value is positive, condition B increases loss
2) If value is negative, condition B decreases loss

Comments:

Attachment C
Model Output Data

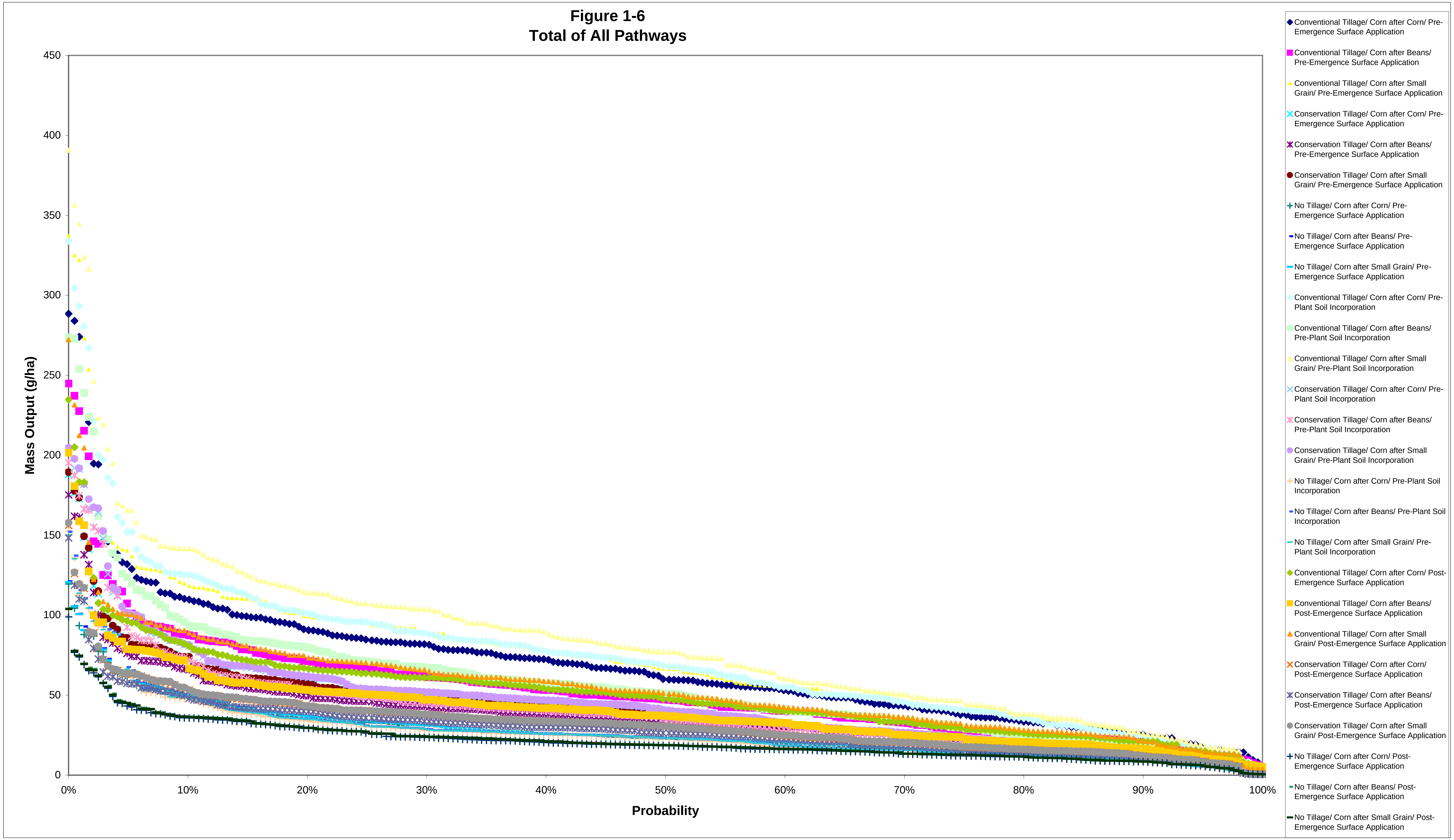


Figure 1-6
Total of All Pathways

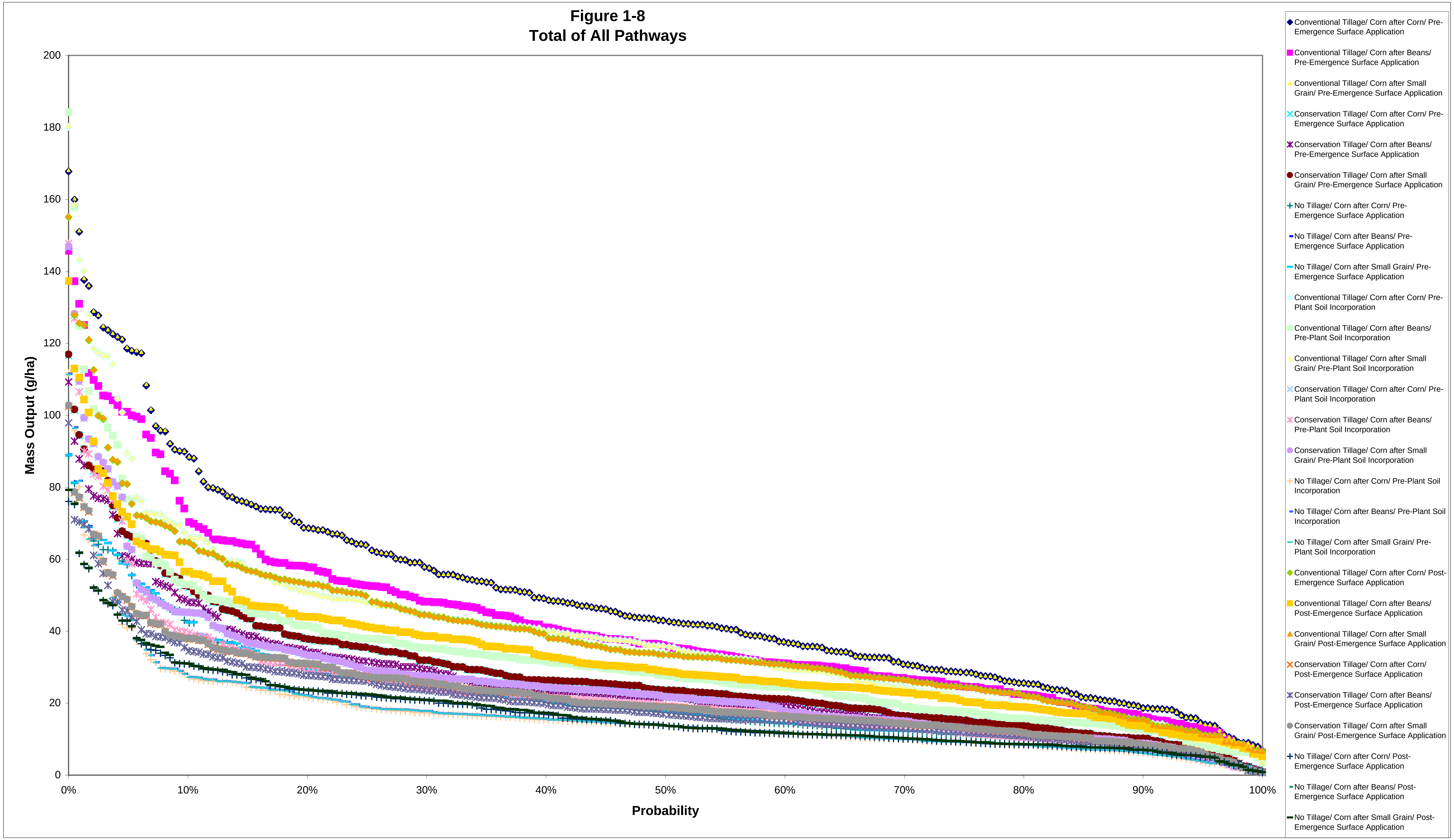


Figure 1-8
Total of All Pathways

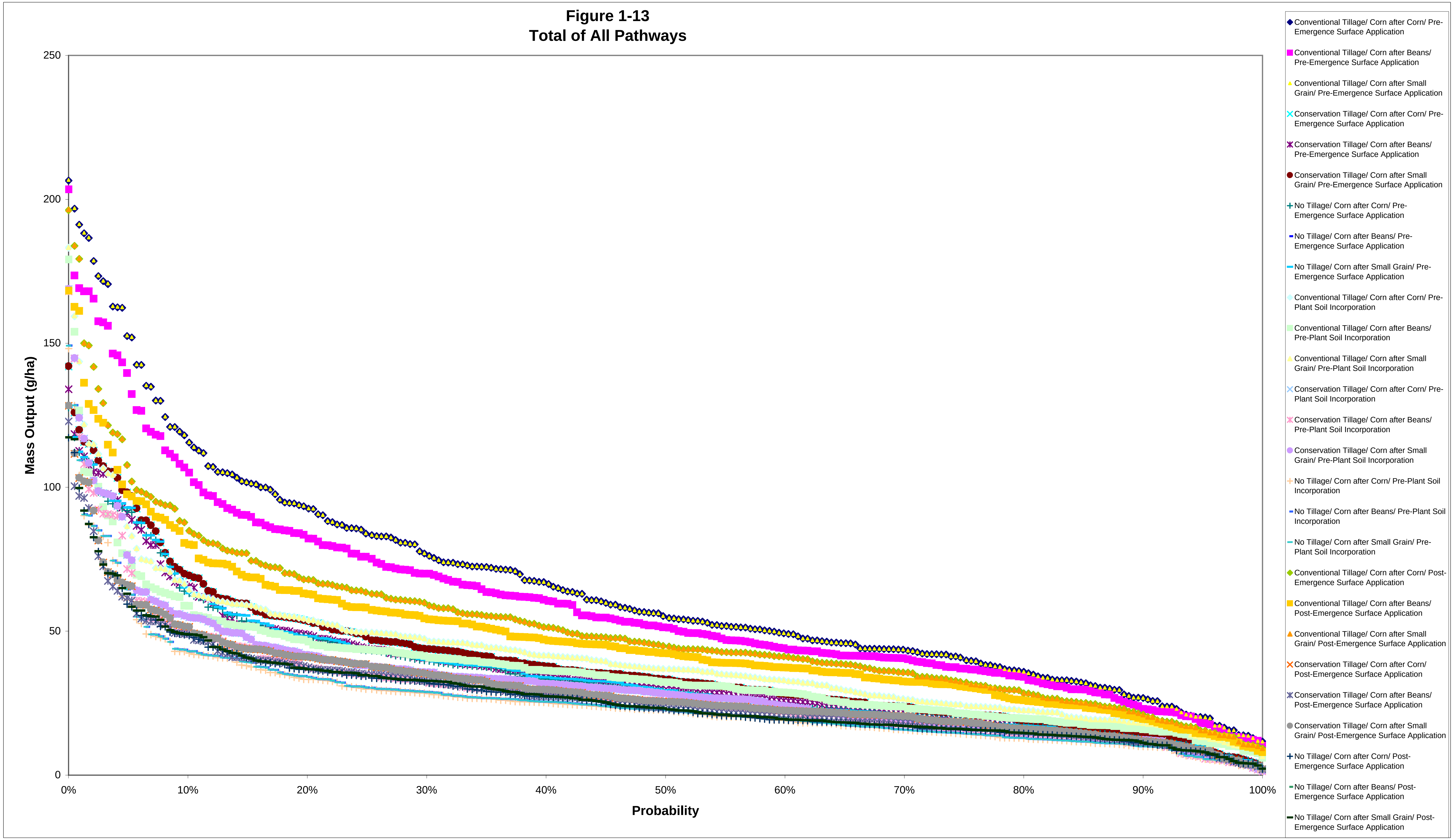


Figure 1-13
Total of All Pathways
Mass Output (g/ha)
250
200
150
100
50
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Probability
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application
No Tillage/ Corn after Corn/ Post-Emergence Surface Application
No Tillage/ Corn after Beans/ Post-Emergence Surface Application
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application

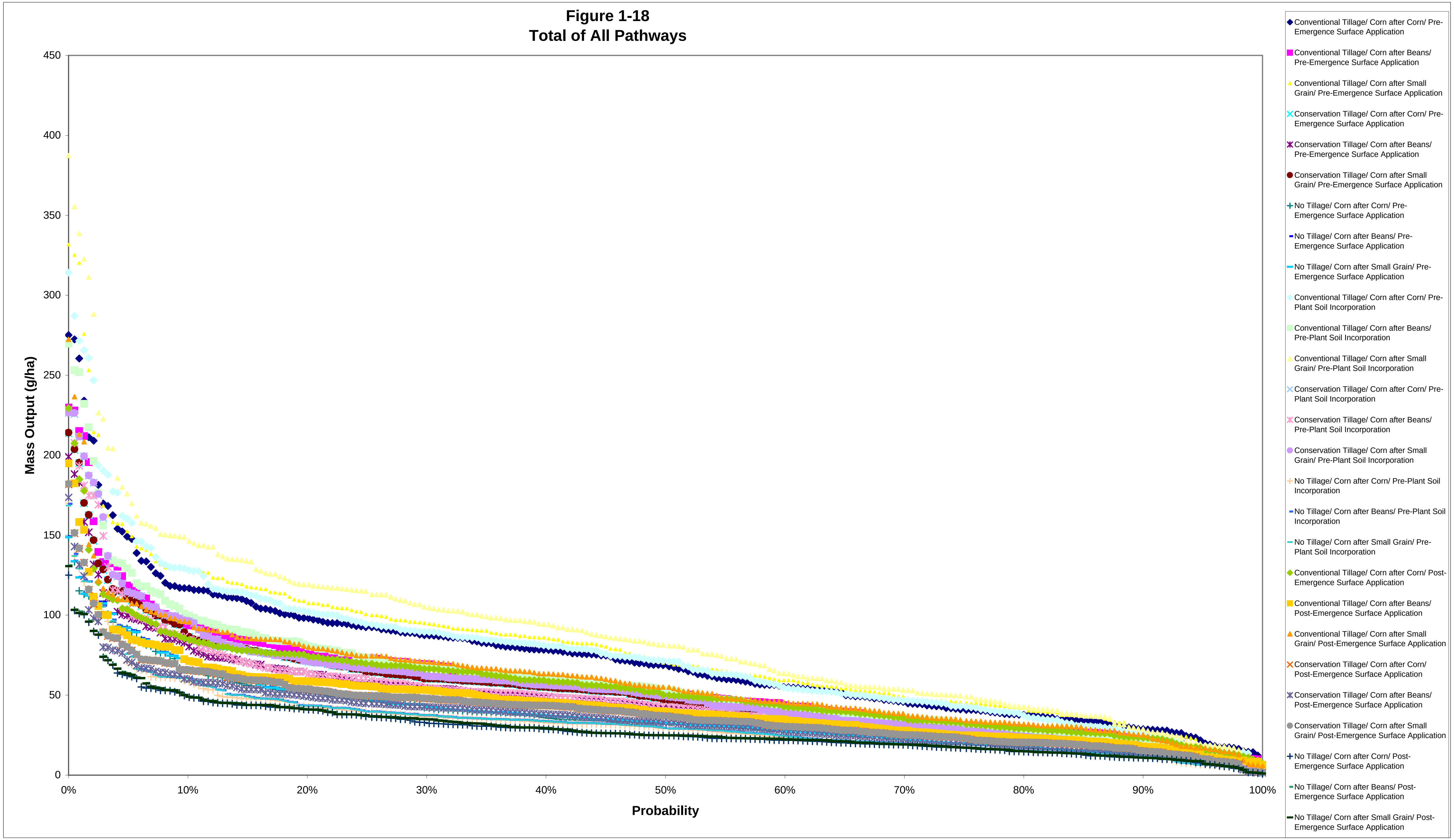


Figure 1-18
Total of All Pathways

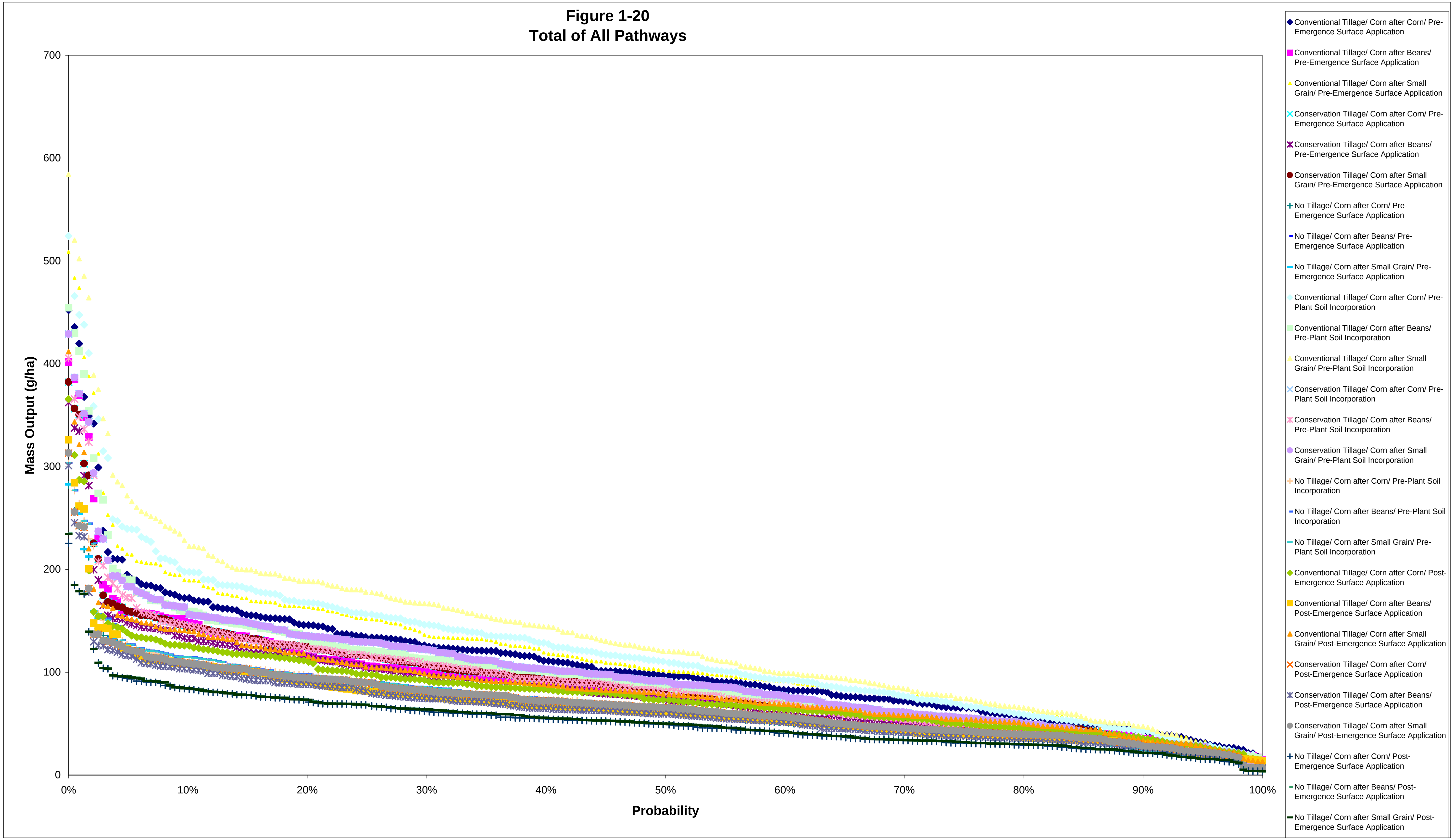


Figure 1-20
Total of All Pathways

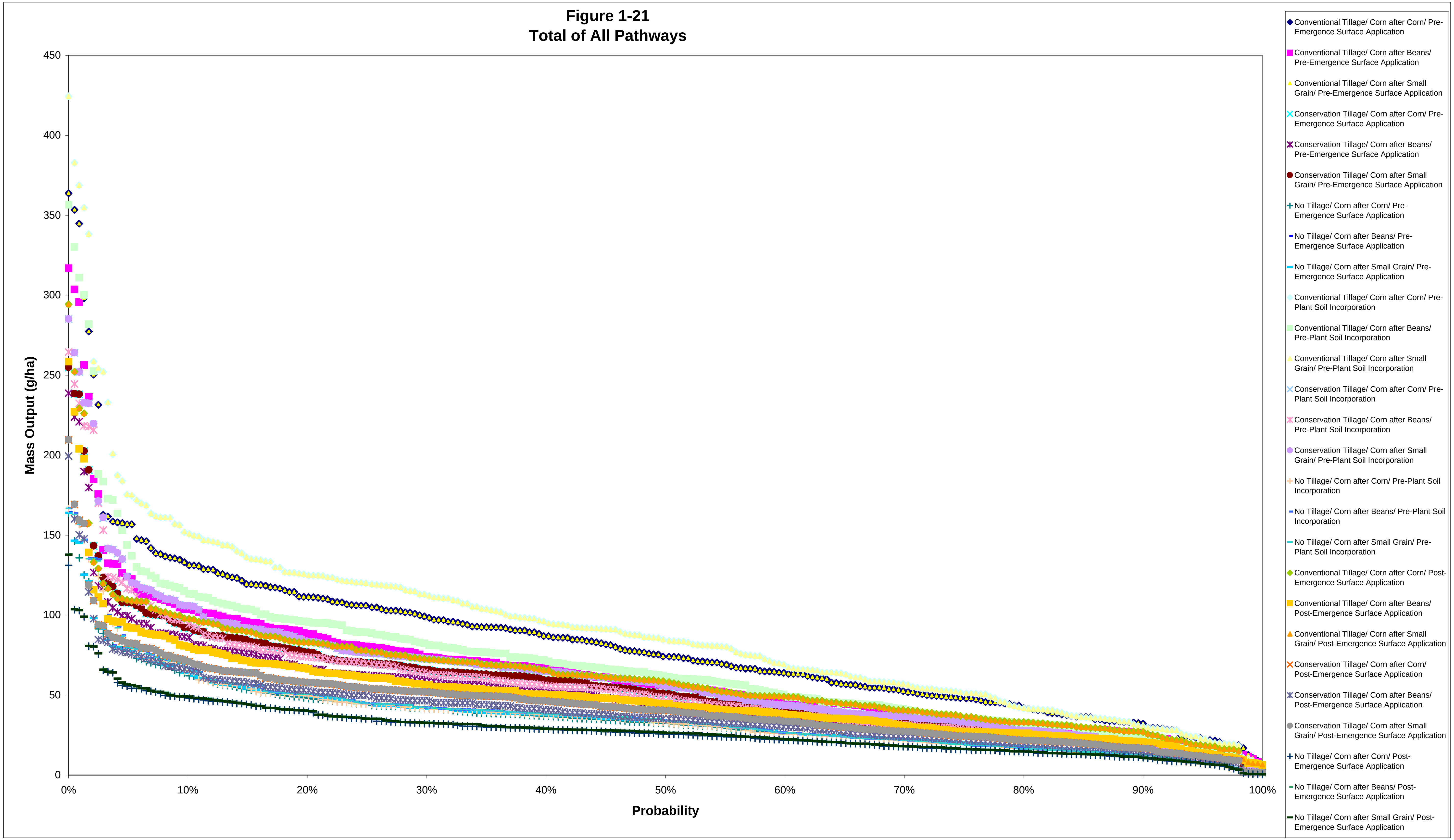


Figure 1-21
Total of All Pathways

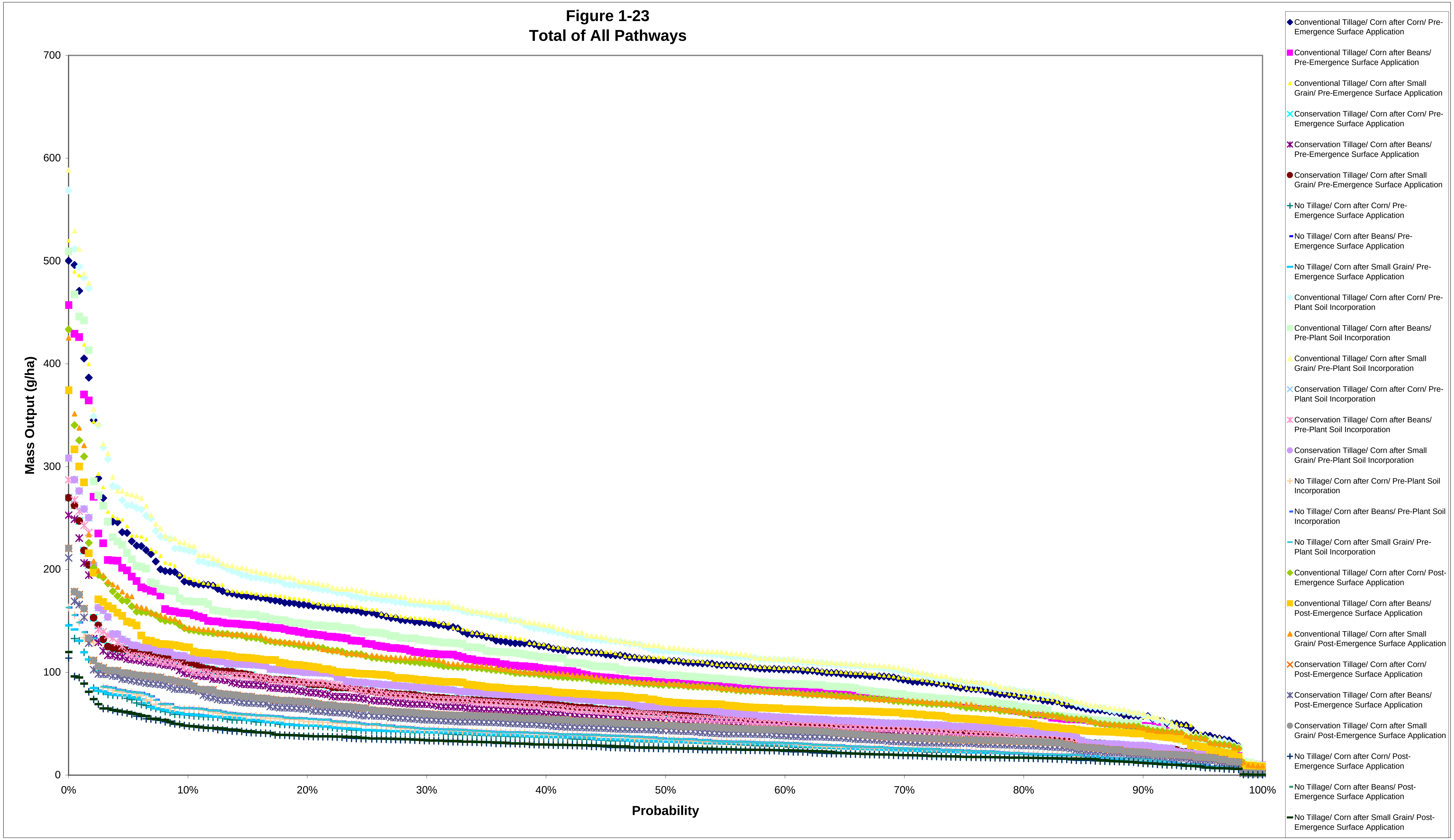


Figure 1-23
Total of All Pathways

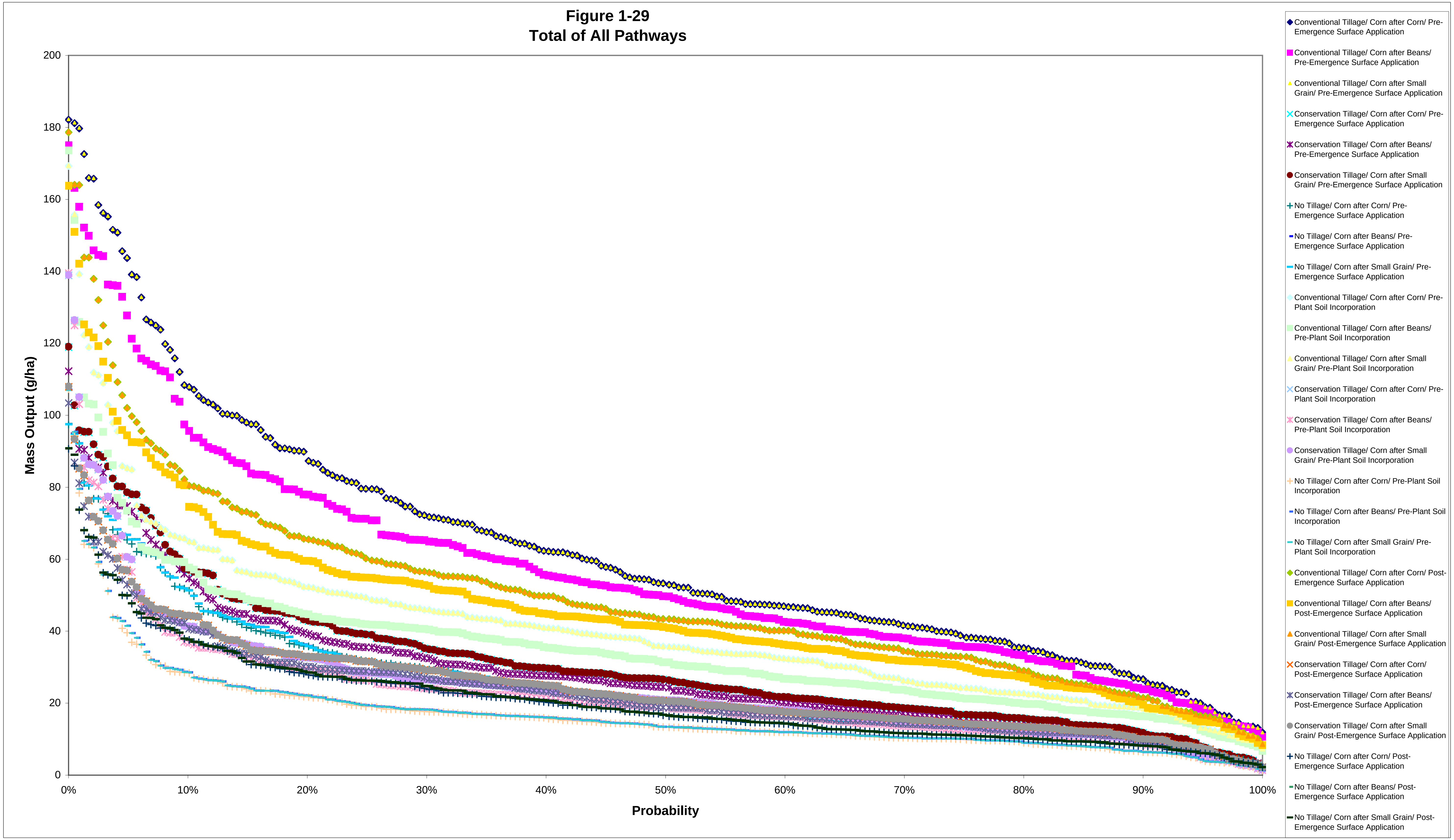


Figure 1-29
Total of All Pathways

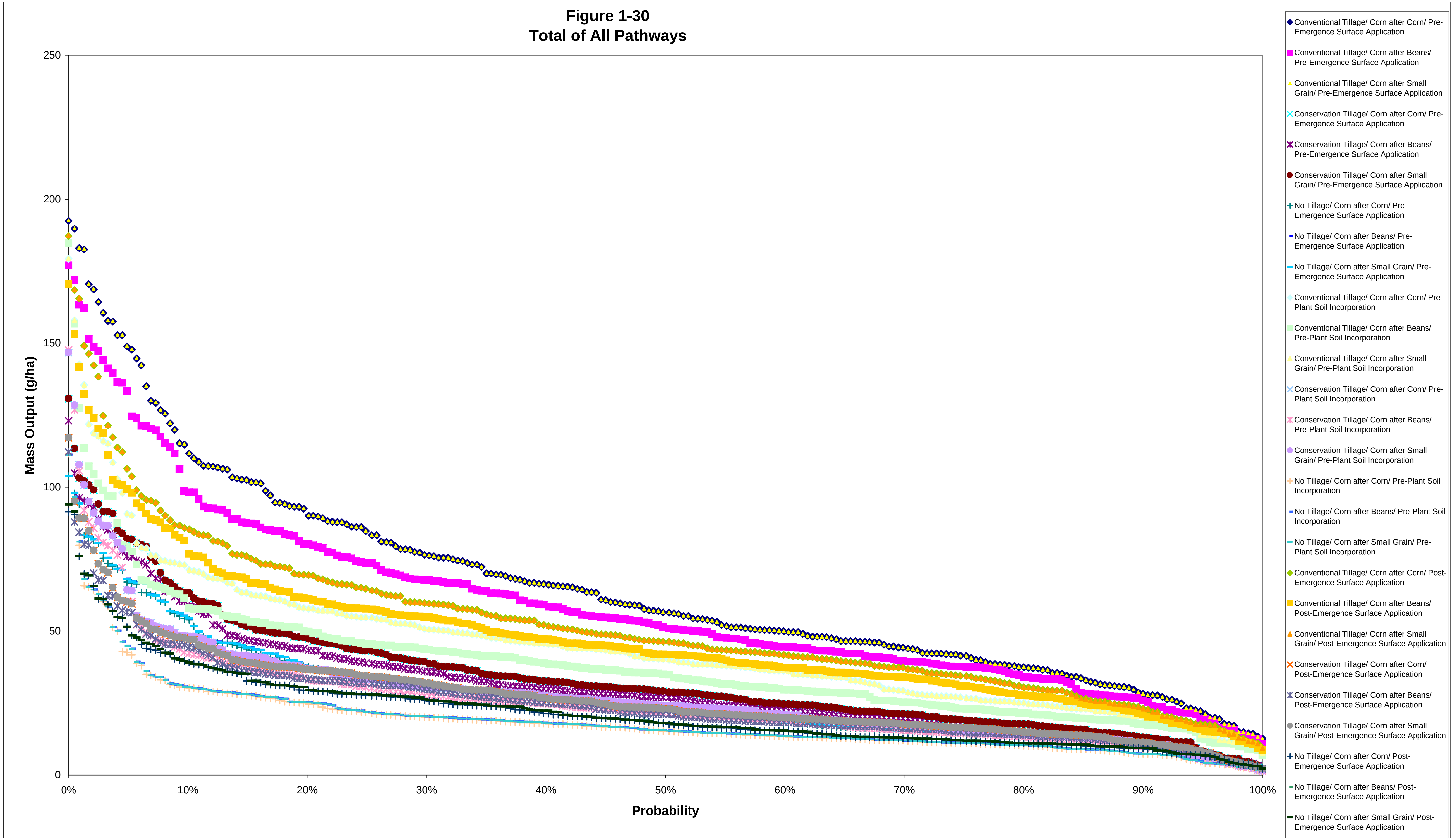


Figure 1-30
Total of All Pathways

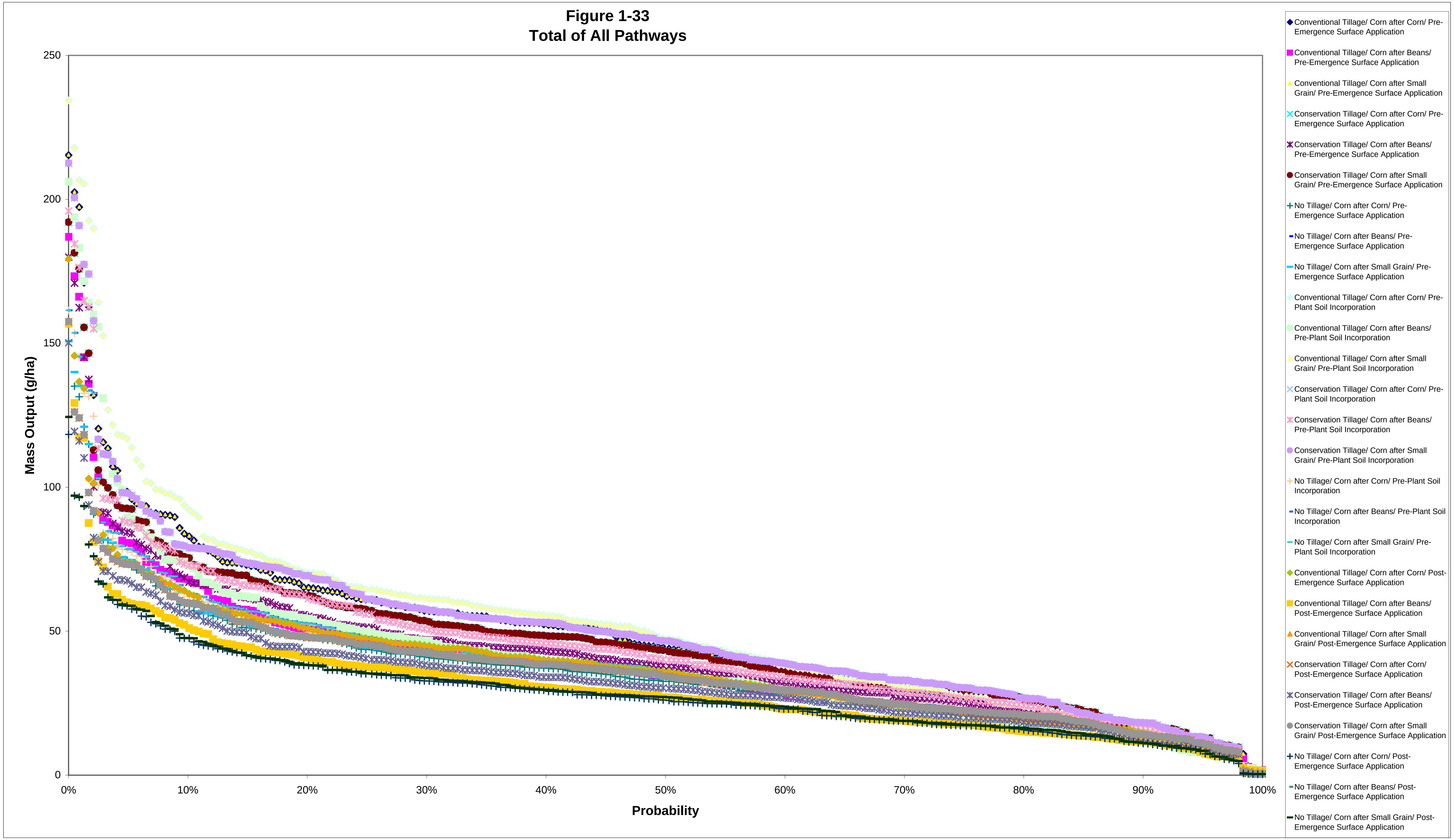


Figure 1-33
Total of All Pathways

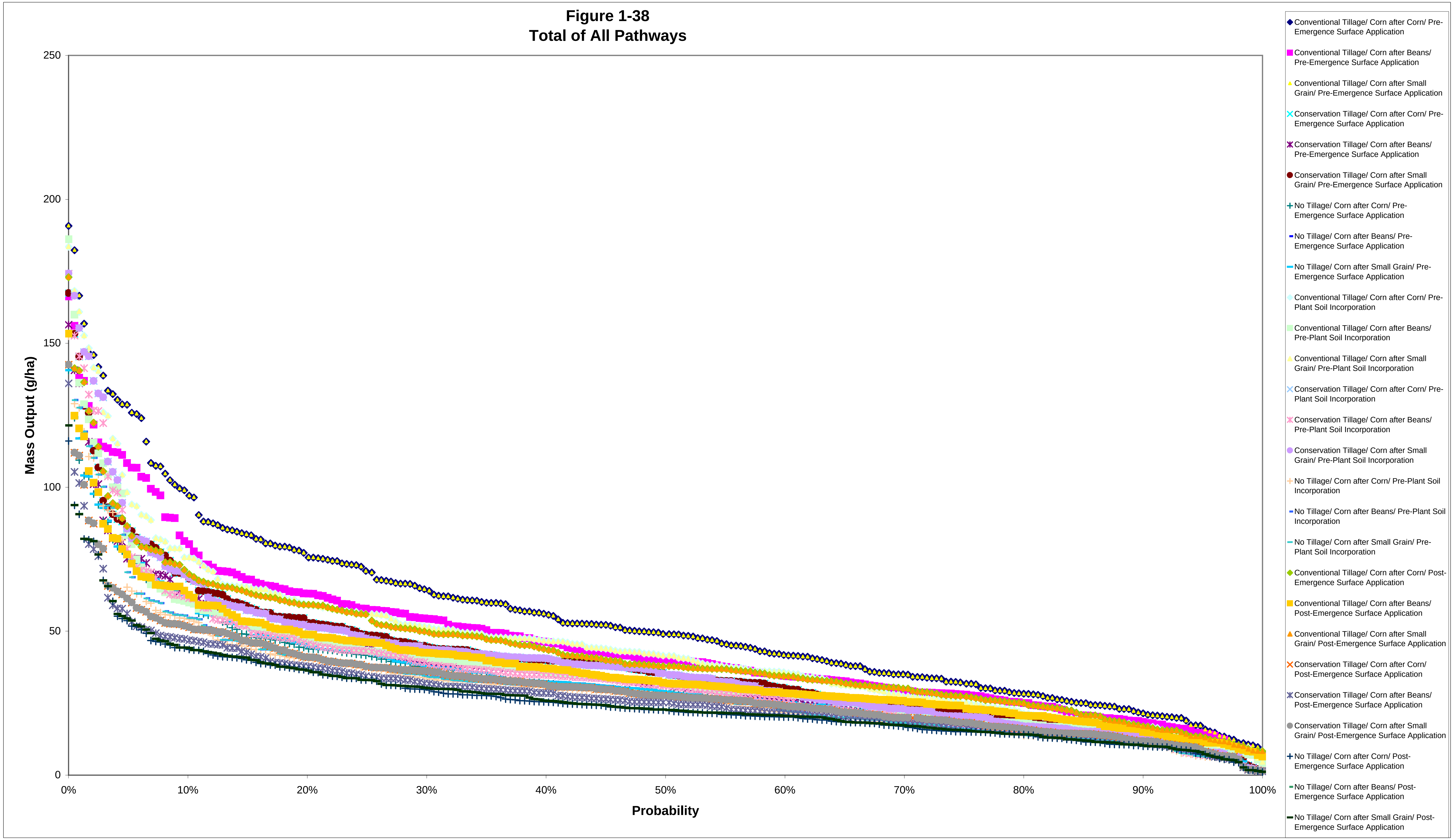
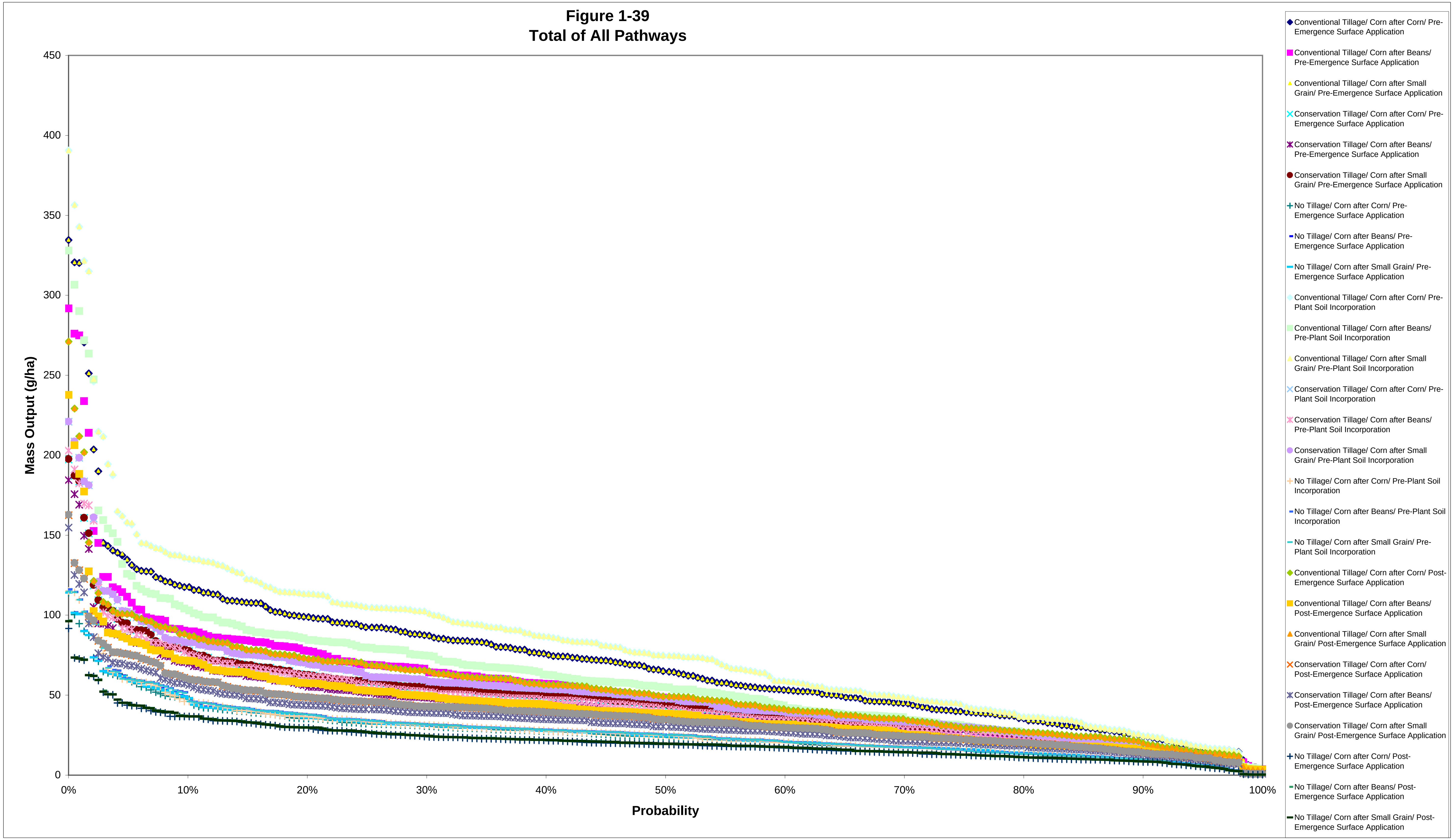


Figure 1-38
Total of All Pathways

Figure 1-39
Total of All Pathways



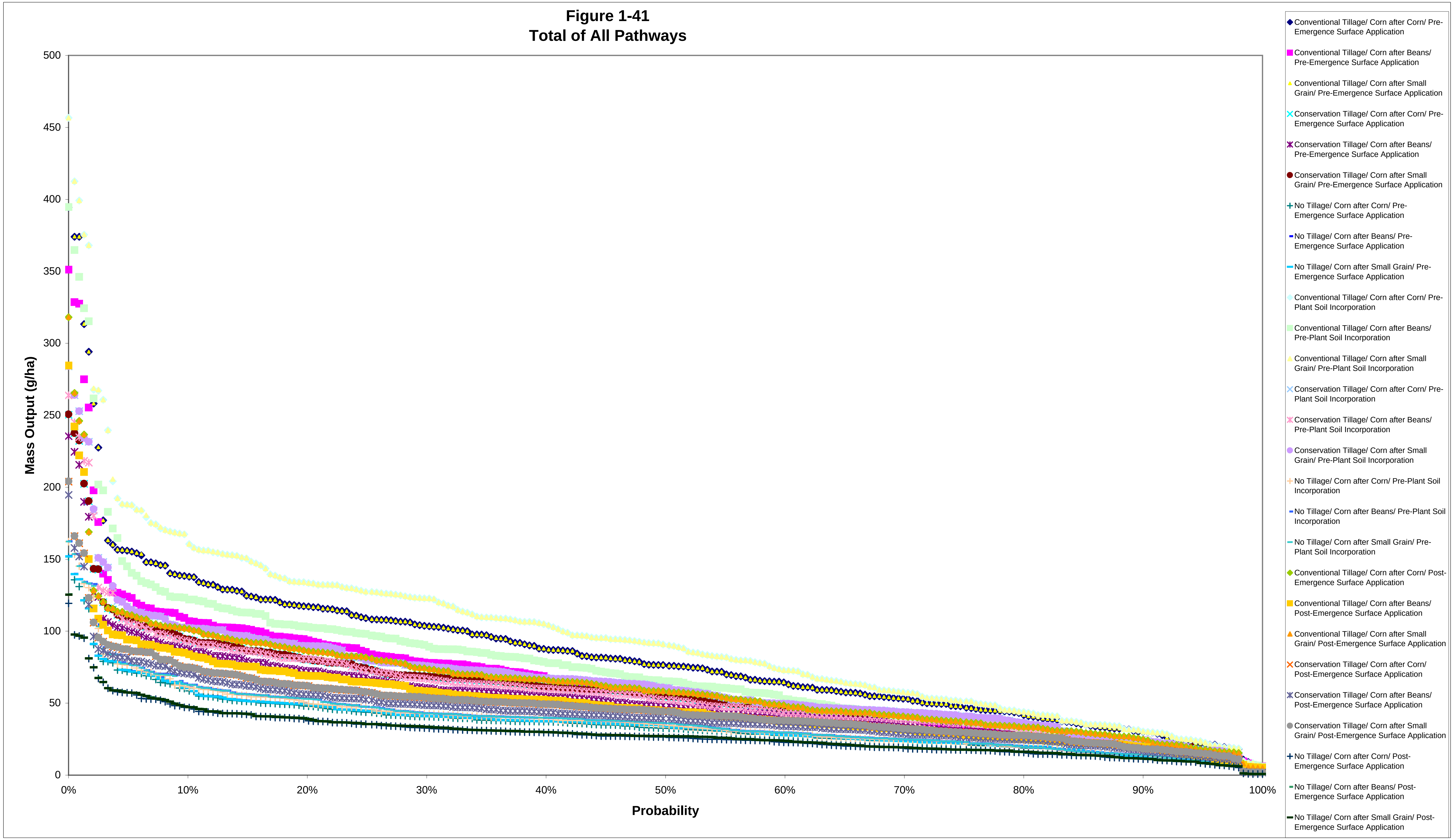


Figure 1-41
Total of All Pathways

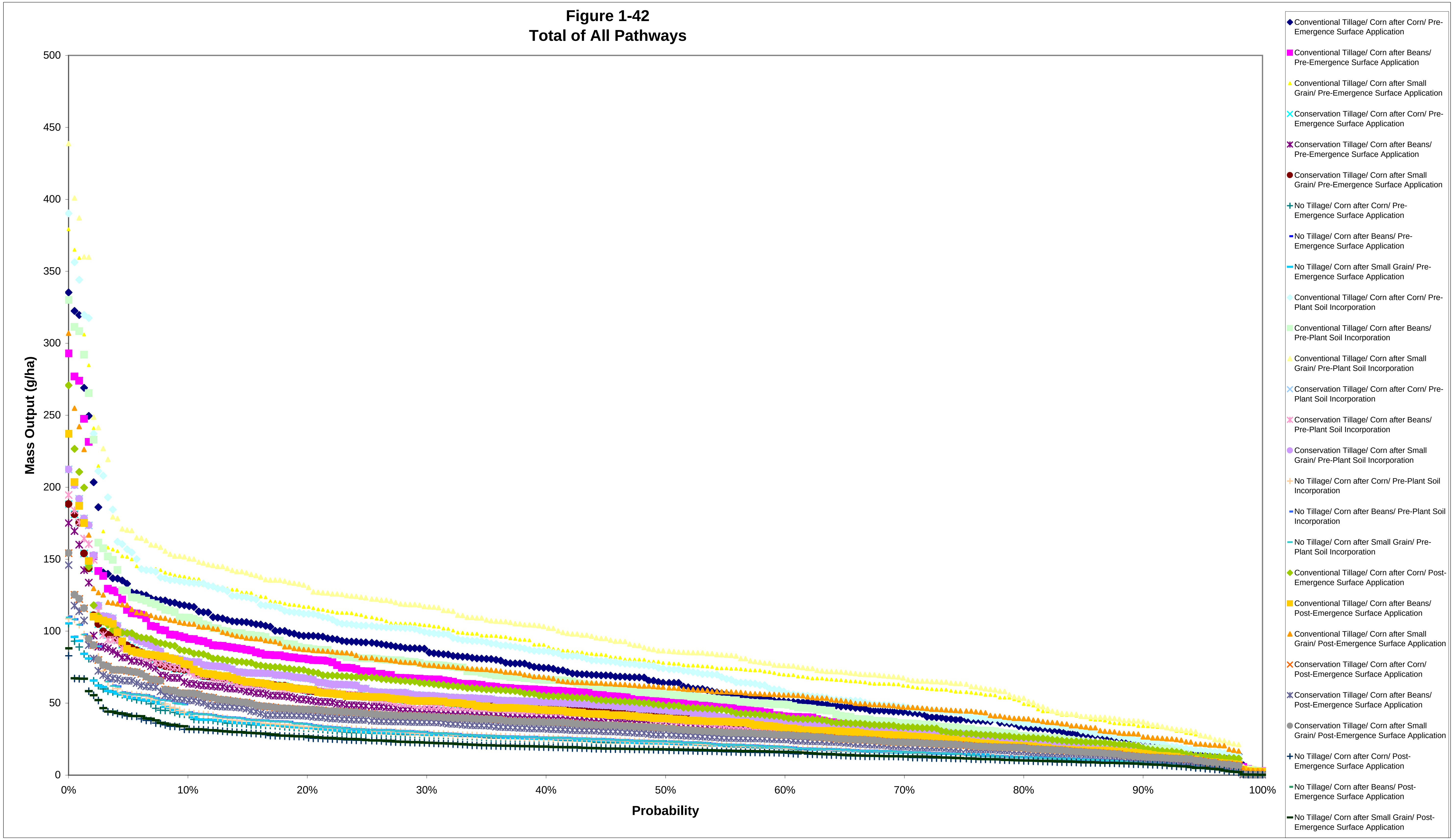


Figure 1-42
Total of All Pathways

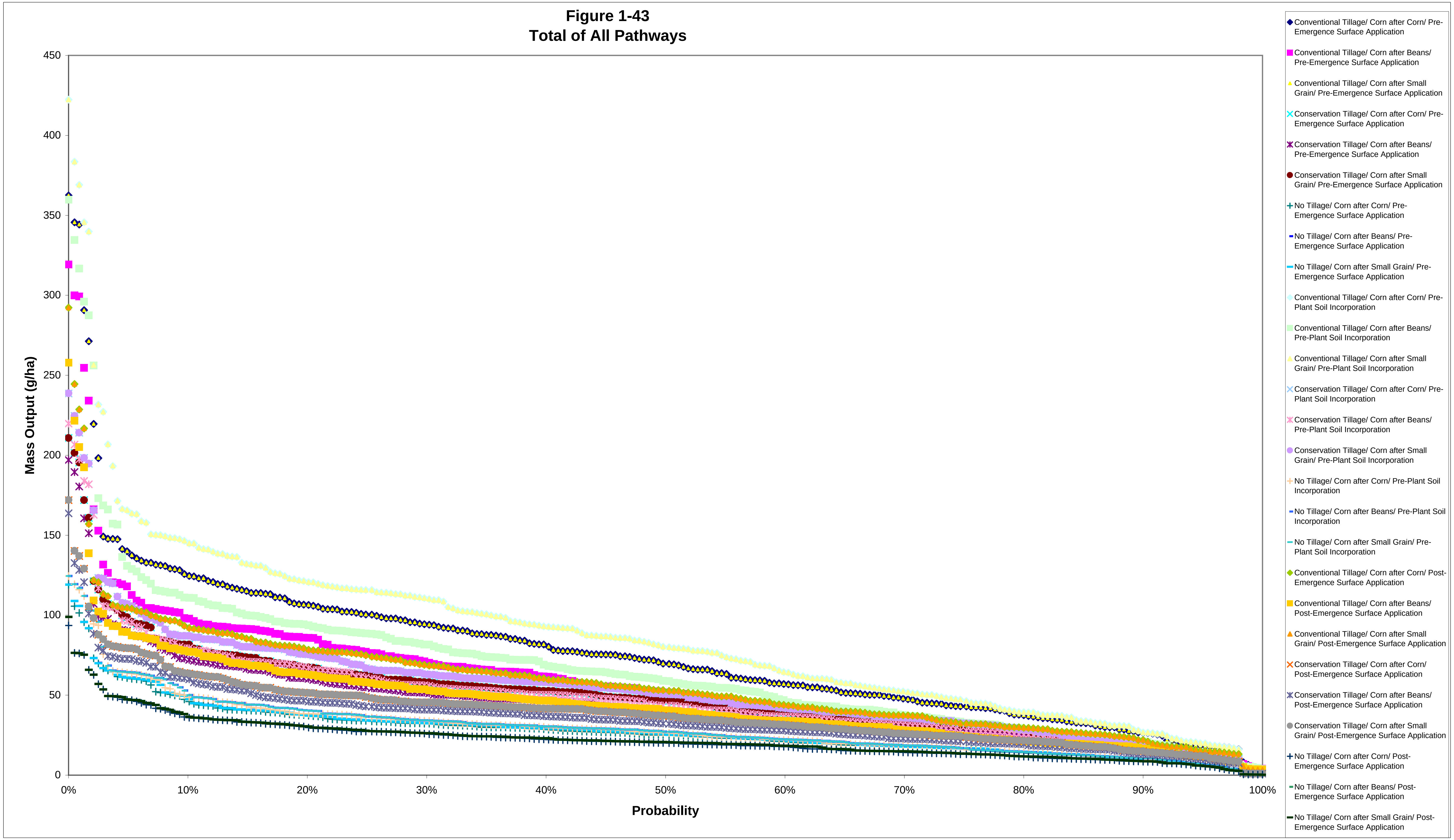
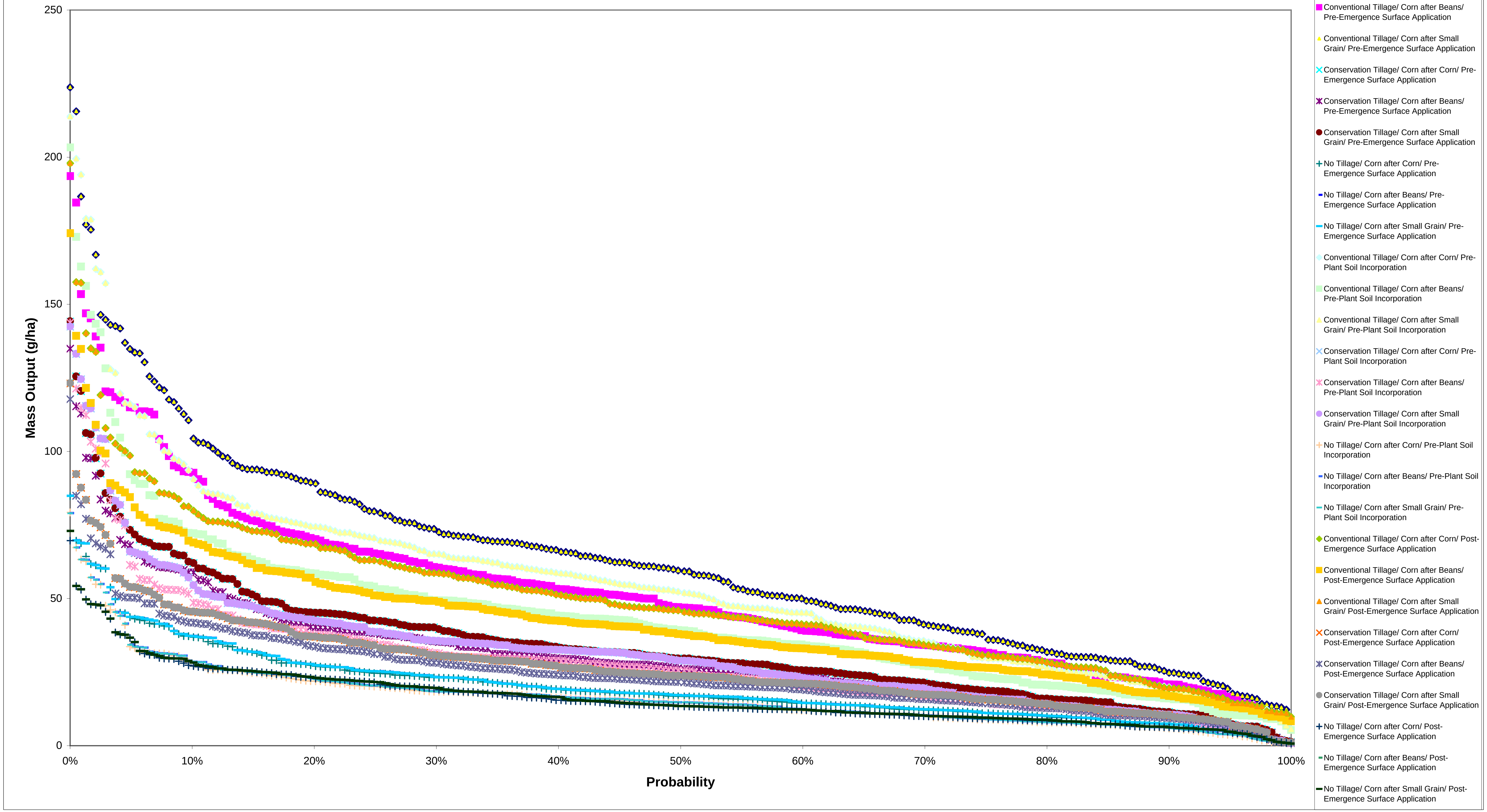


Figure 1-43
Total of All Pathways

Figure 1-57
Total of All Pathways



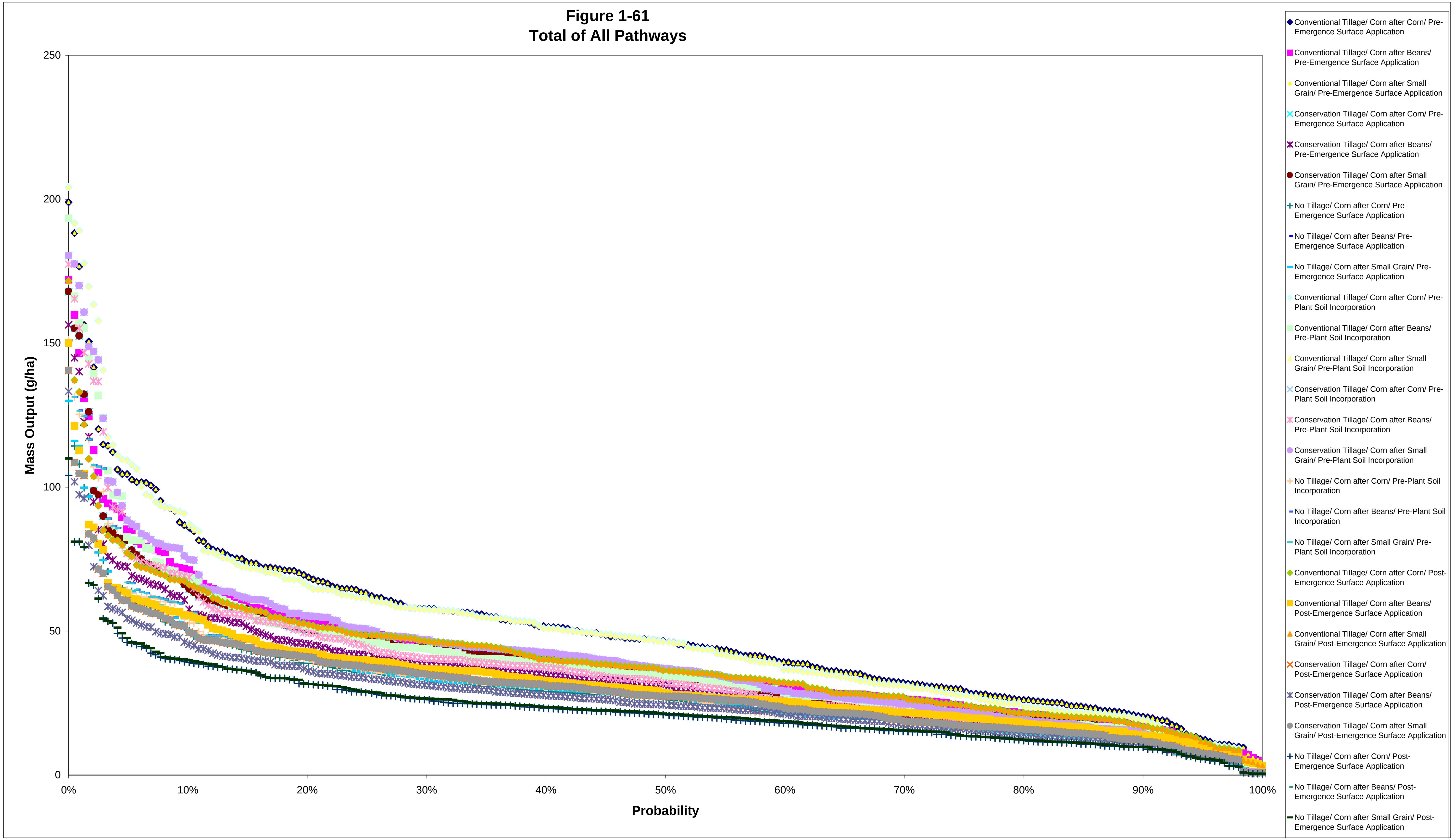


Figure 1-61
Total of All Pathways

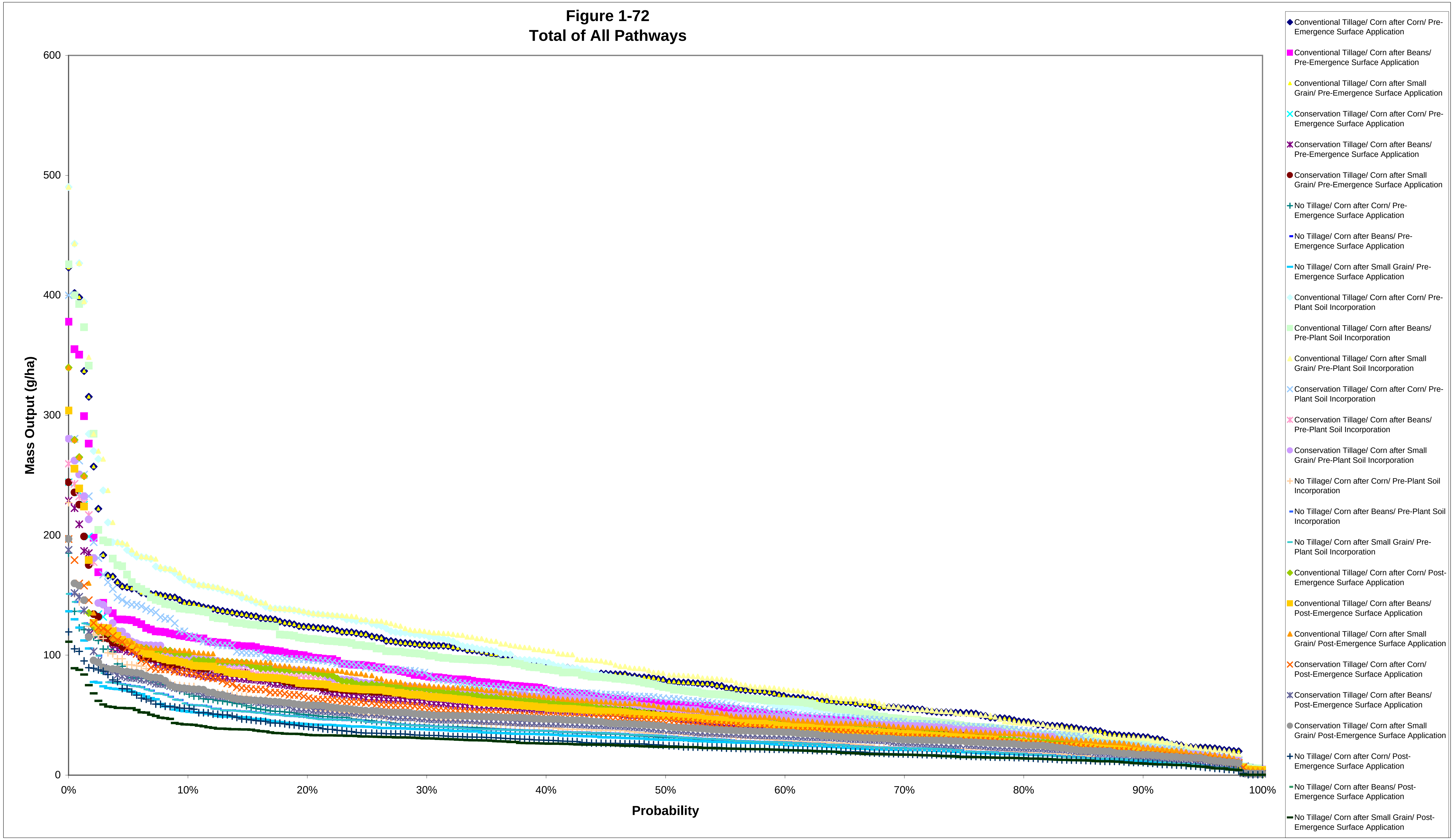


Figure 1-72
Total of All Pathways

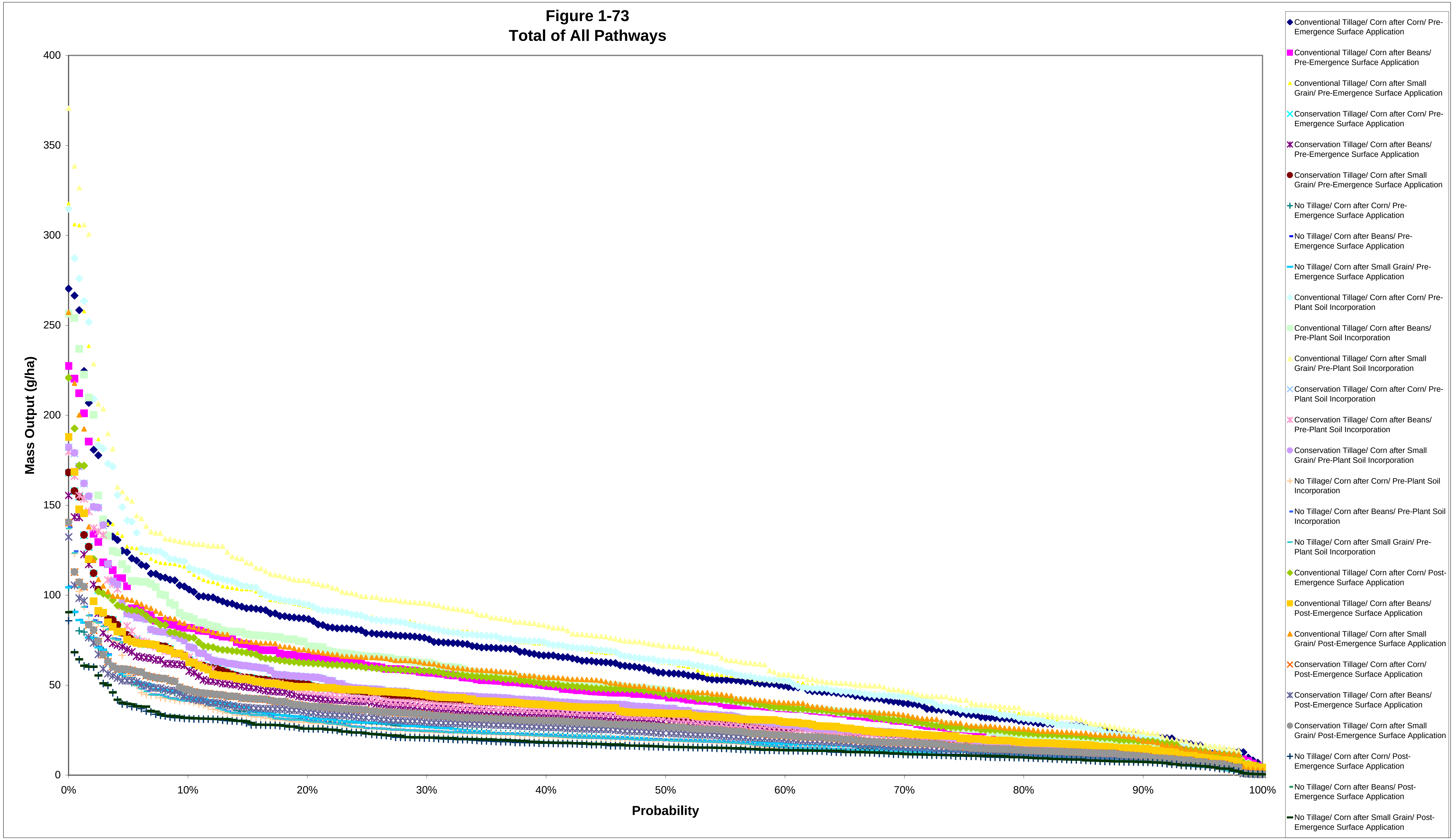


Figure 1-73
Total of All Pathways

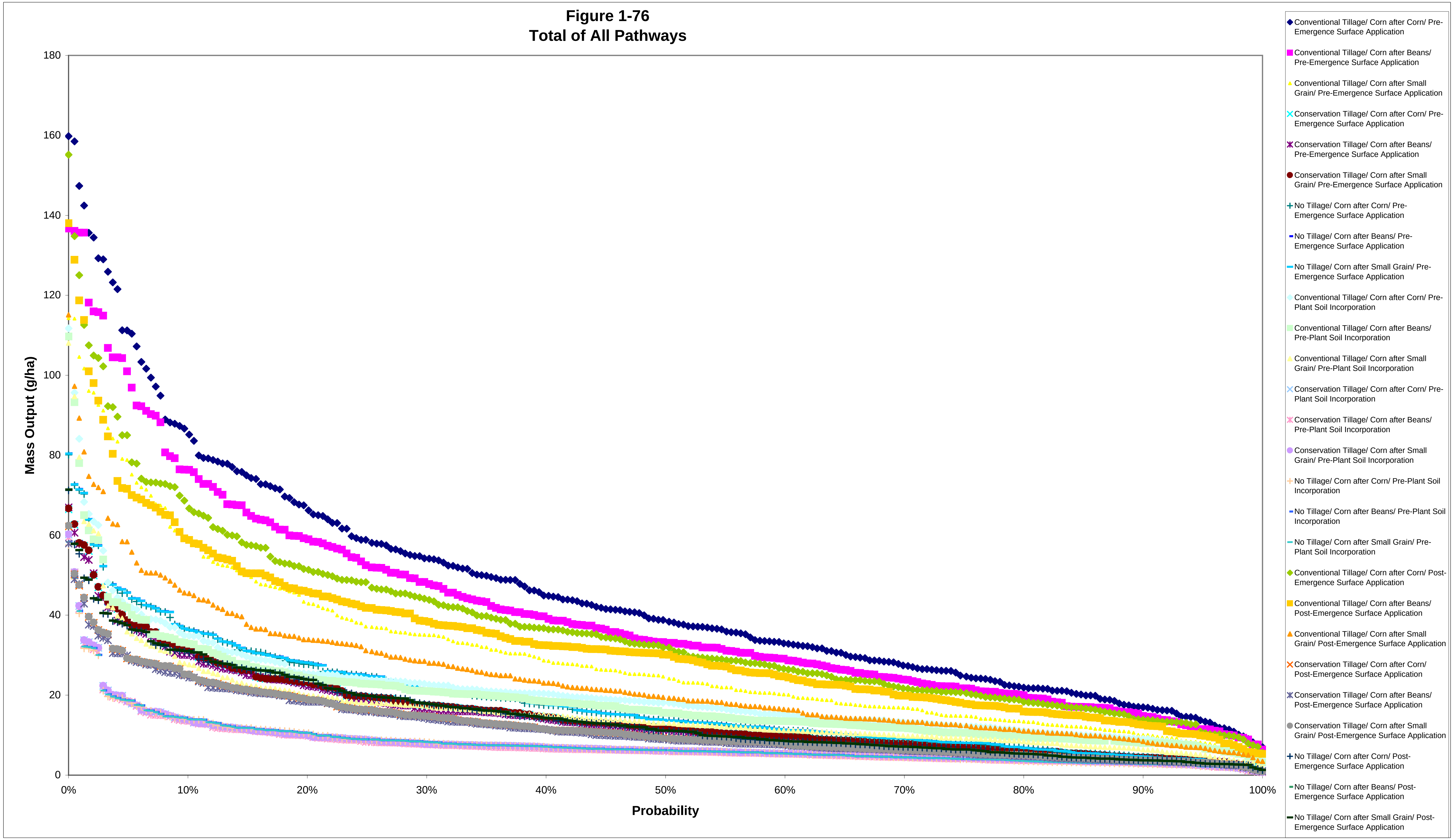


Figure 1-76
Total of All Pathways

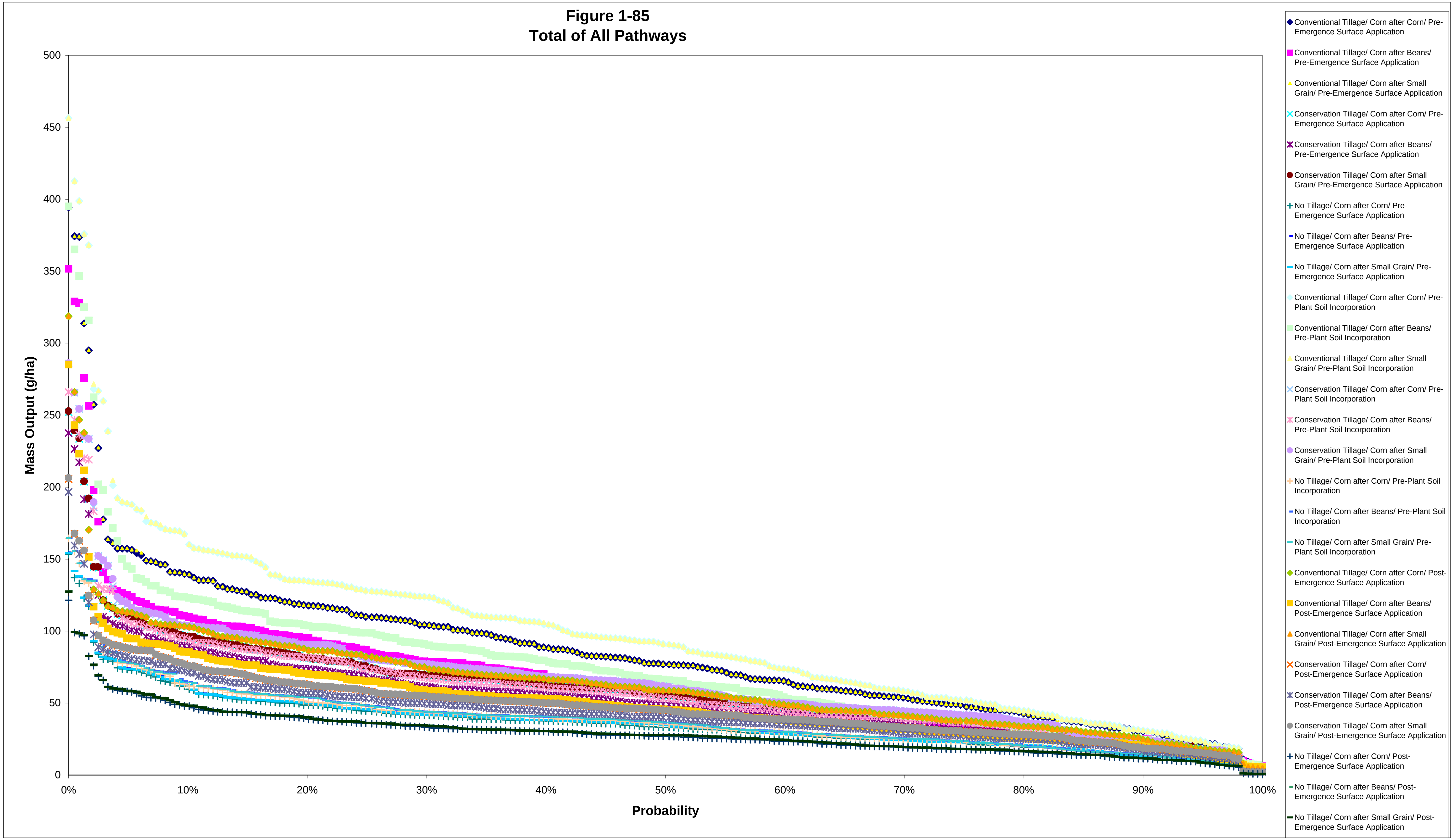


Figure 1-85
Total of All Pathways

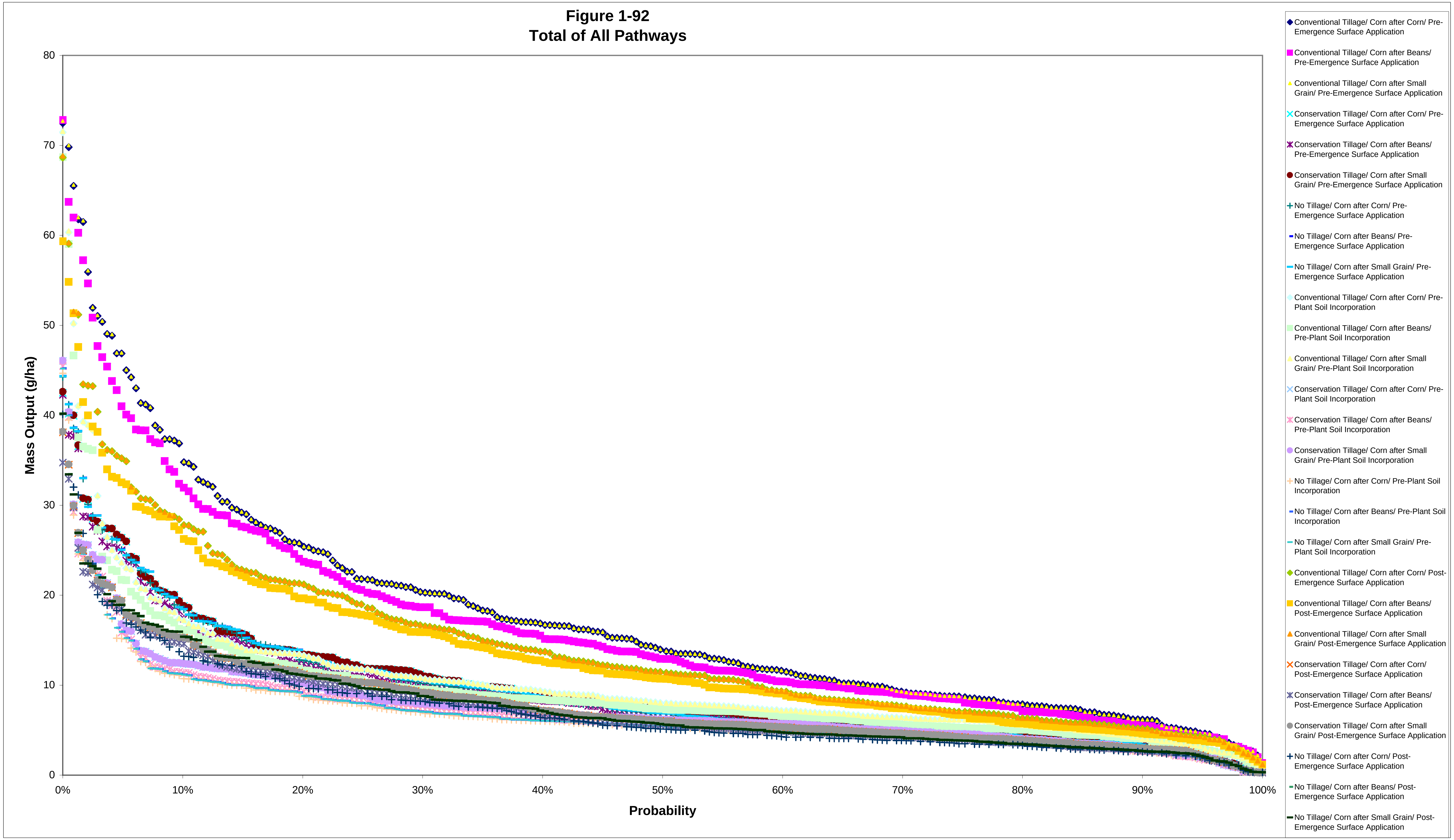


Figure 1-92
Total of All Pathways

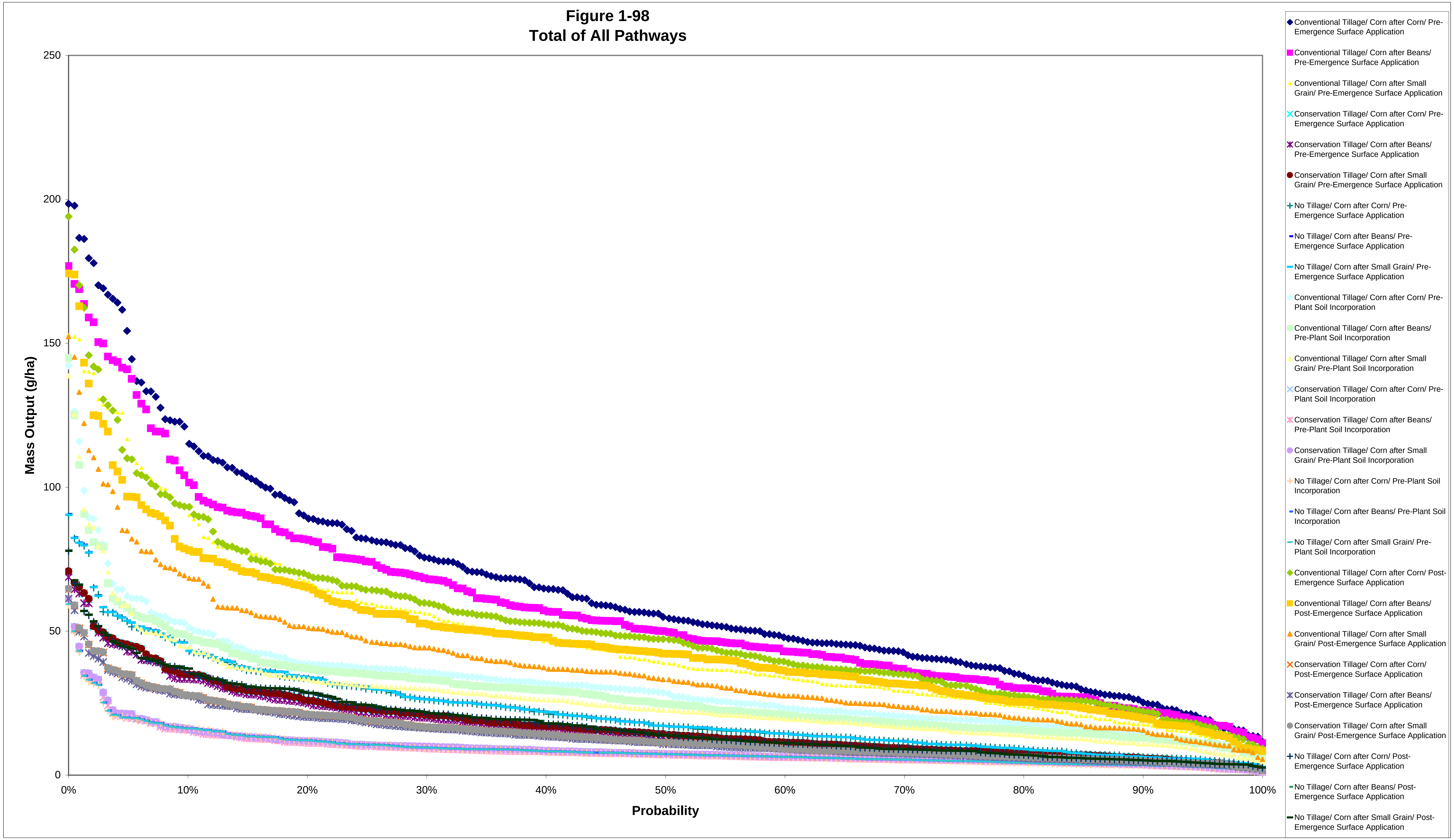


Figure 1-98
Total of All Pathways

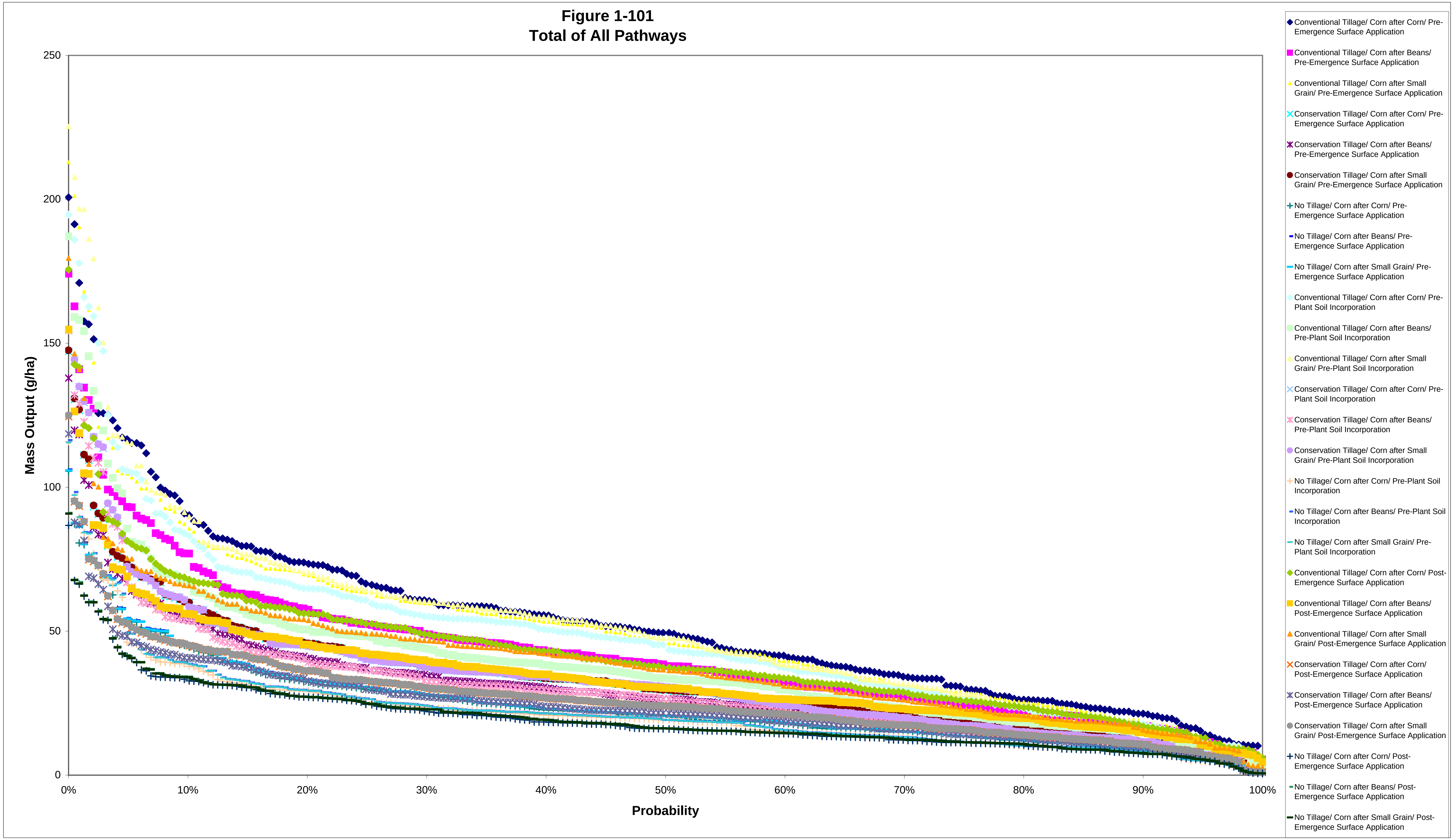
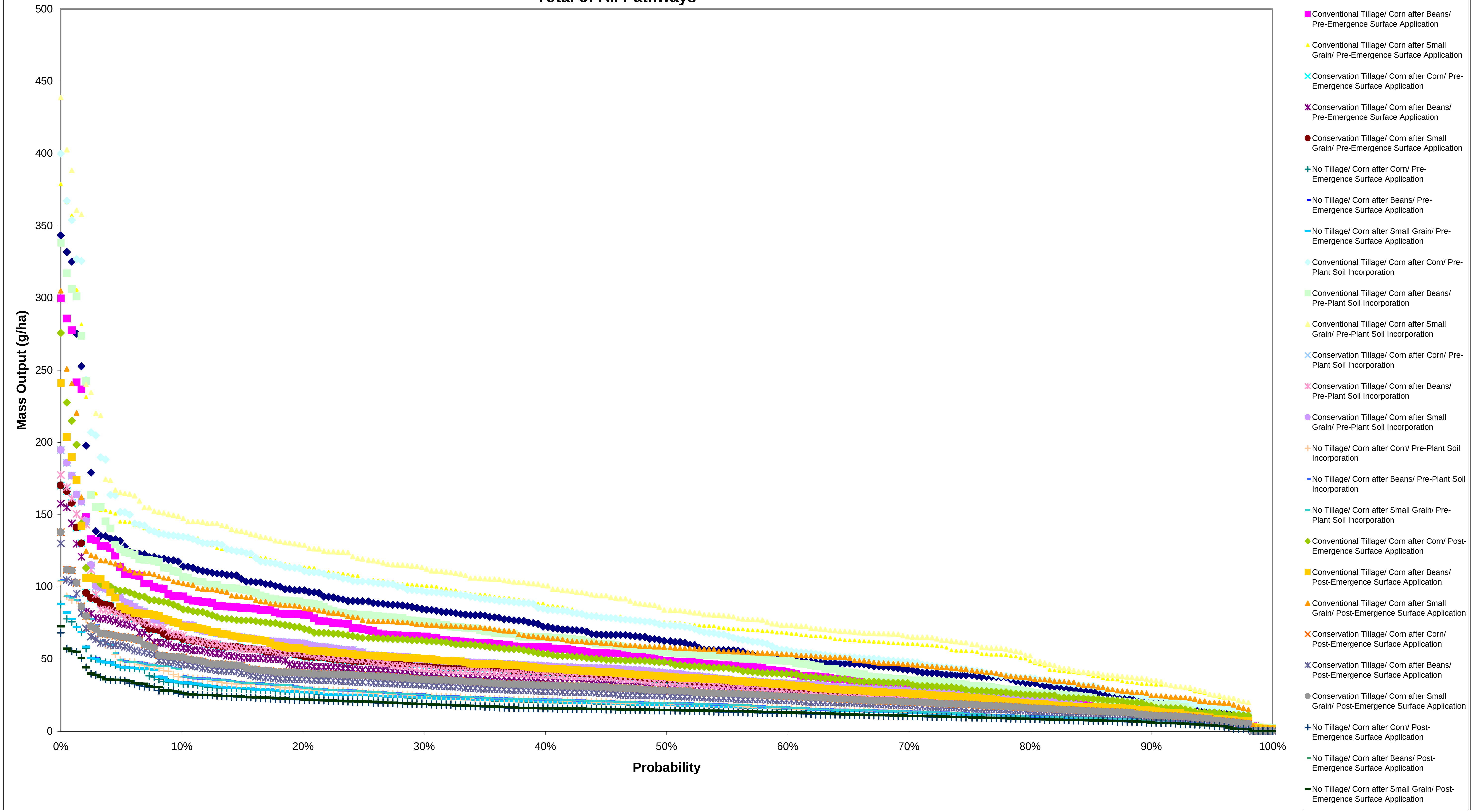


Figure 1-101
Total of All Pathways

Figure 1-105
Total of All Pathways



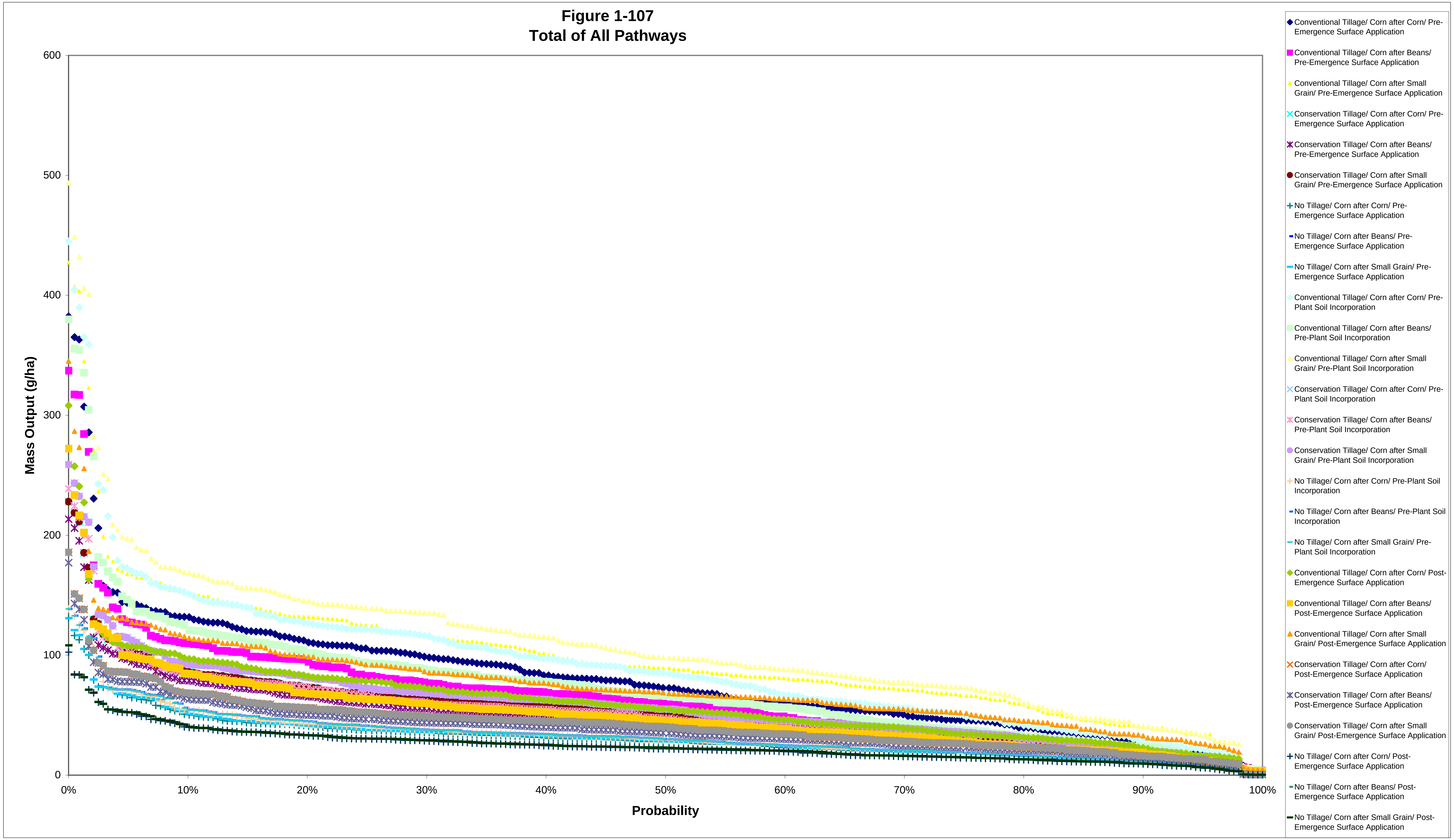


Figure 1-107
Total of All Pathways

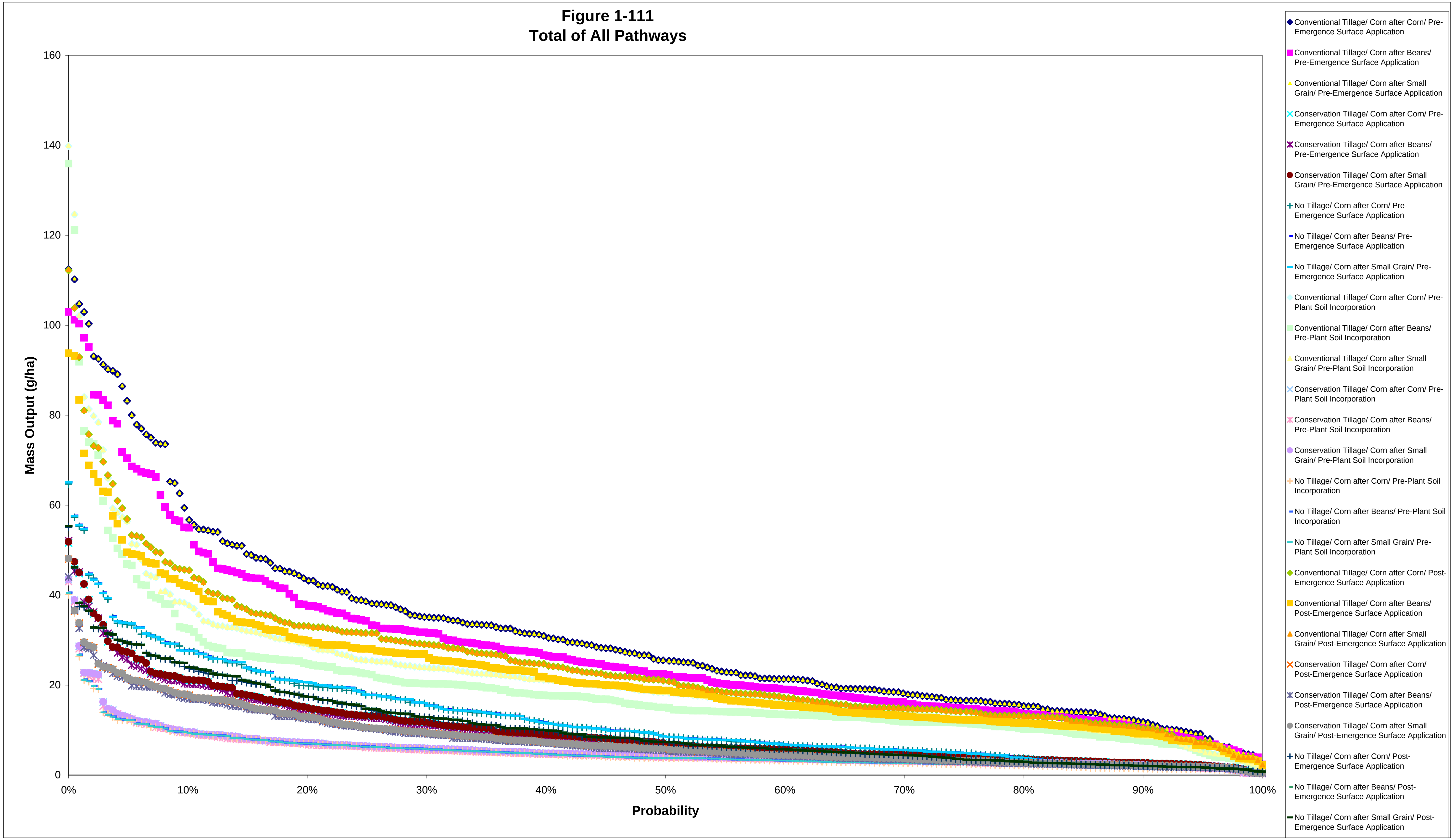


Figure 1-111
Total of All Pathways

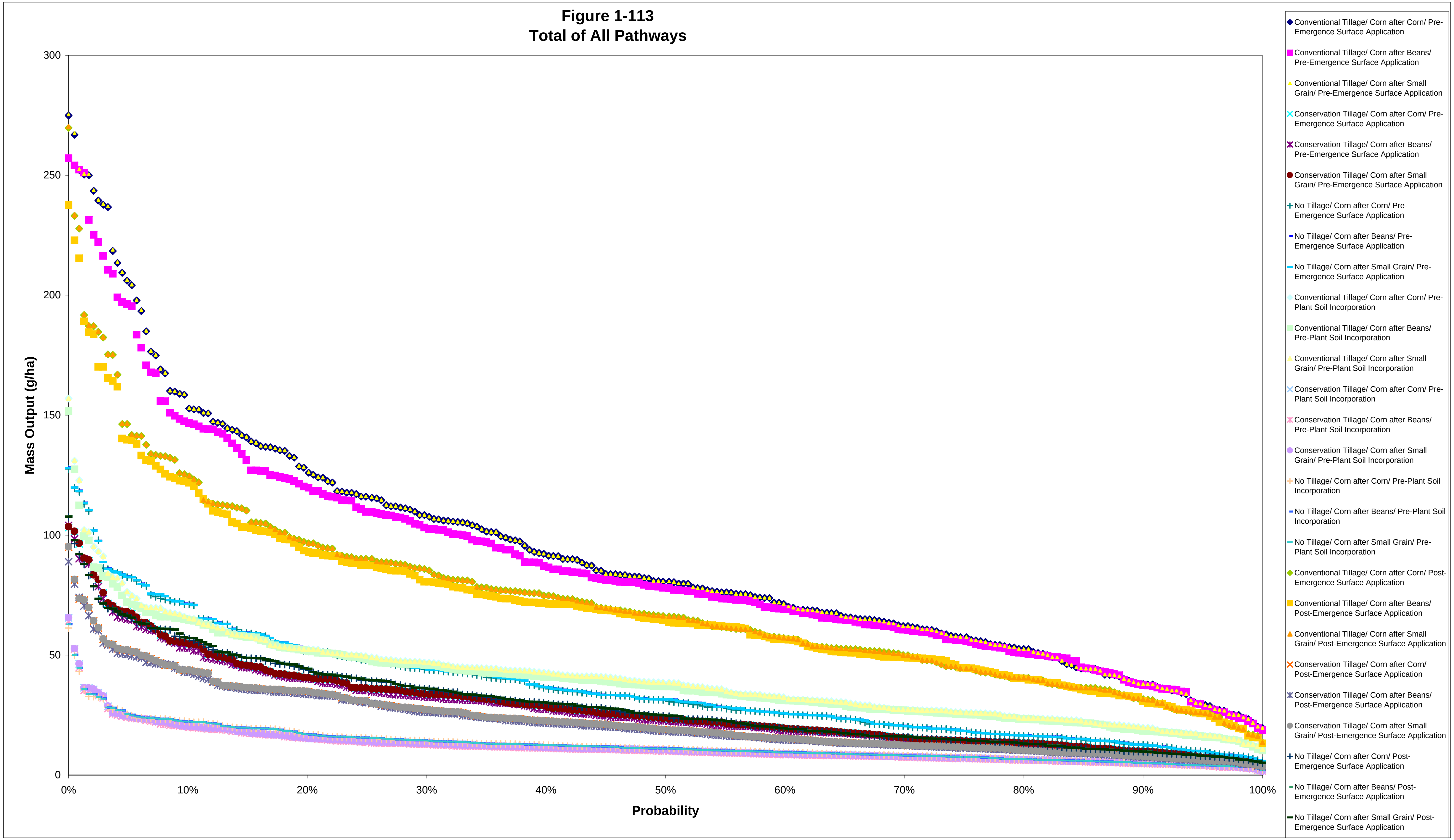


Figure 1-113
Total of All Pathways

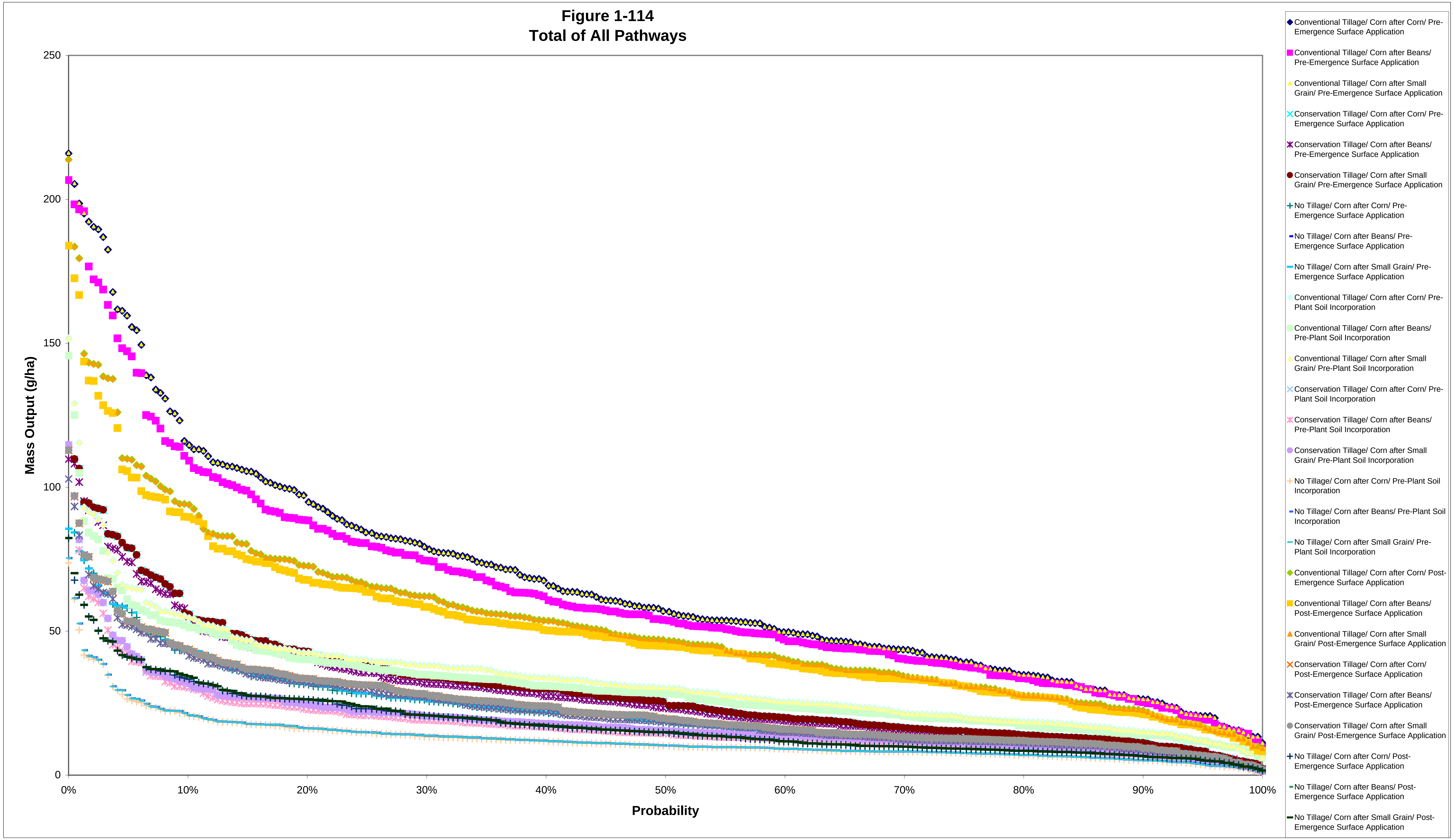


Figure 1-114
Total of All Pathways

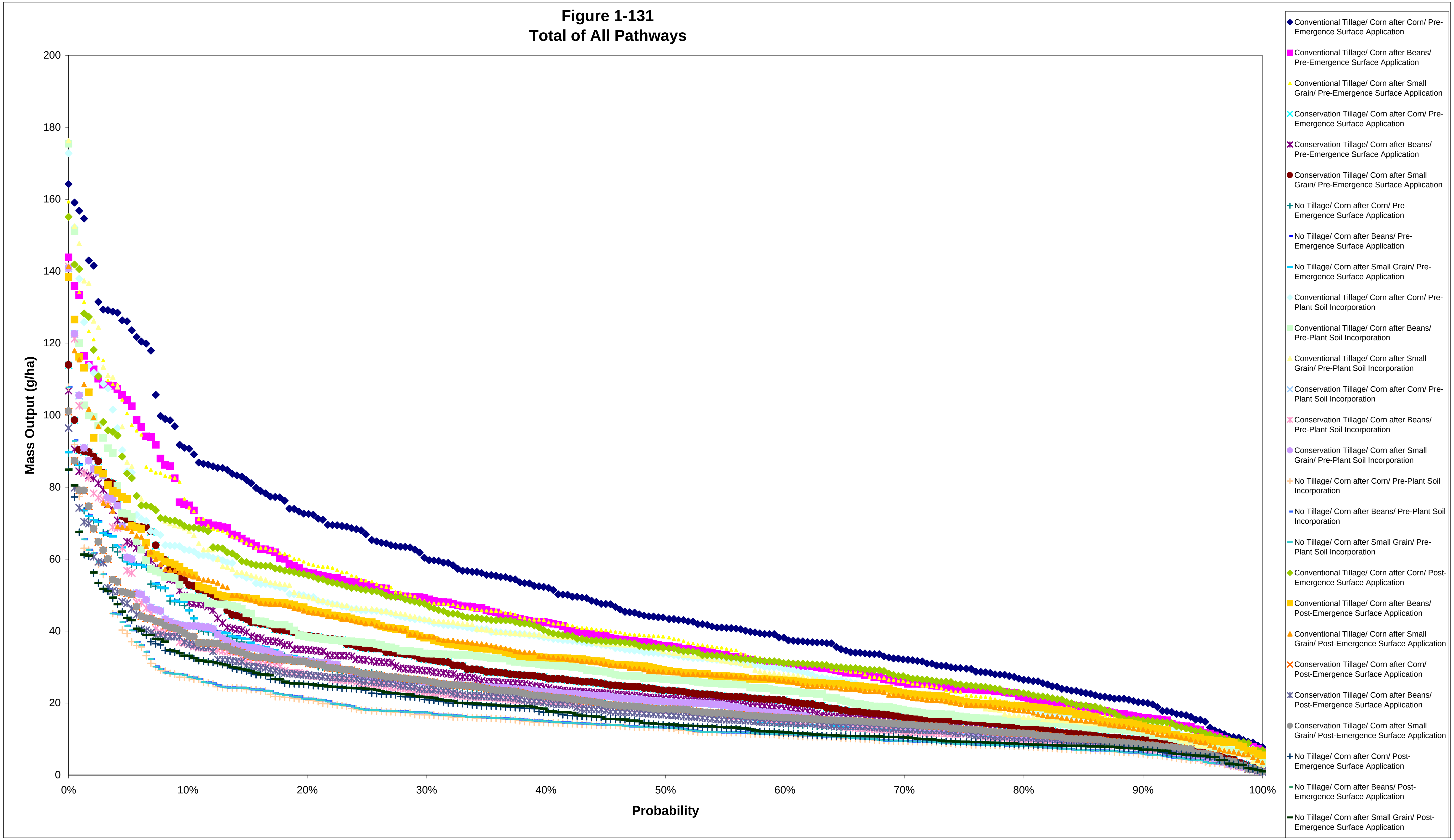


Figure 1-131
Total of All Pathways

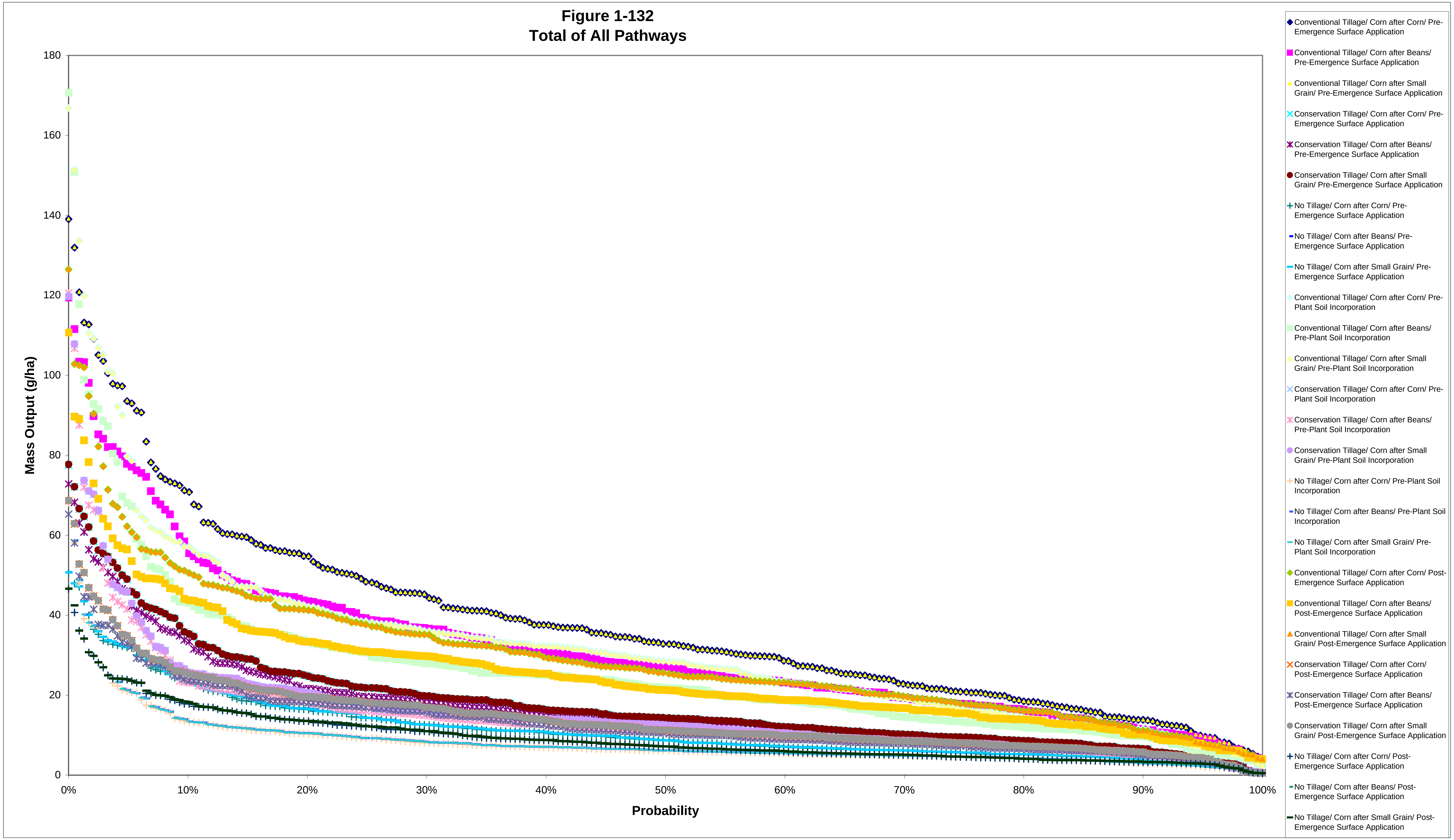


Figure 1-132
Total of All Pathways

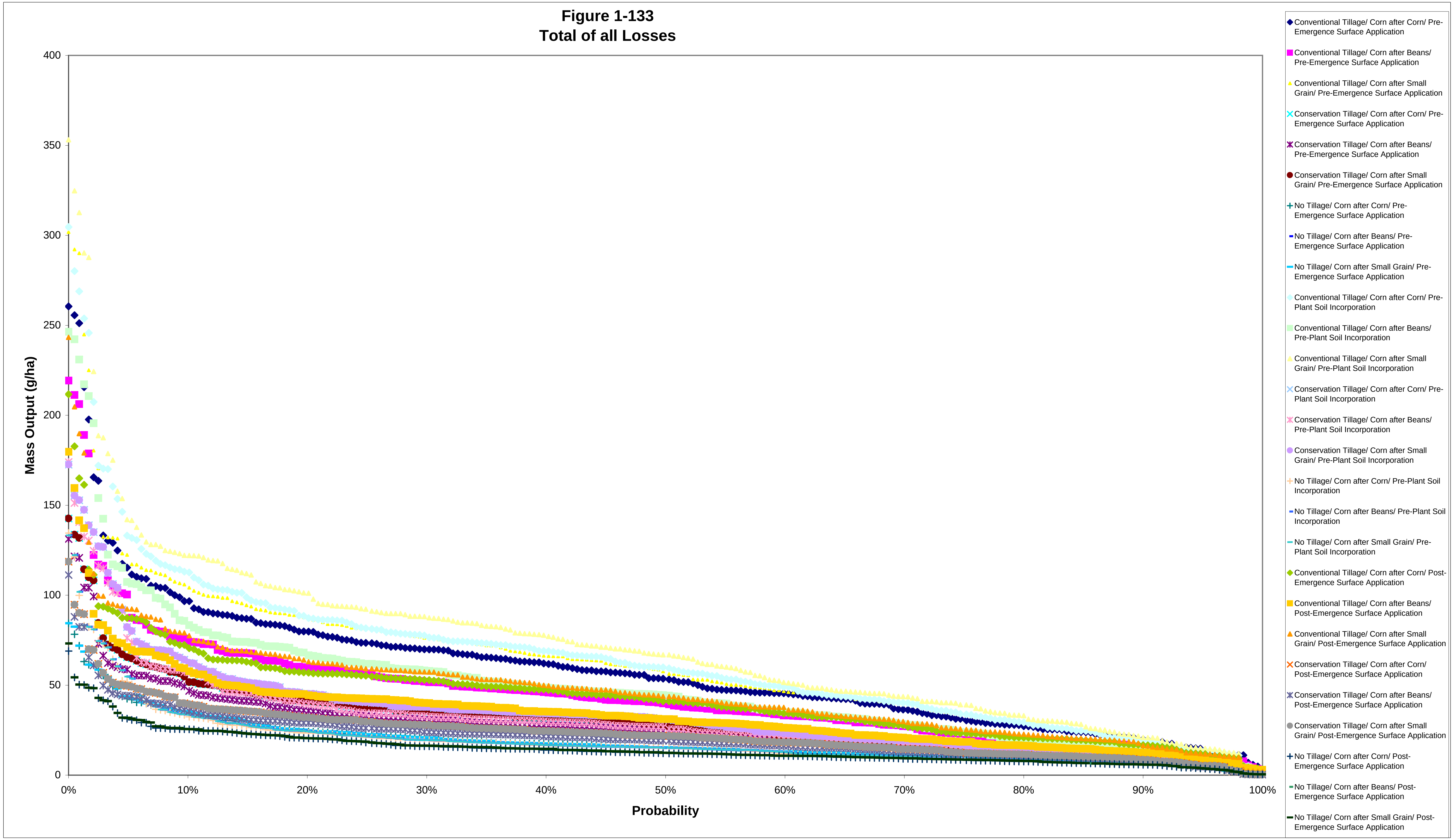


Figure 1-133
Total of all Losses

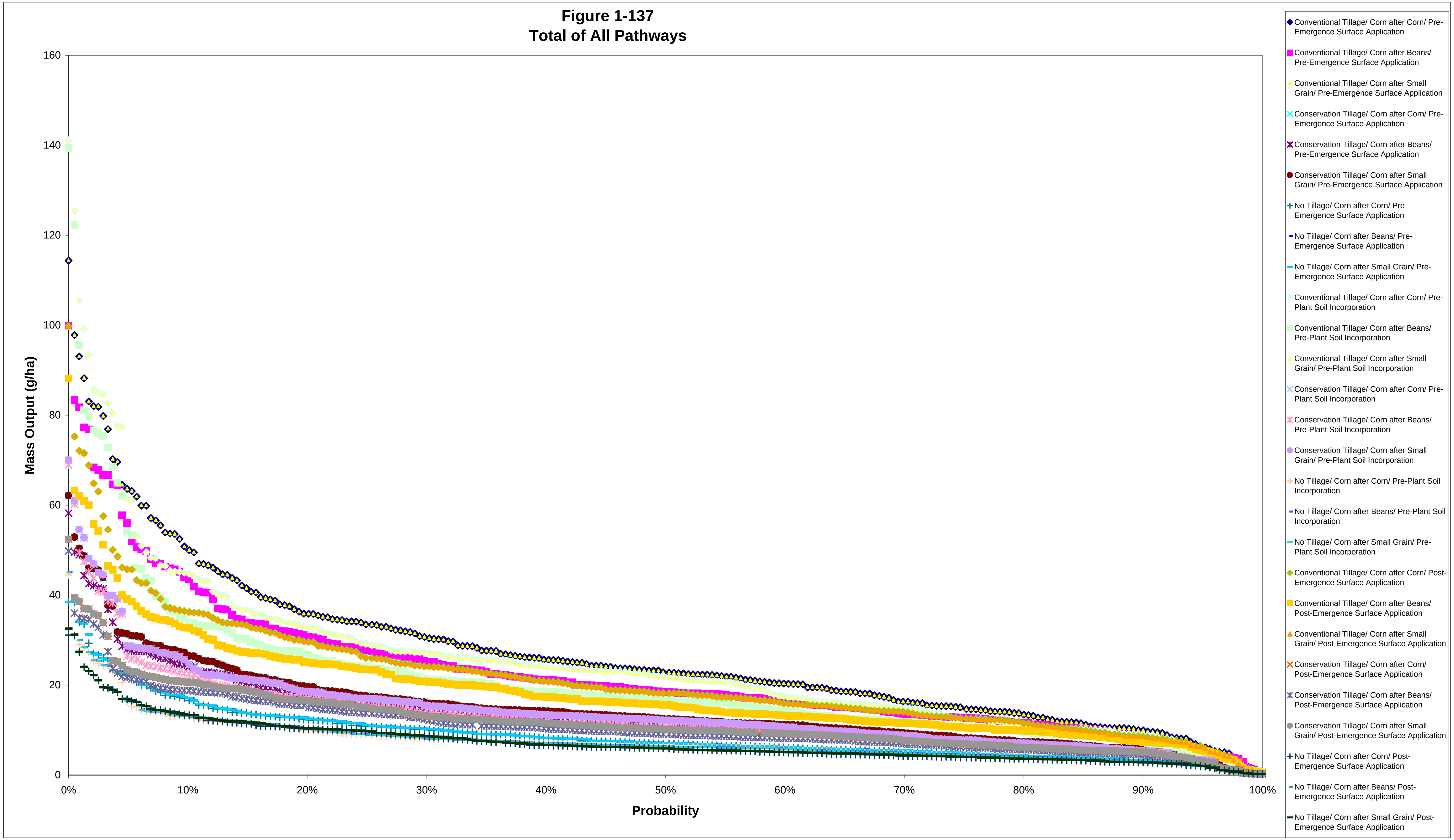


Figure 1-137
Total of All Pathways

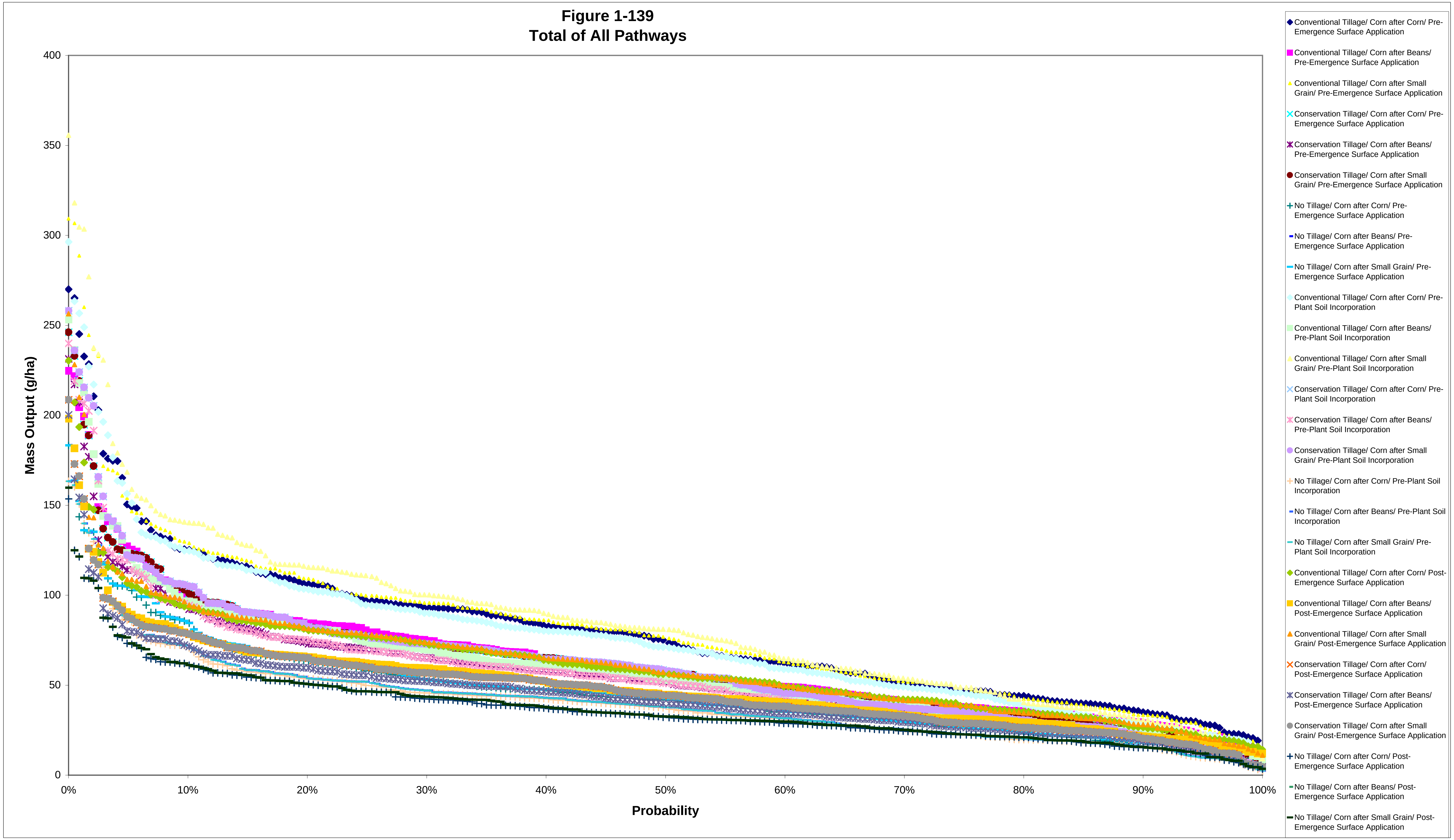


Figure 1-139
Total of All Pathways

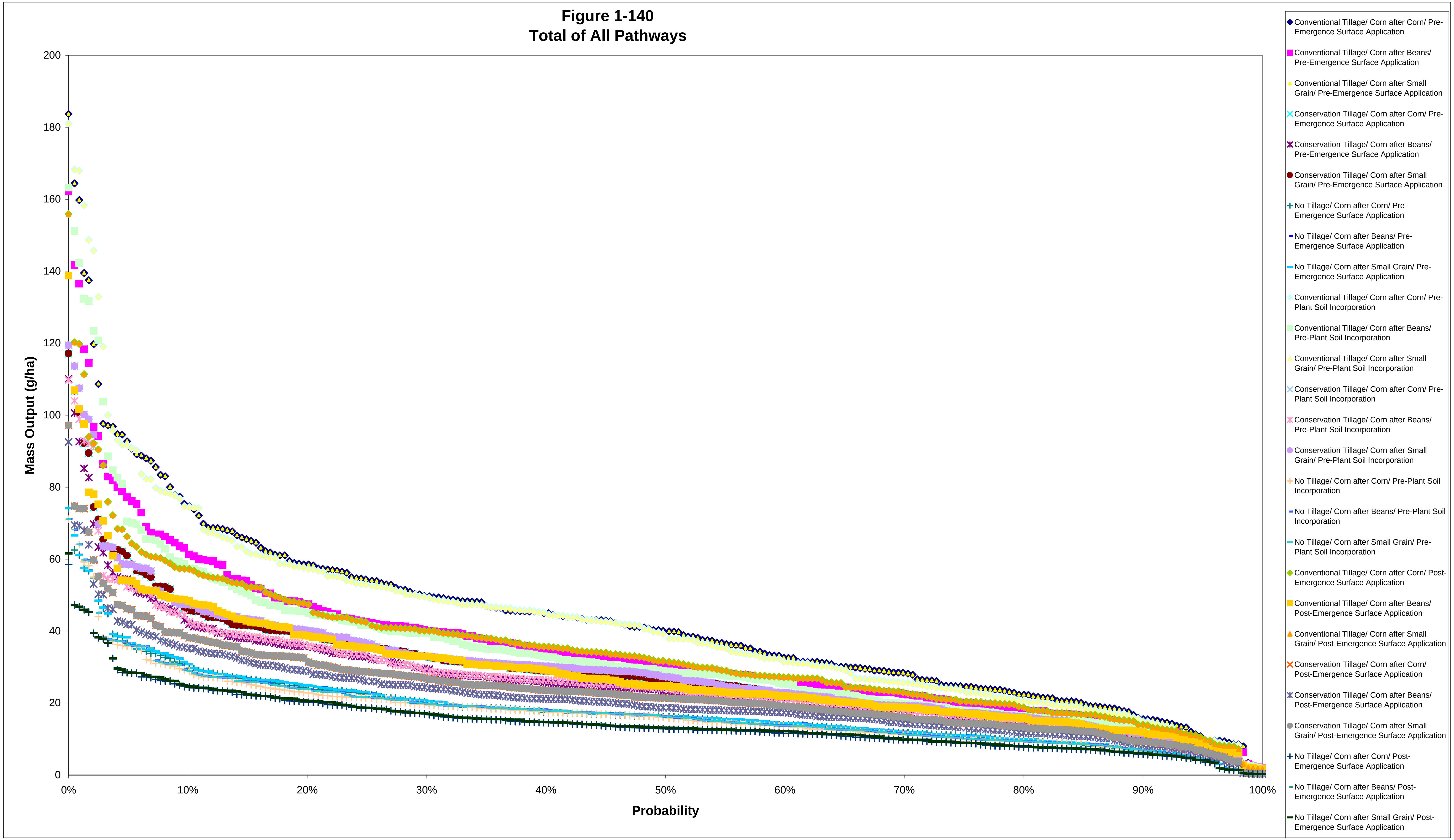


Figure 1-140
Total of All Pathways

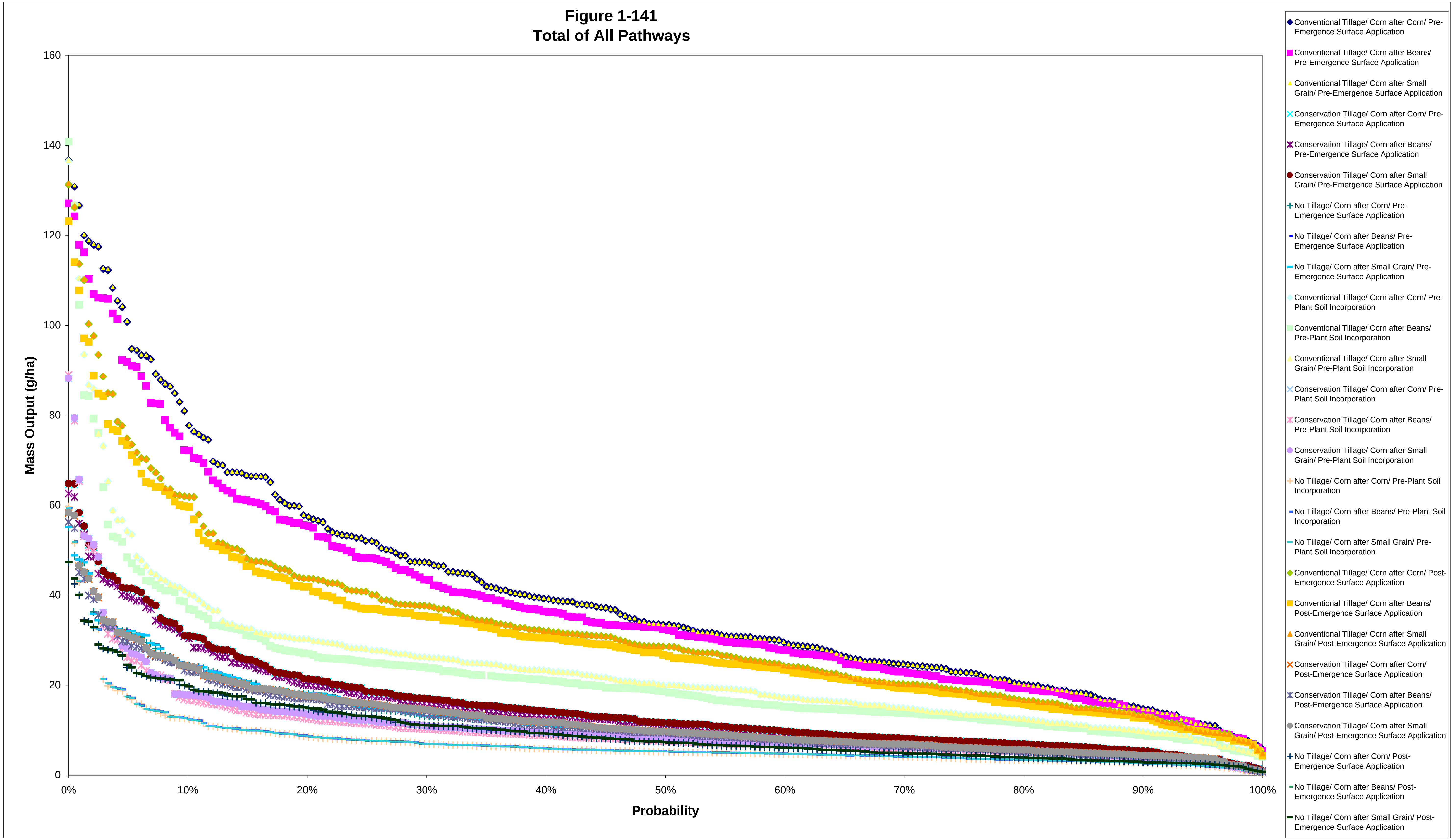


Figure 1-141
Total of All Pathways

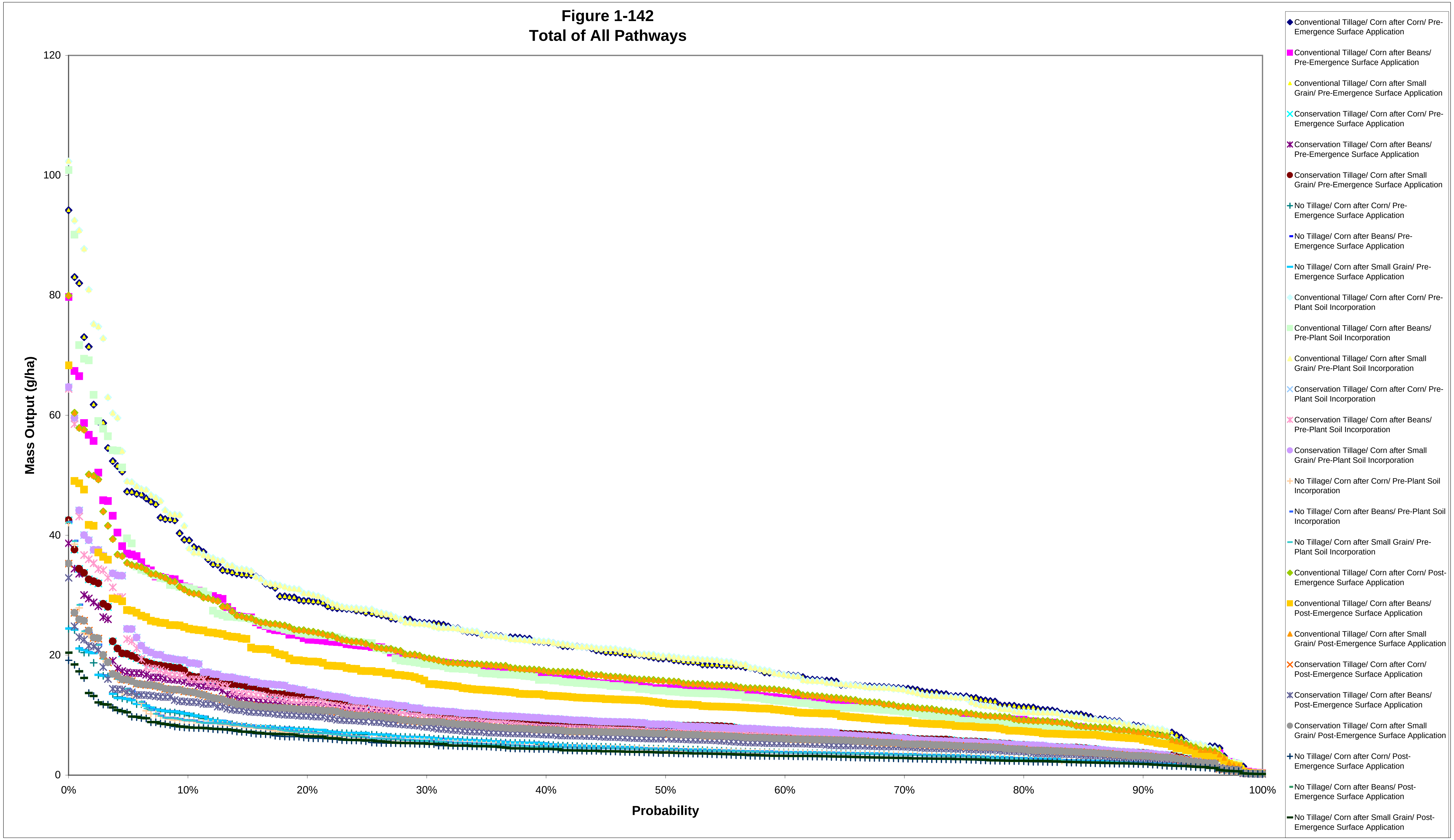


Figure 1-142
Total of All Pathways

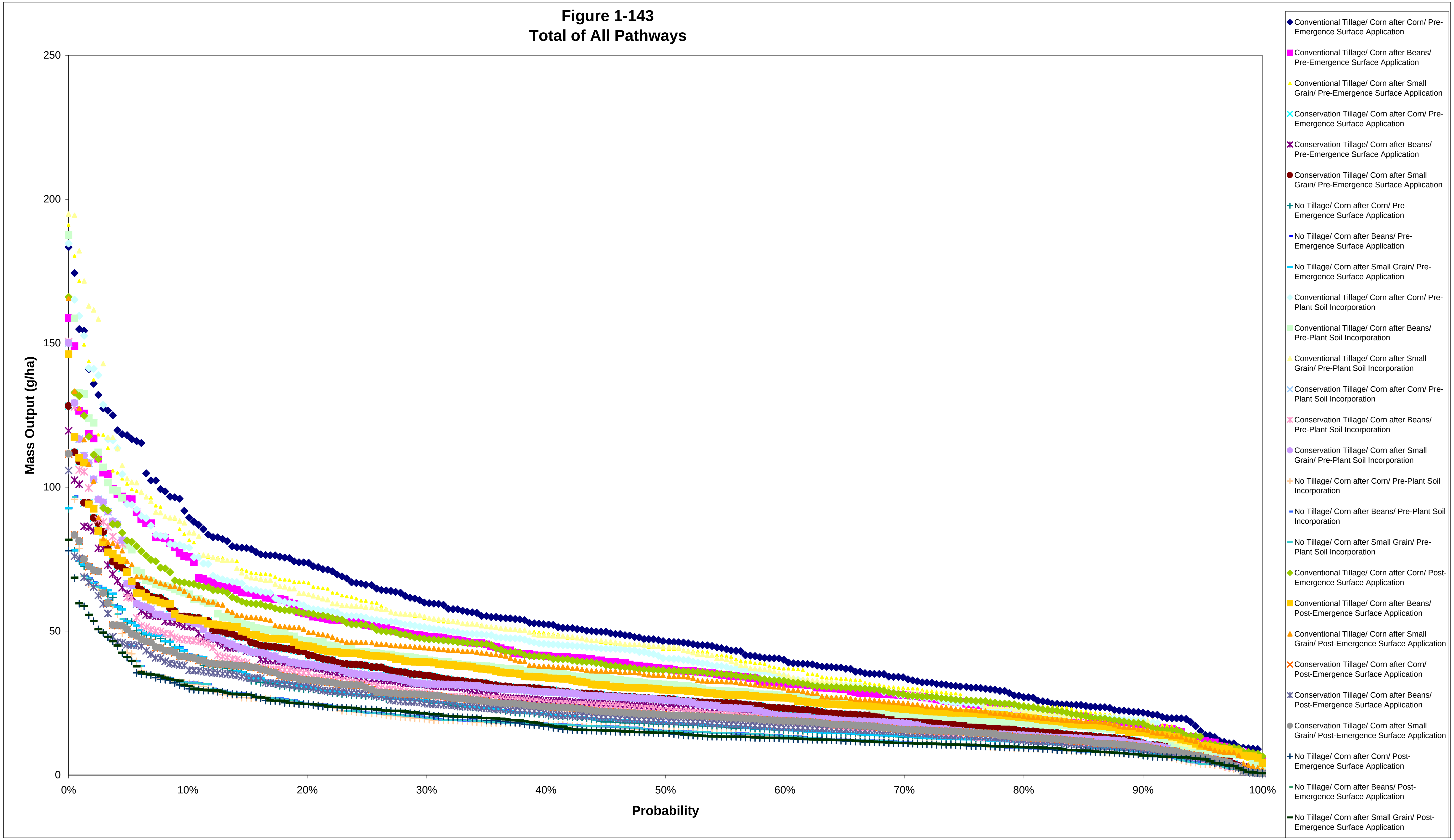


Figure 1-143
Total of All Pathways

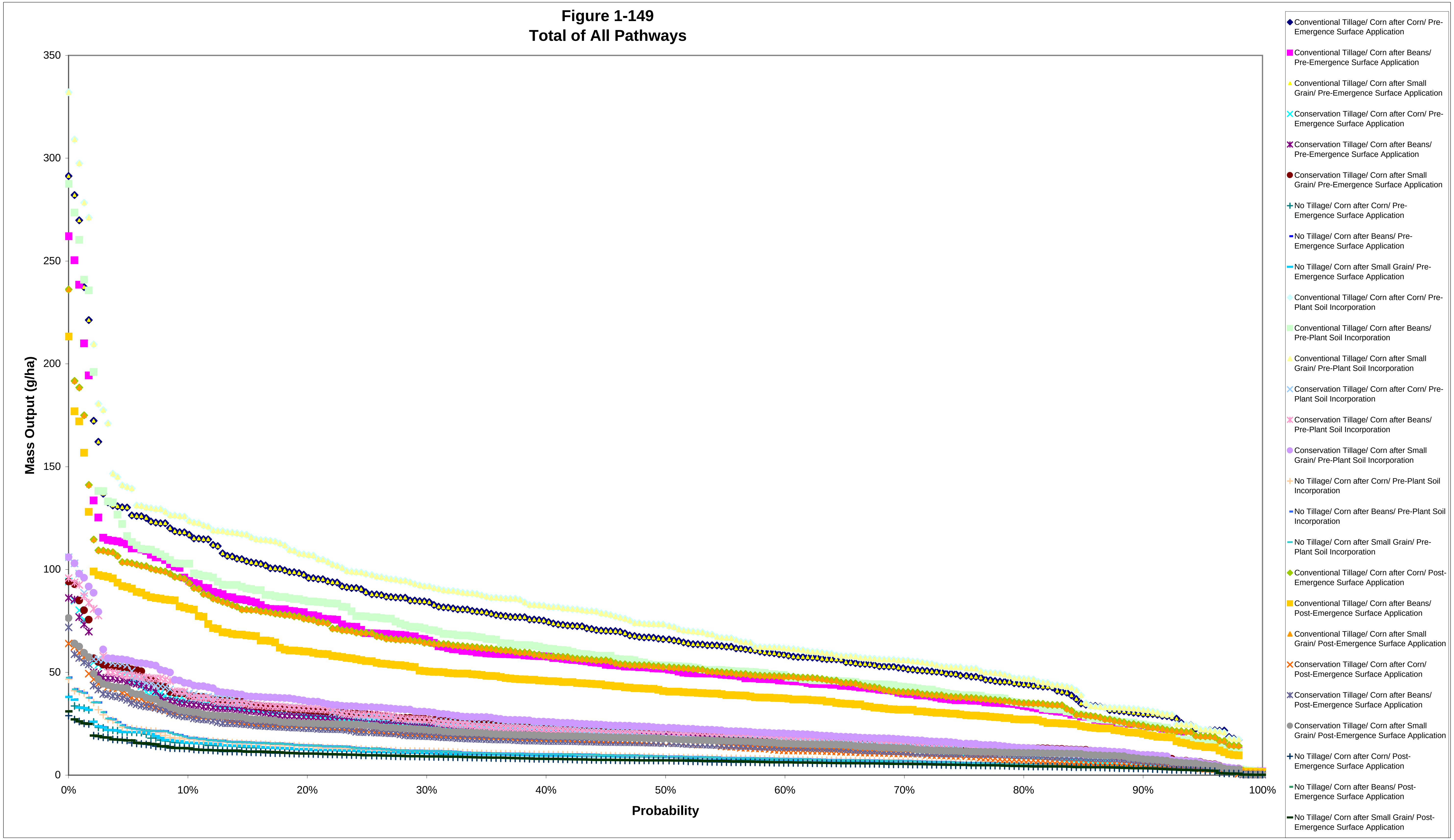
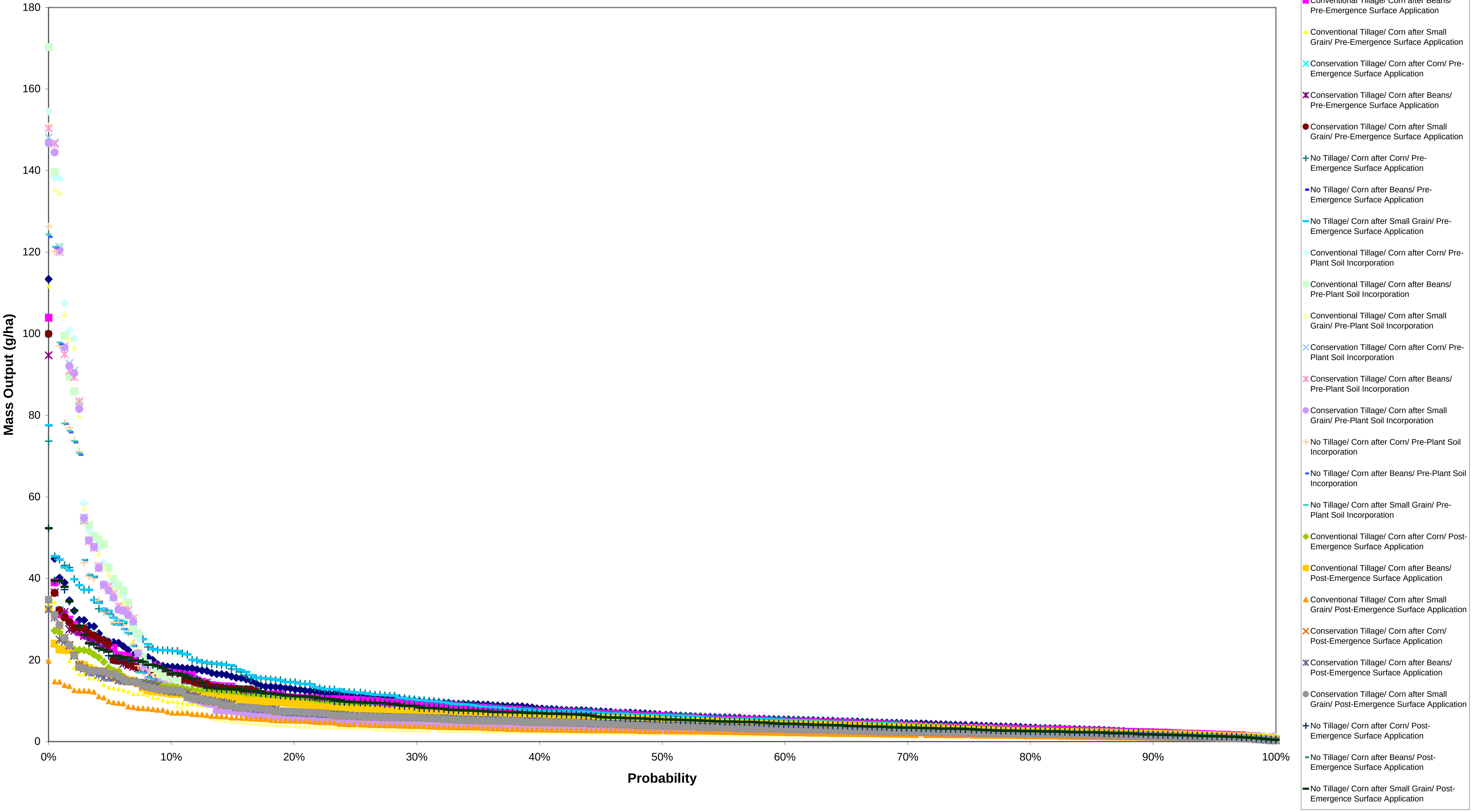


Figure 1-149
Total of All Pathways

Figure 2-6
SSL Pathway



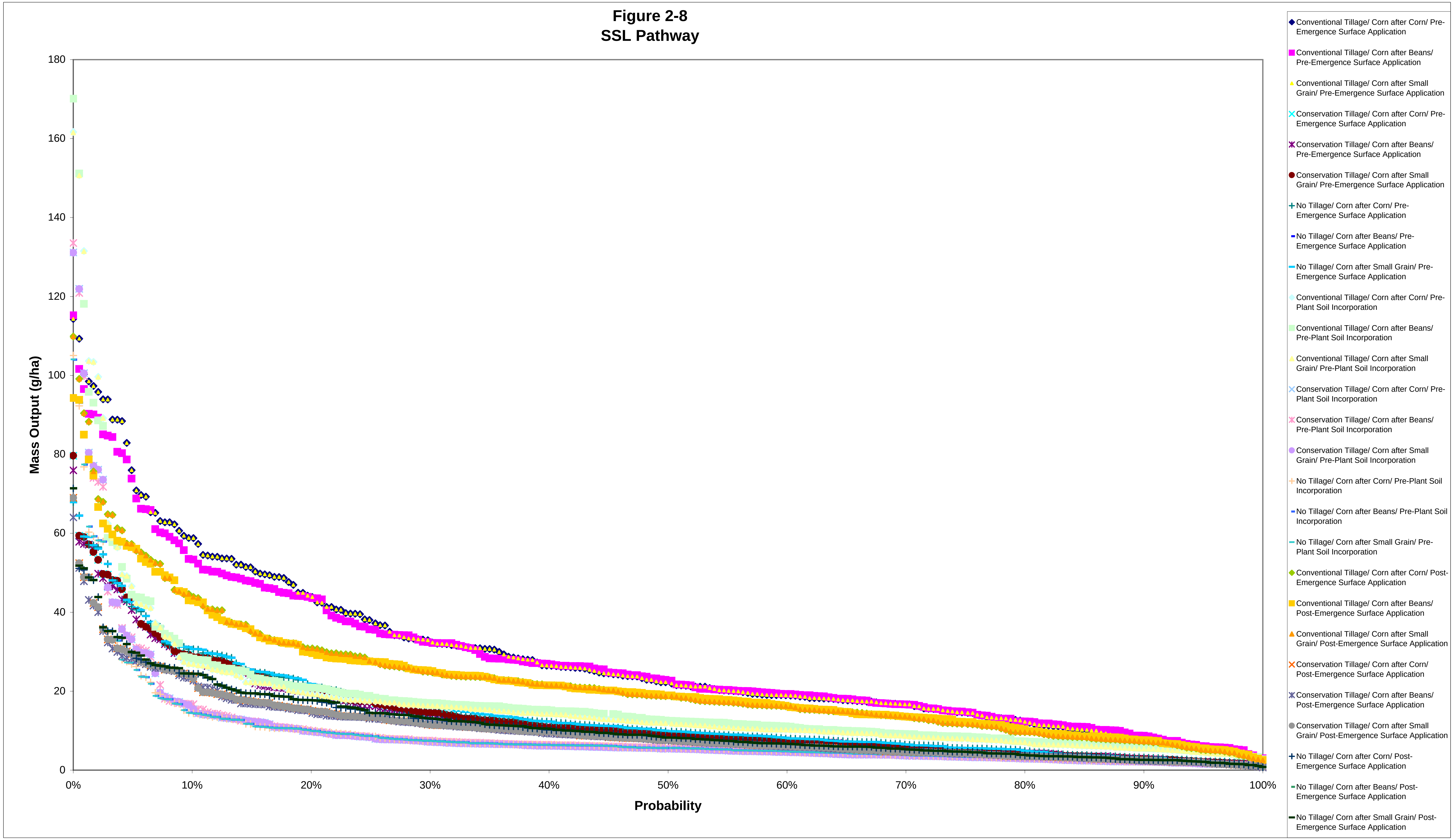


Figure 2-8
SSL Pathway

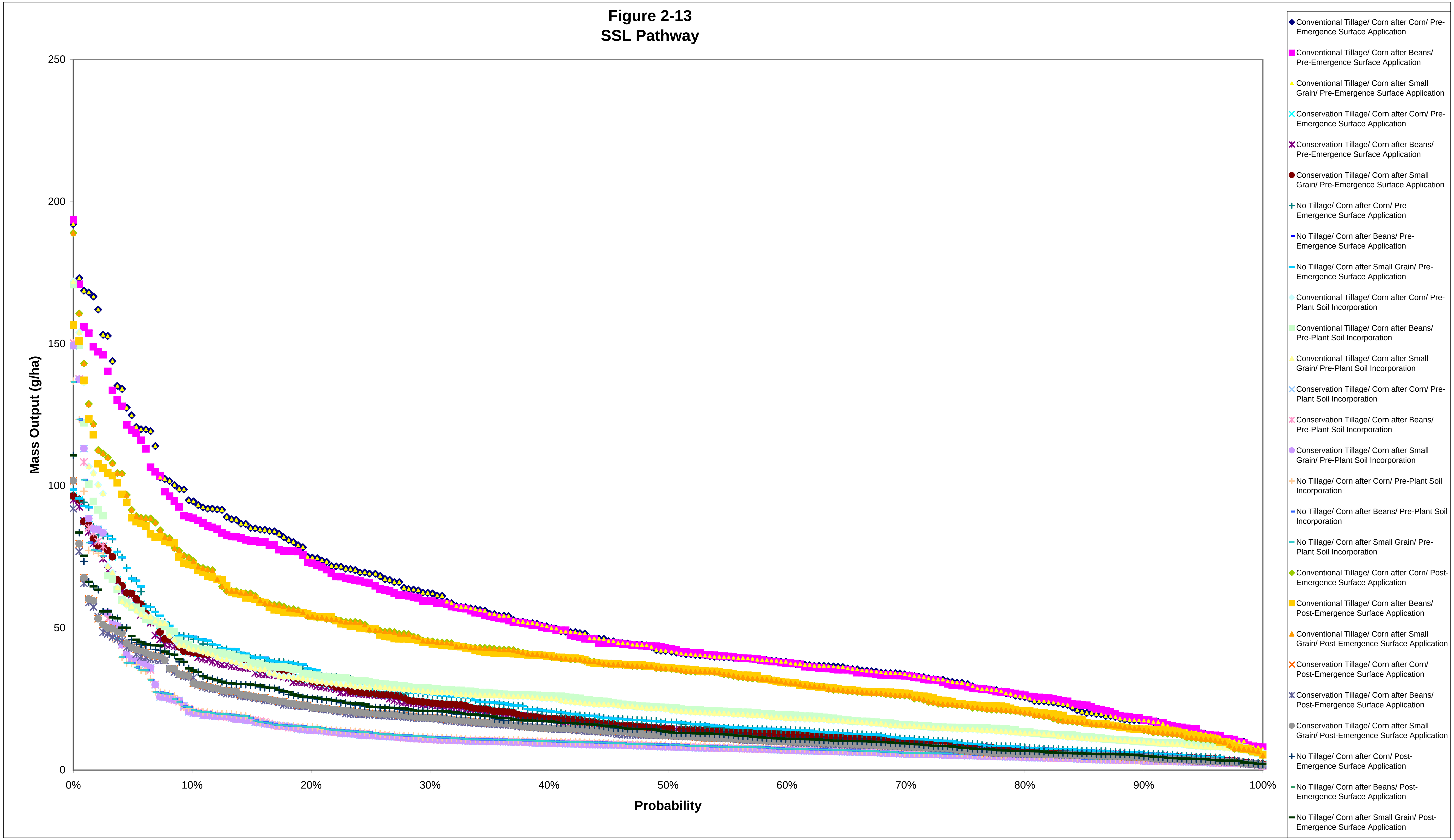


Figure 2-13
SSL Pathway

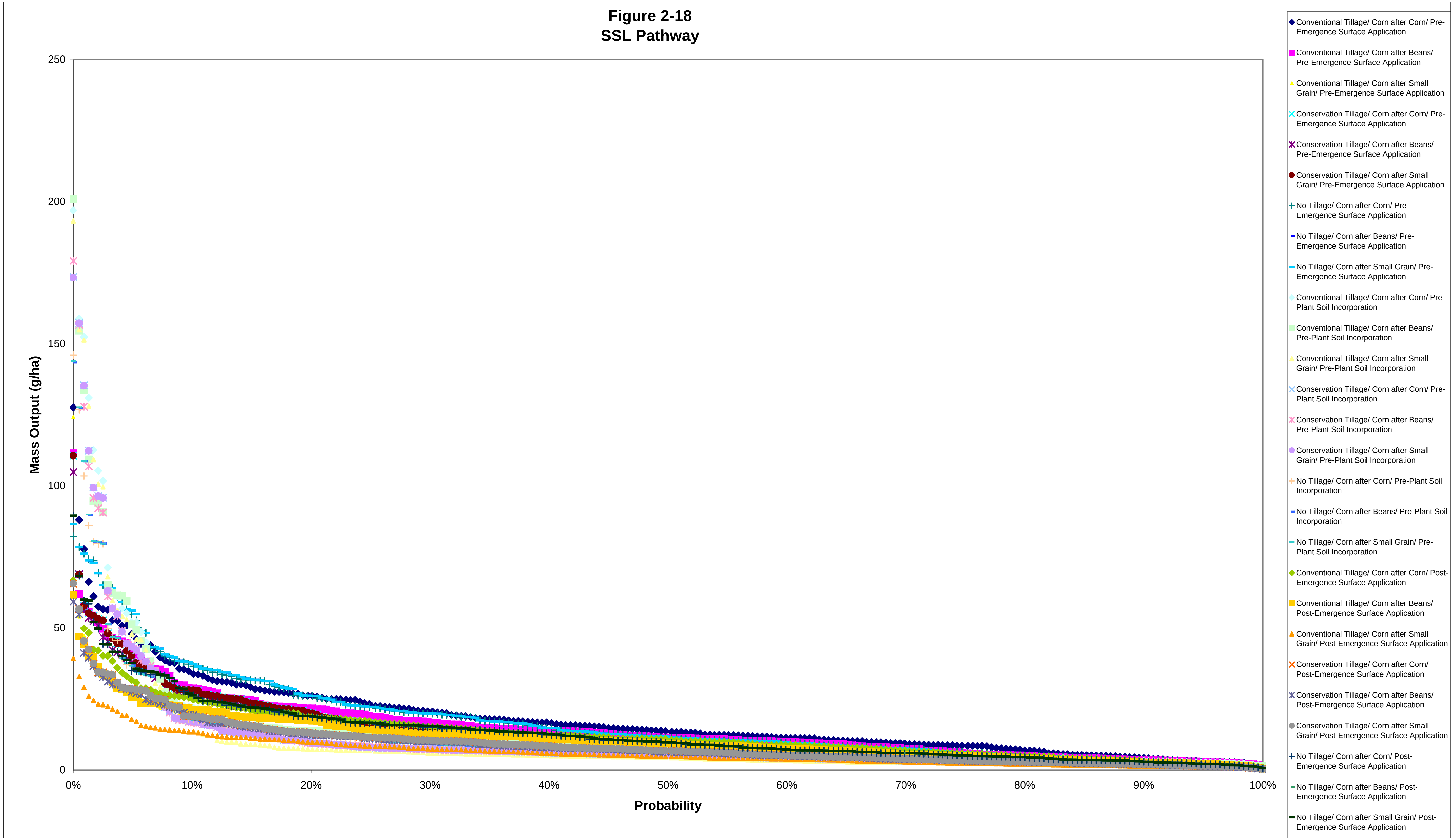


Figure 2-18
SSL Pathway

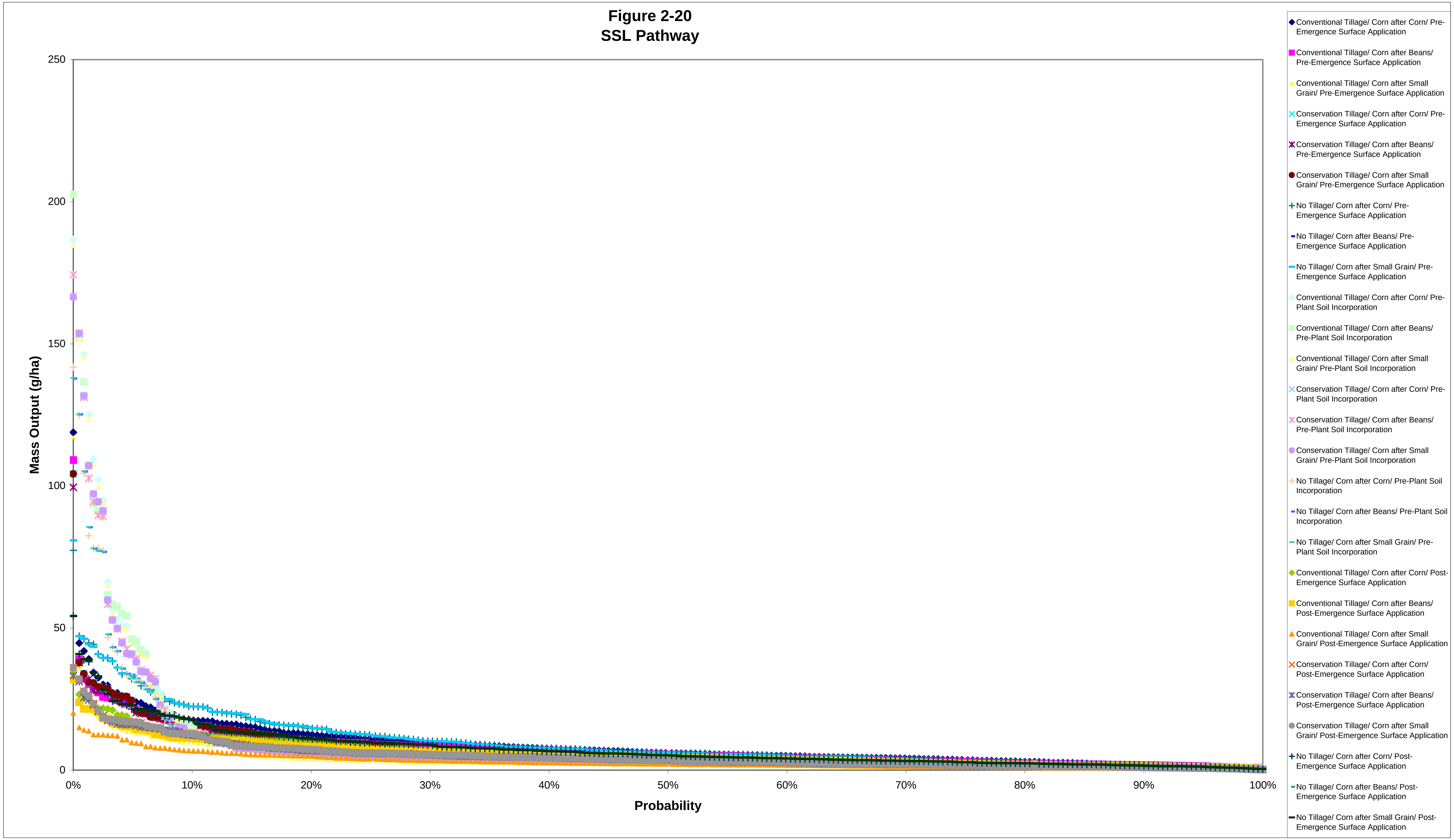


Figure 2-20
SSL Pathway

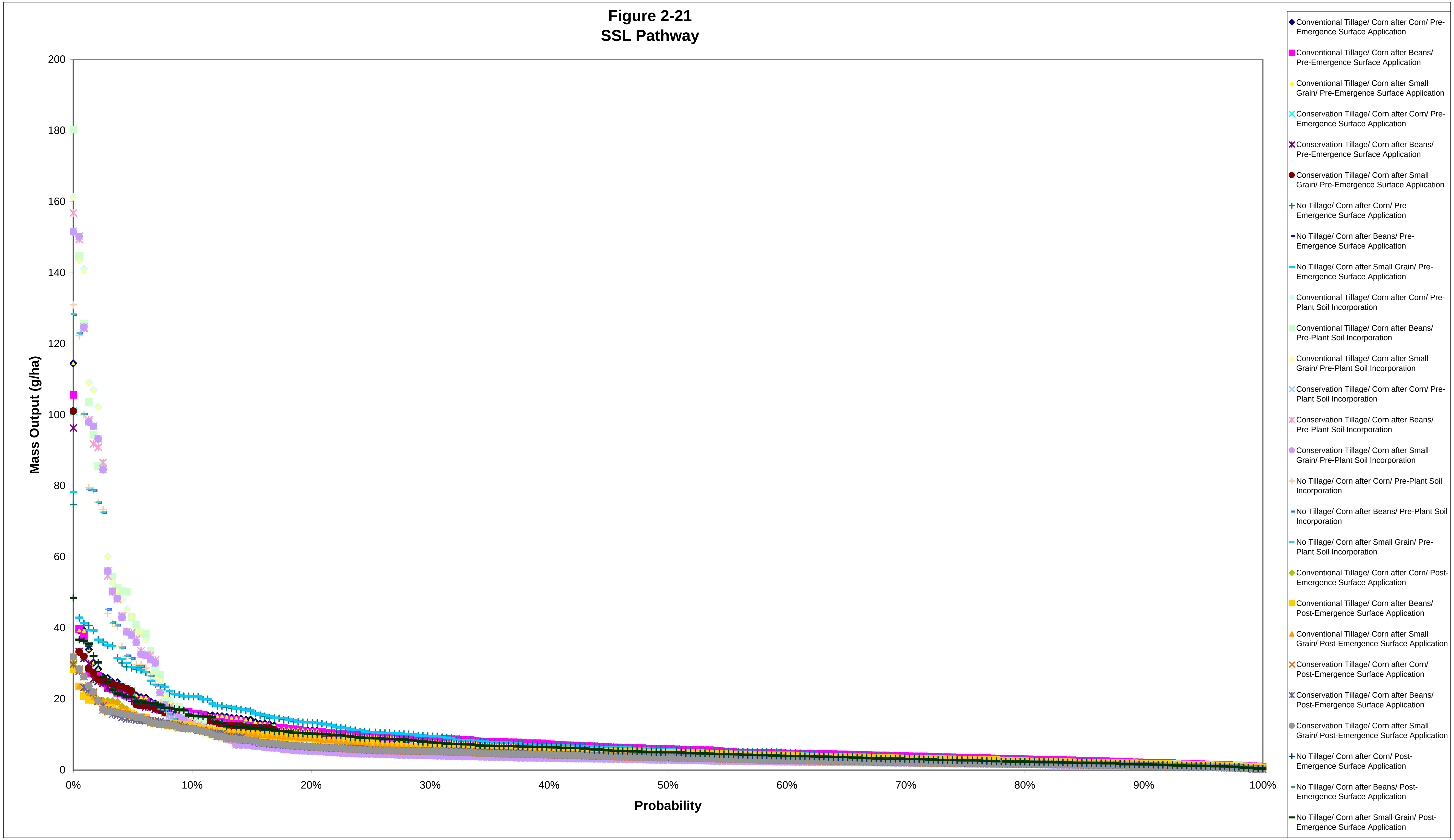
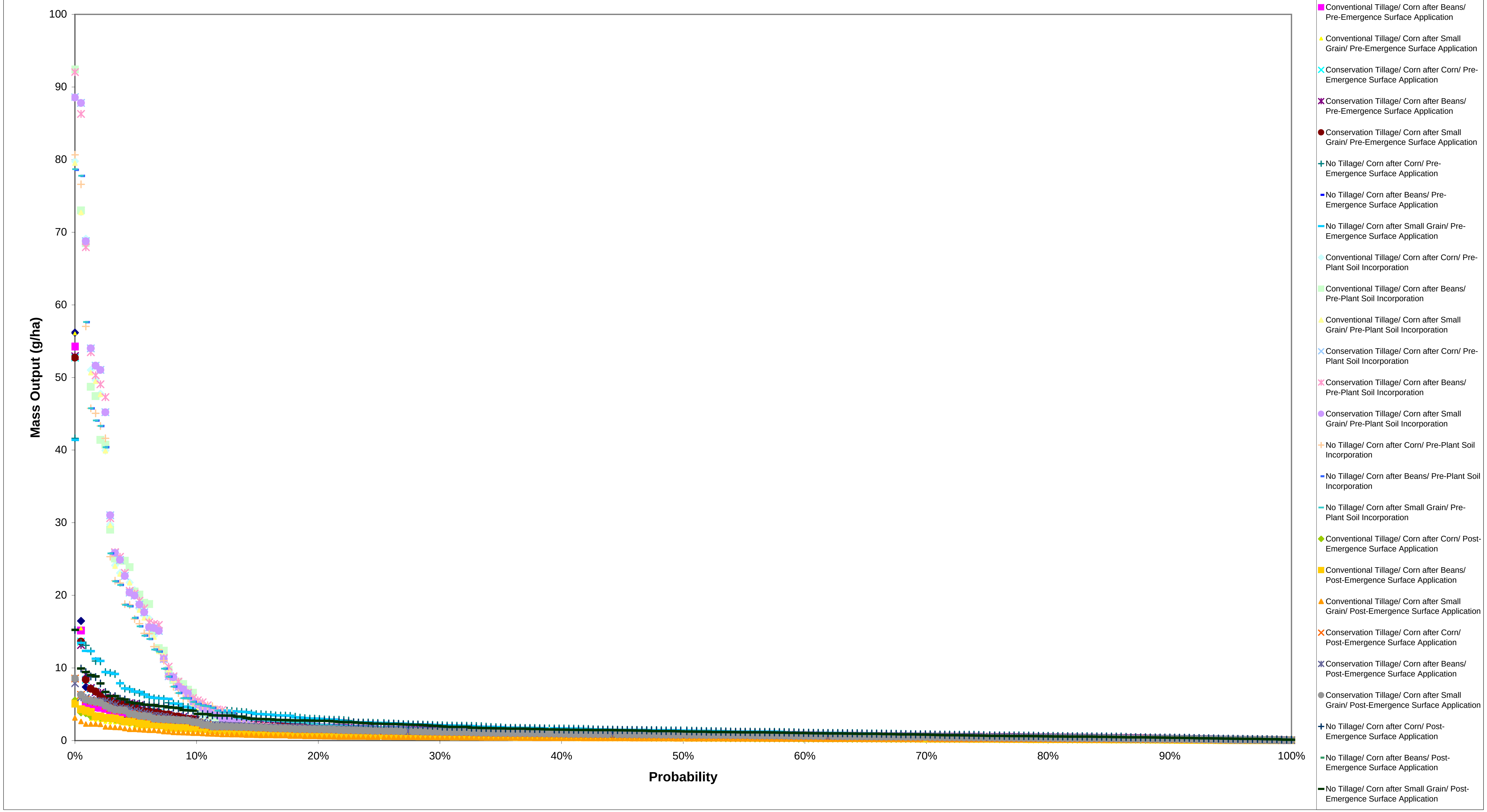


Figure 2-21
SSL Pathway

Figure 2-23
SSL Pathway



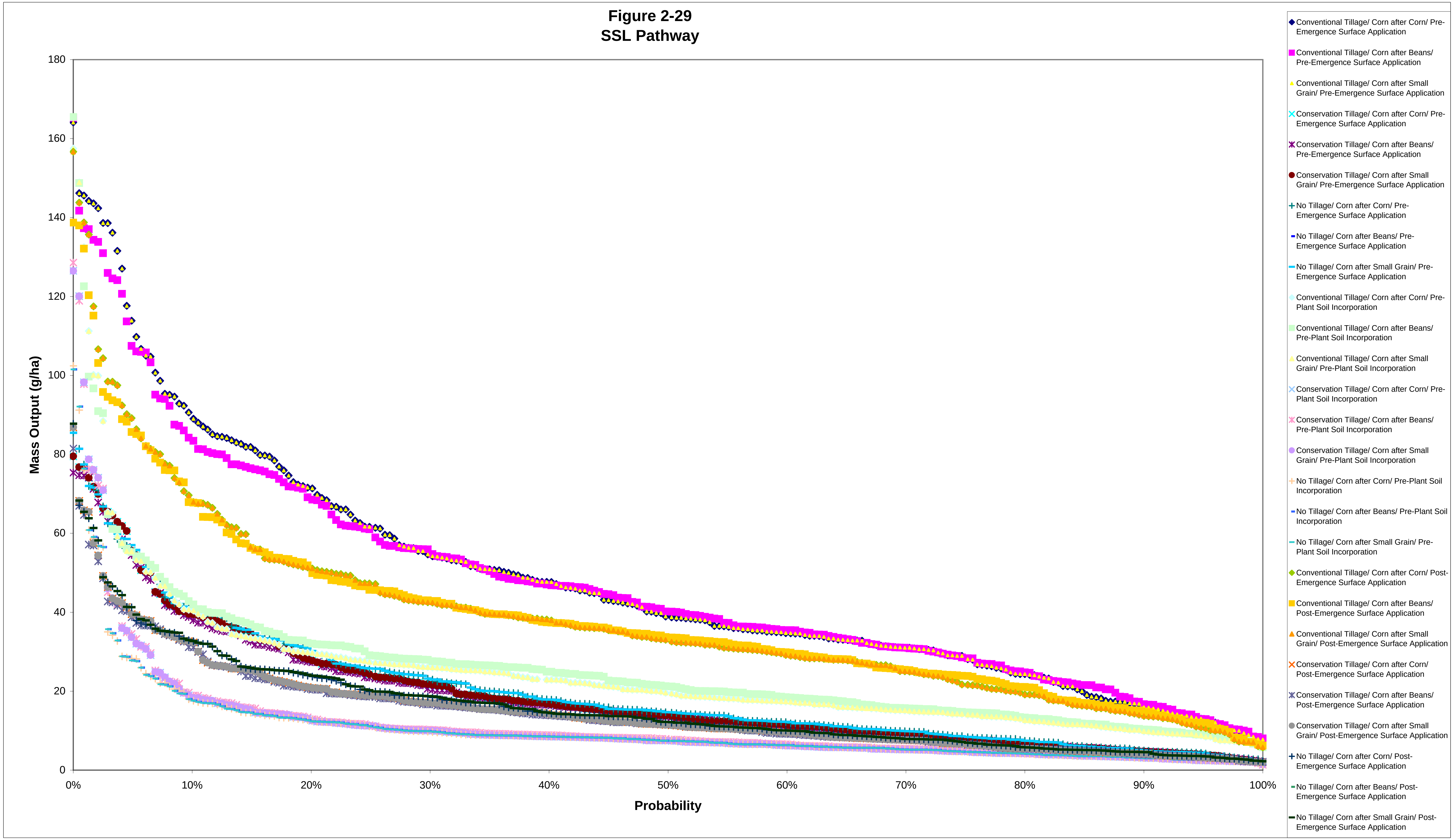


Figure 2-29
SSL Pathway

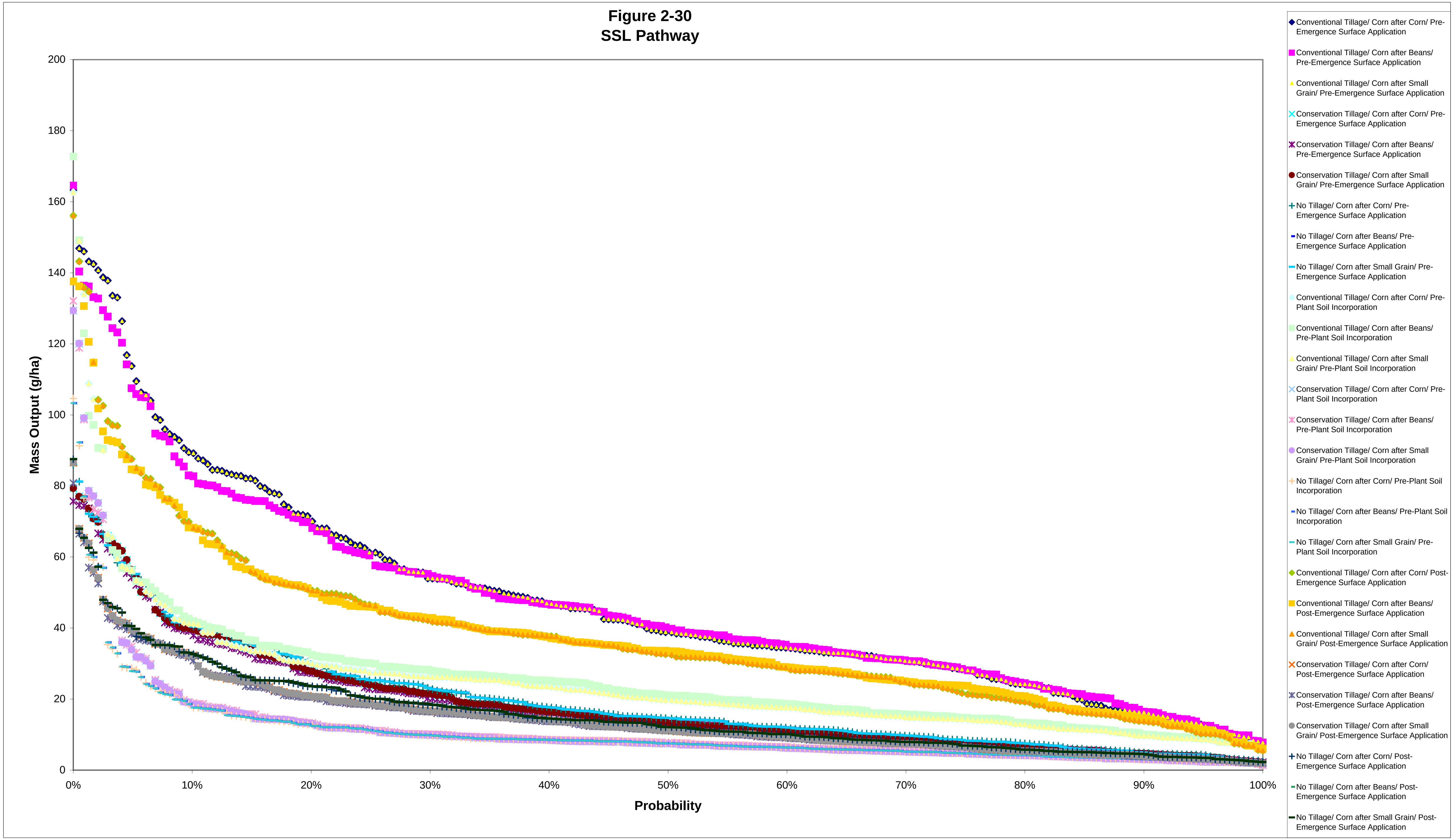


Figure 2-30
SSL Pathway

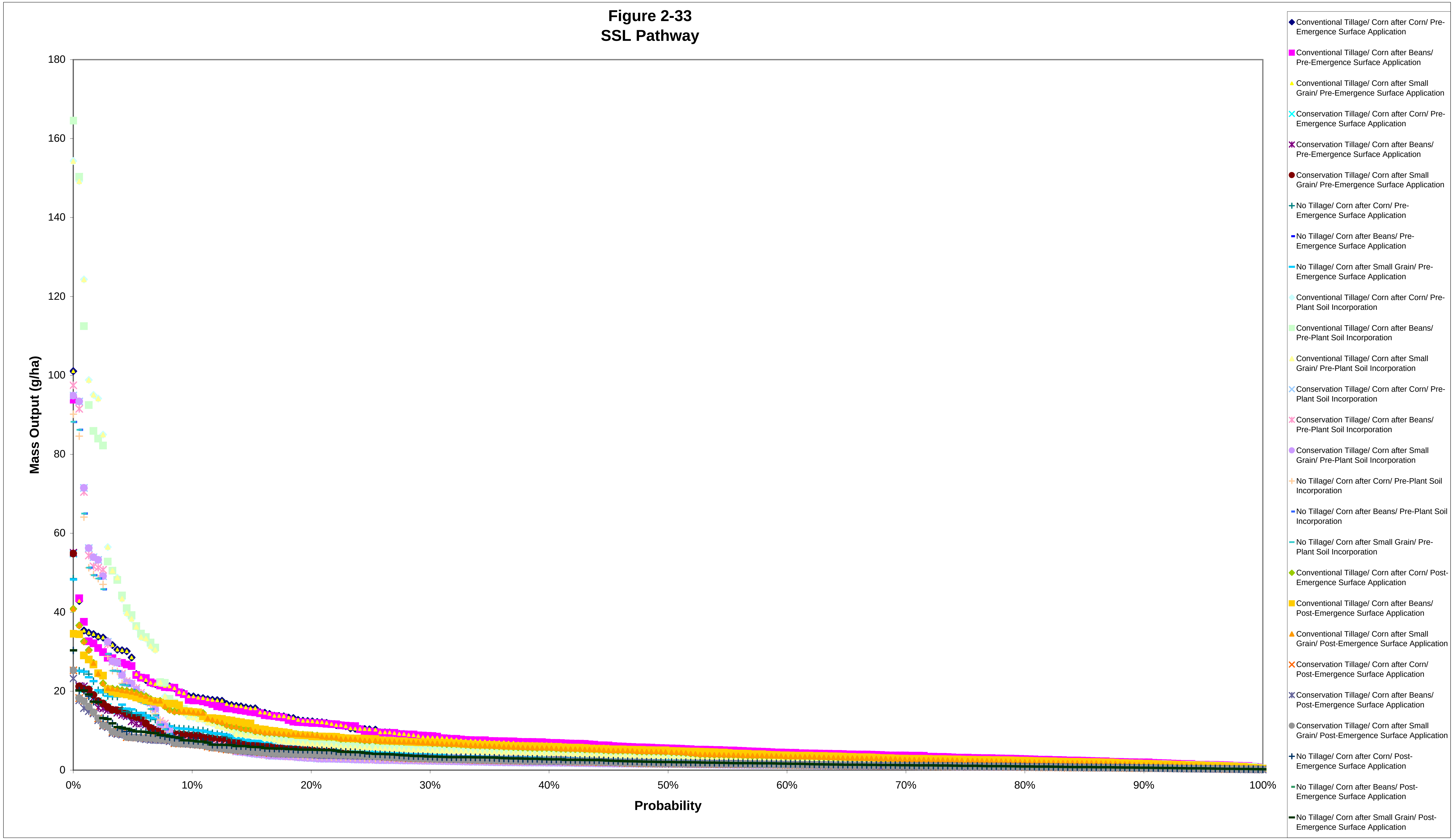


Figure 2-33

SSL Pathway

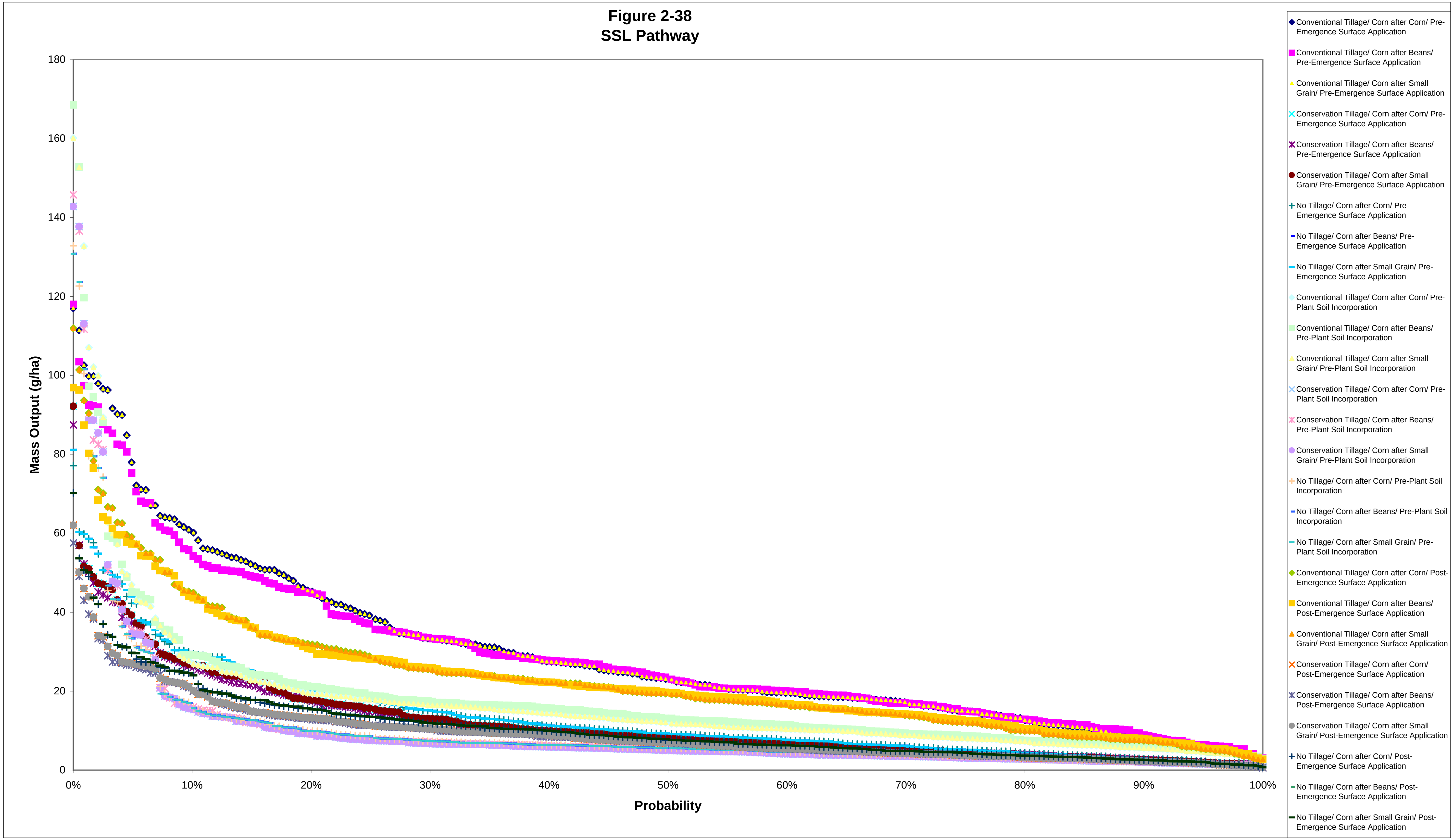


Figure 2-38
SSL Pathway

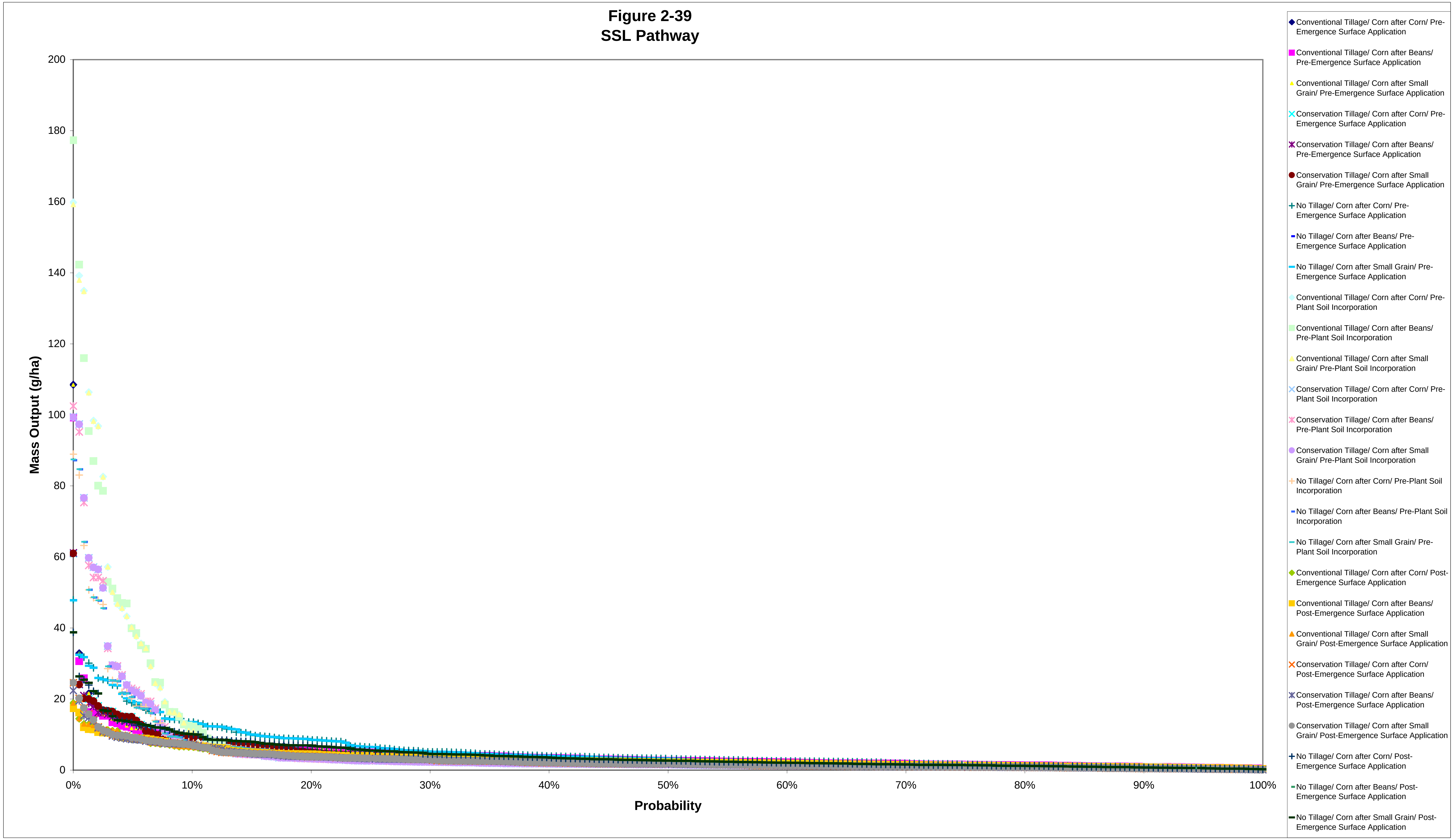


Figure 2-39
SSL Pathway

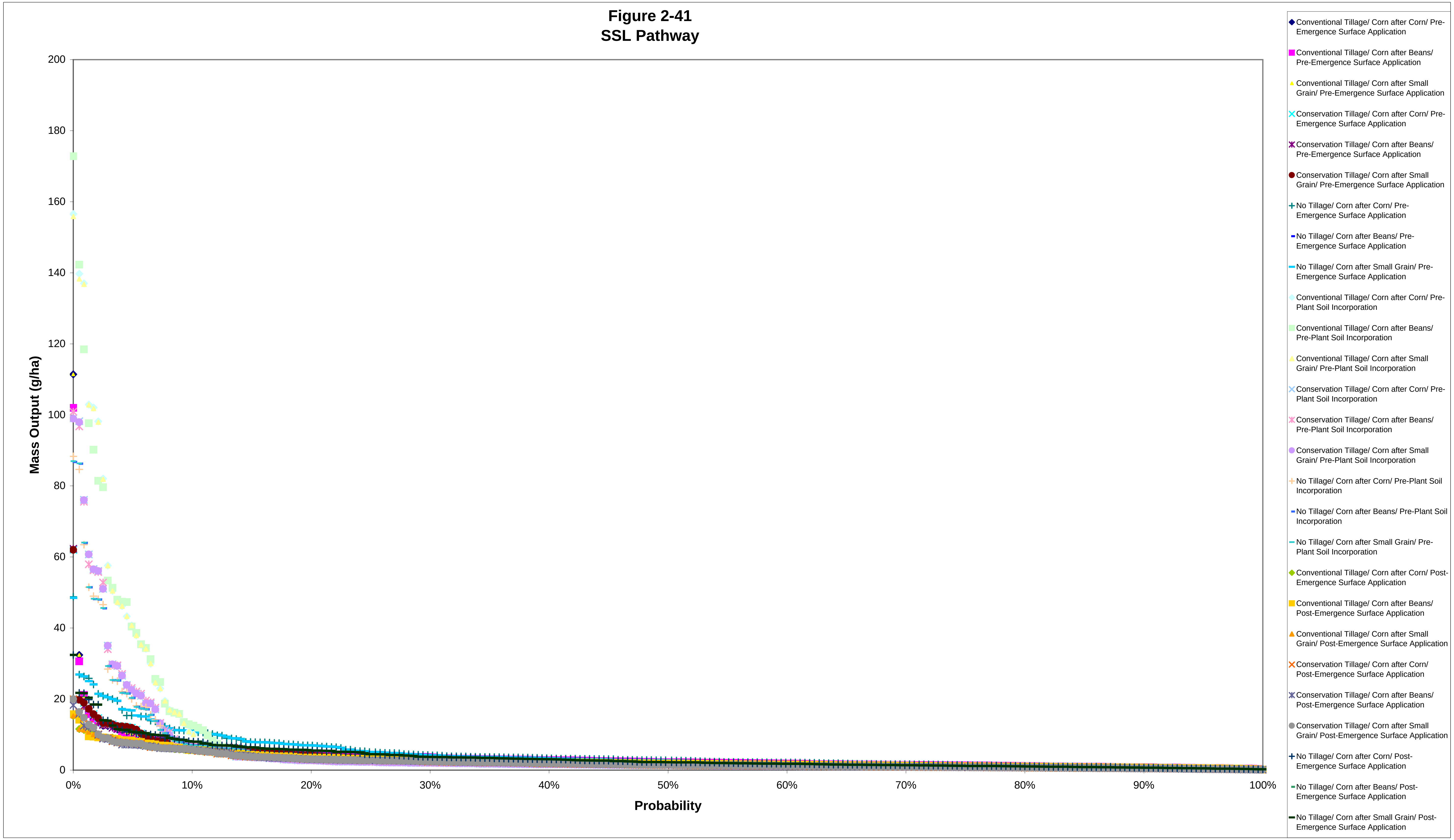


Figure 2-41
SSL Pathway

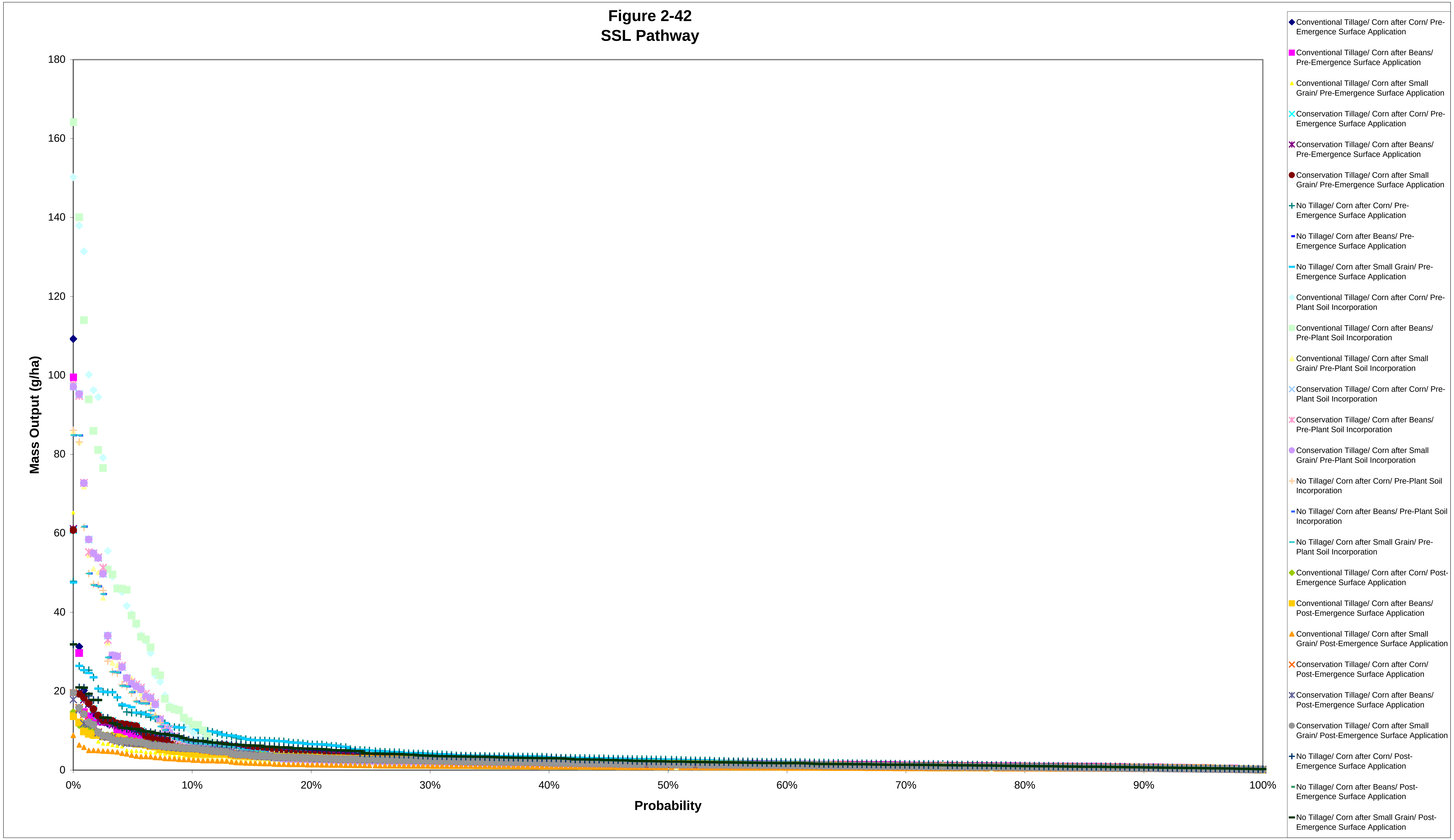


Figure 2-42
SSL Pathway

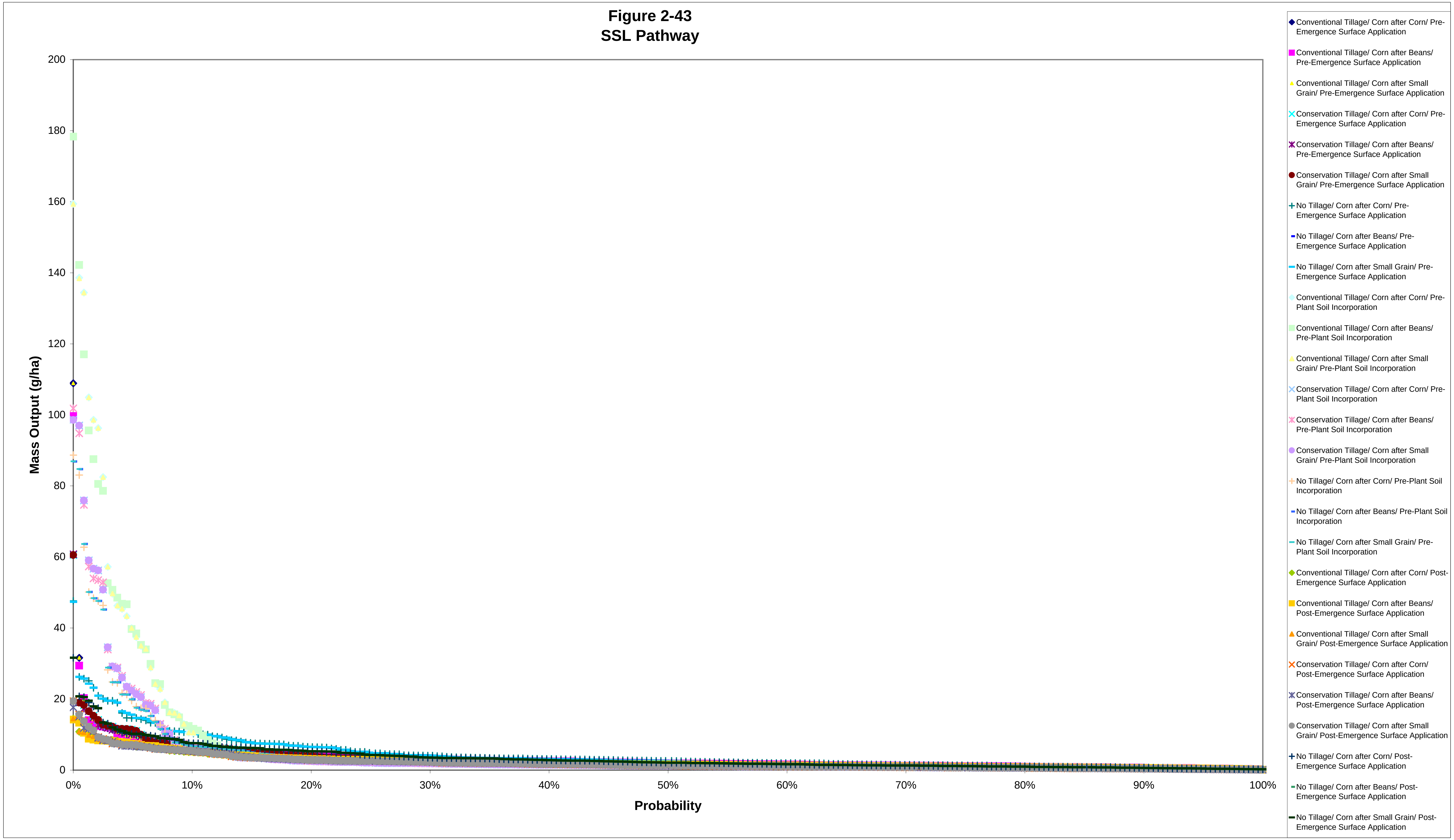
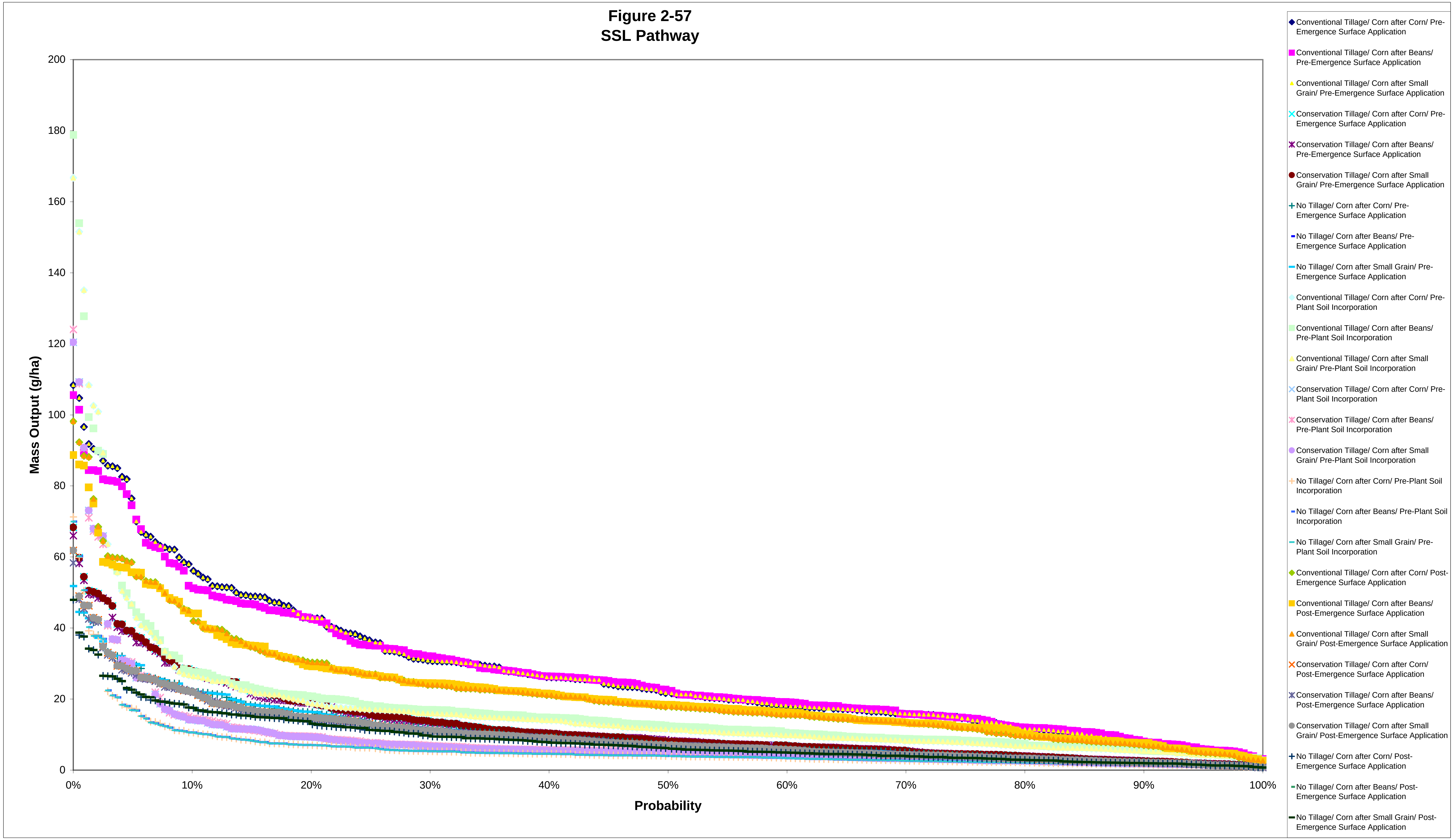


Figure 2-43
SSL Pathway

Figure 2-57
SSL Pathway



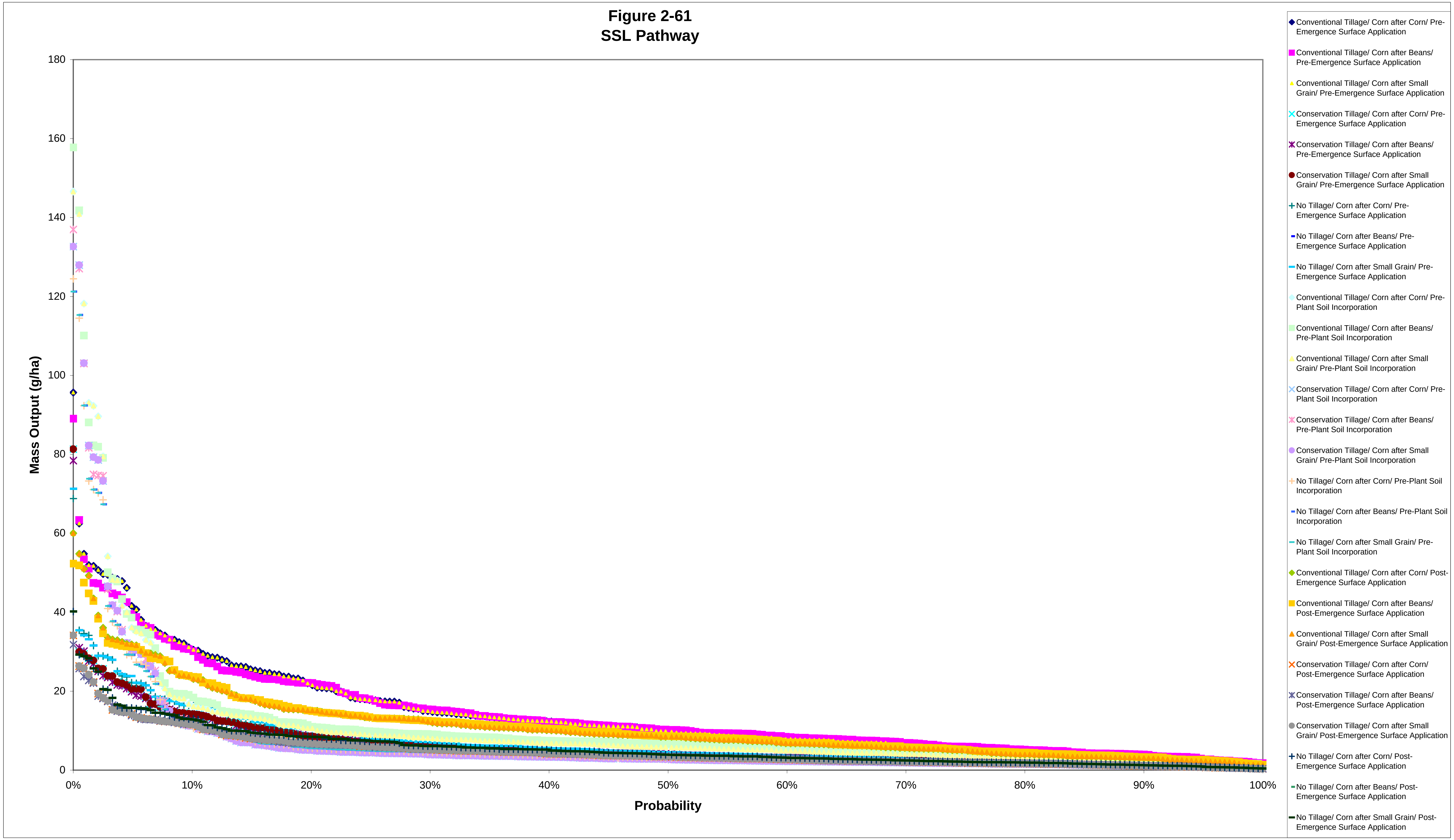


Figure 2-61
SSL Pathway

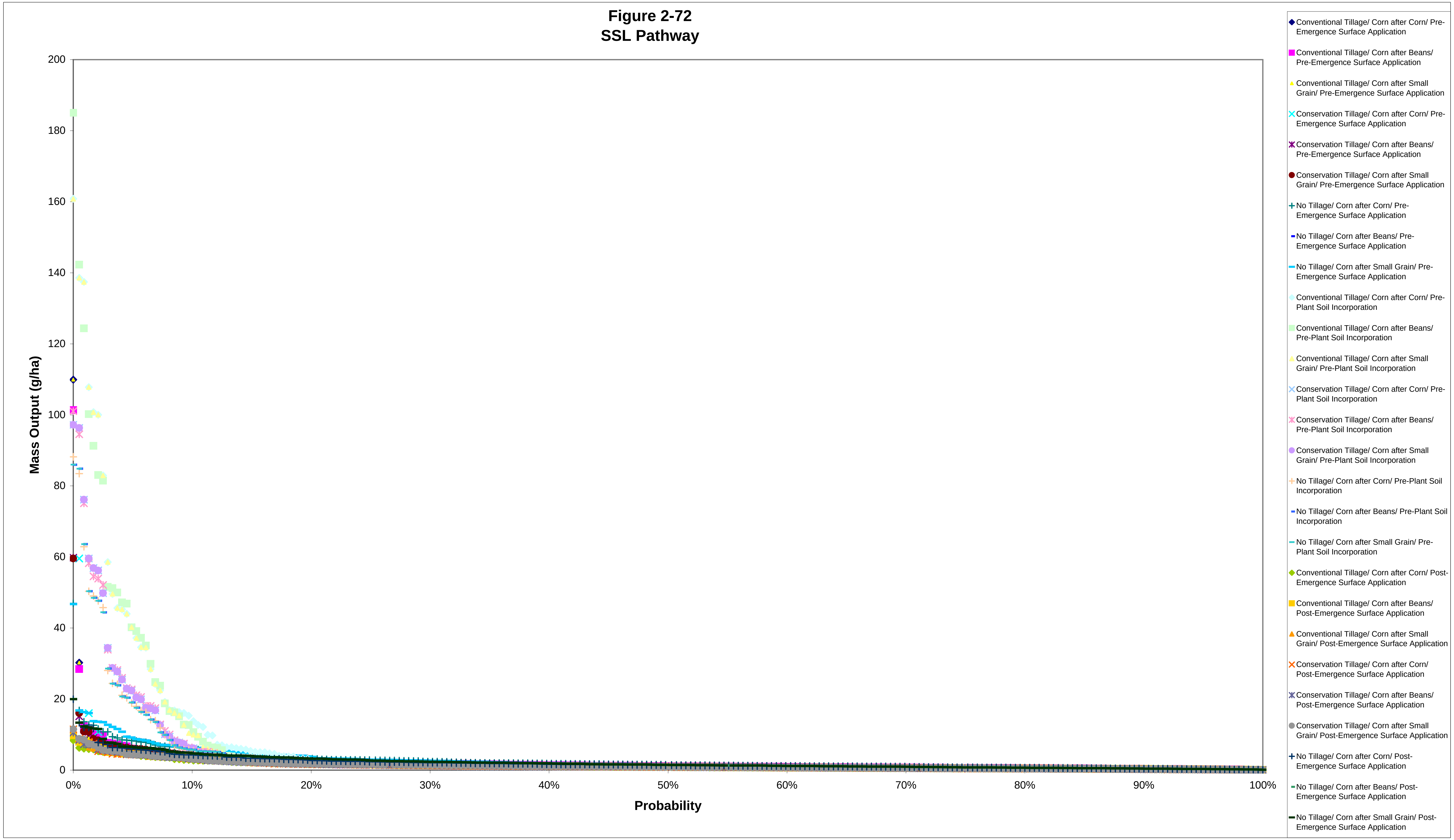


Figure 2-72
SSL Pathway

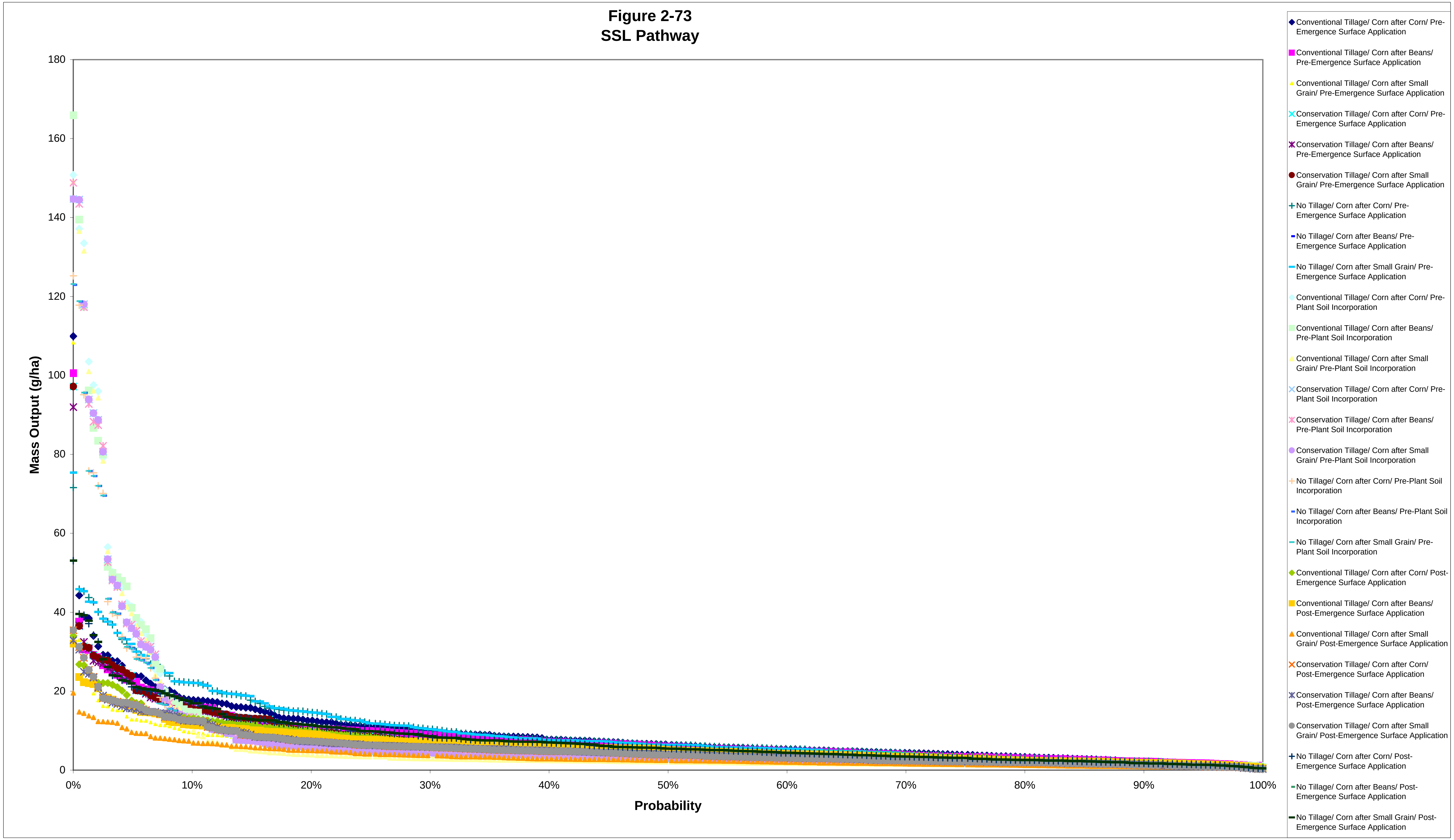


Figure 2-73
SSL Pathway

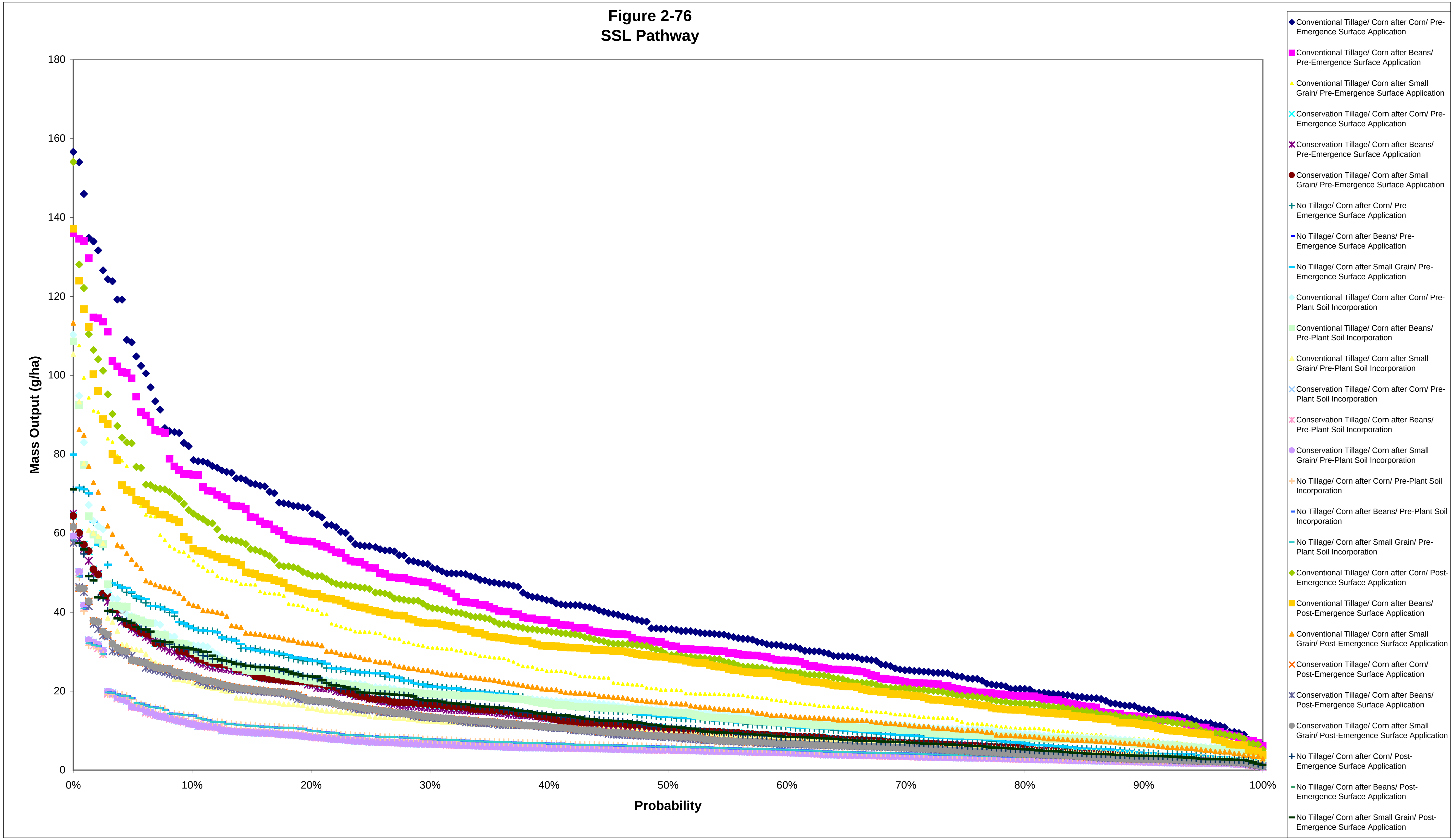


Figure 2-76
SSL Pathway

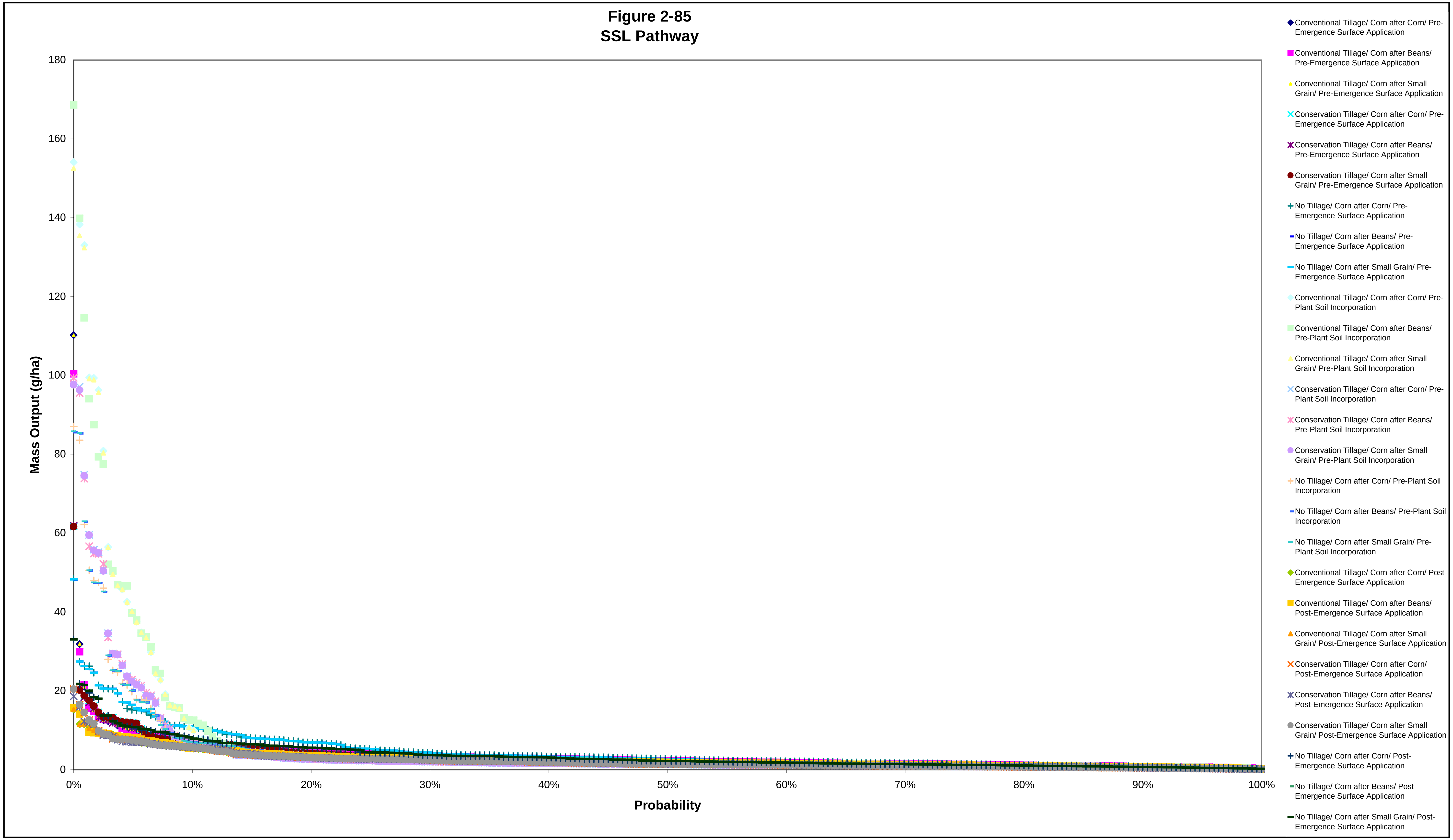
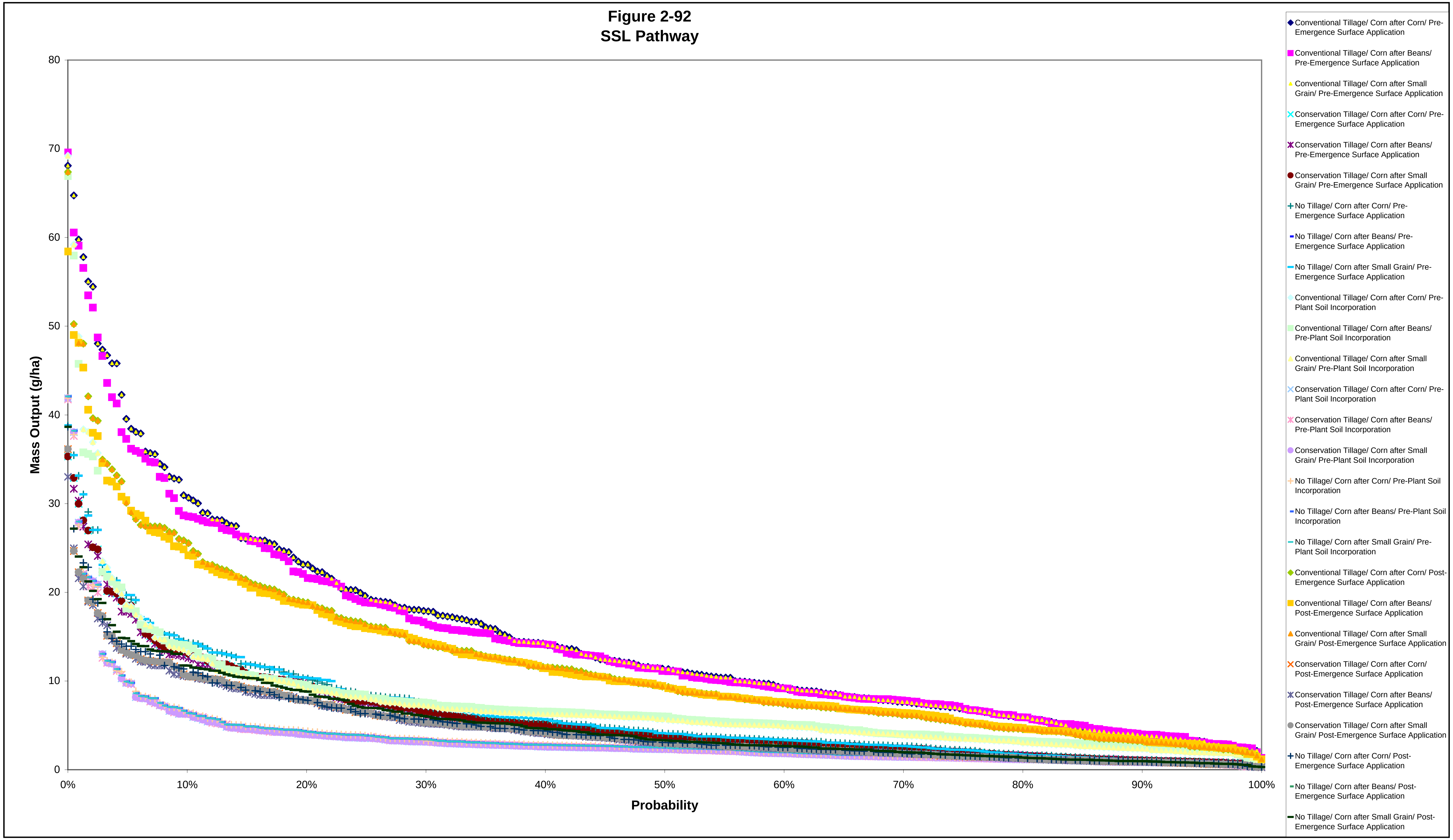


Figure 2-85
SSL Pathway

Figure 2-92
SSL Pathway



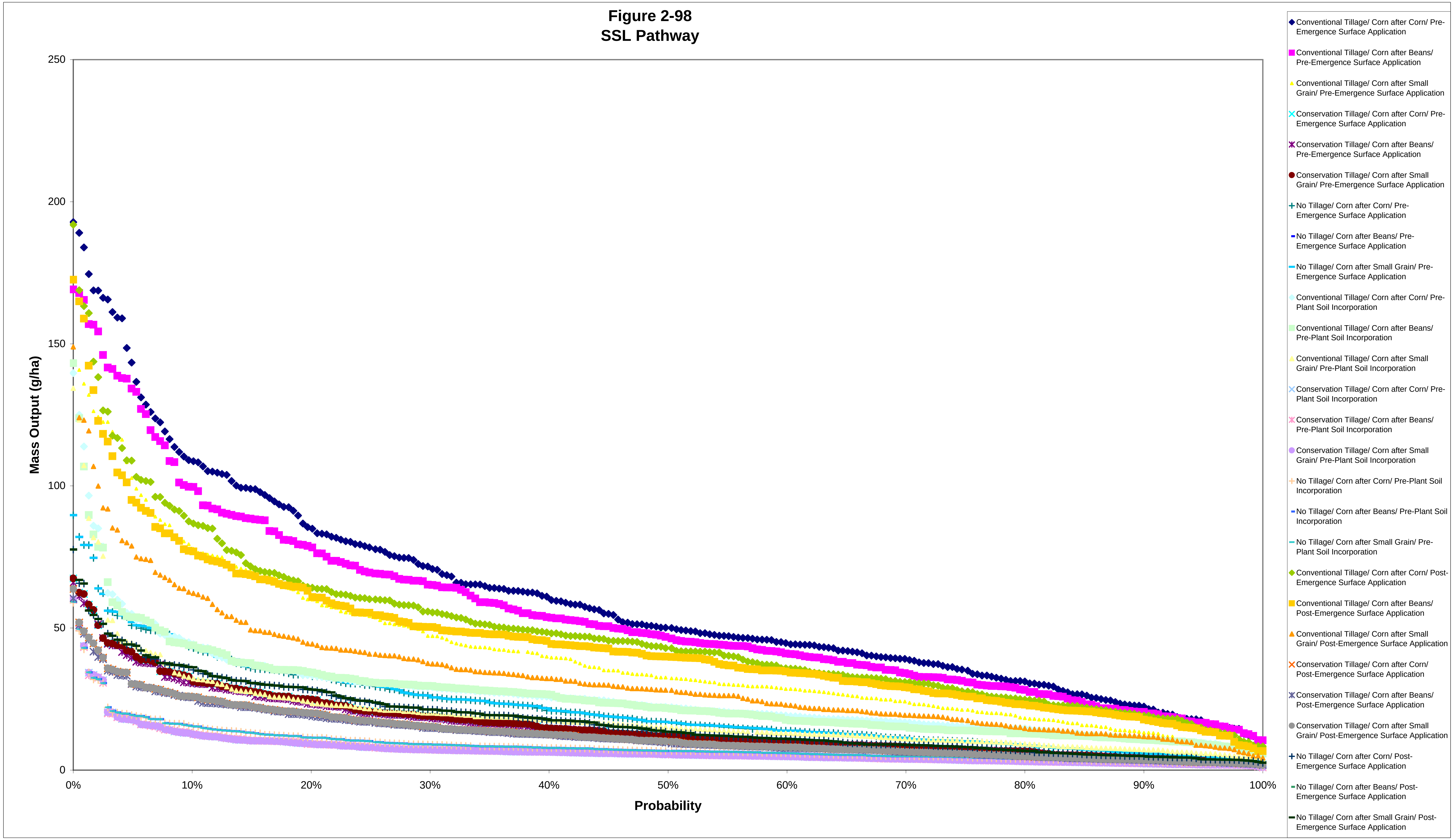


Figure 2-98
SSL Pathway

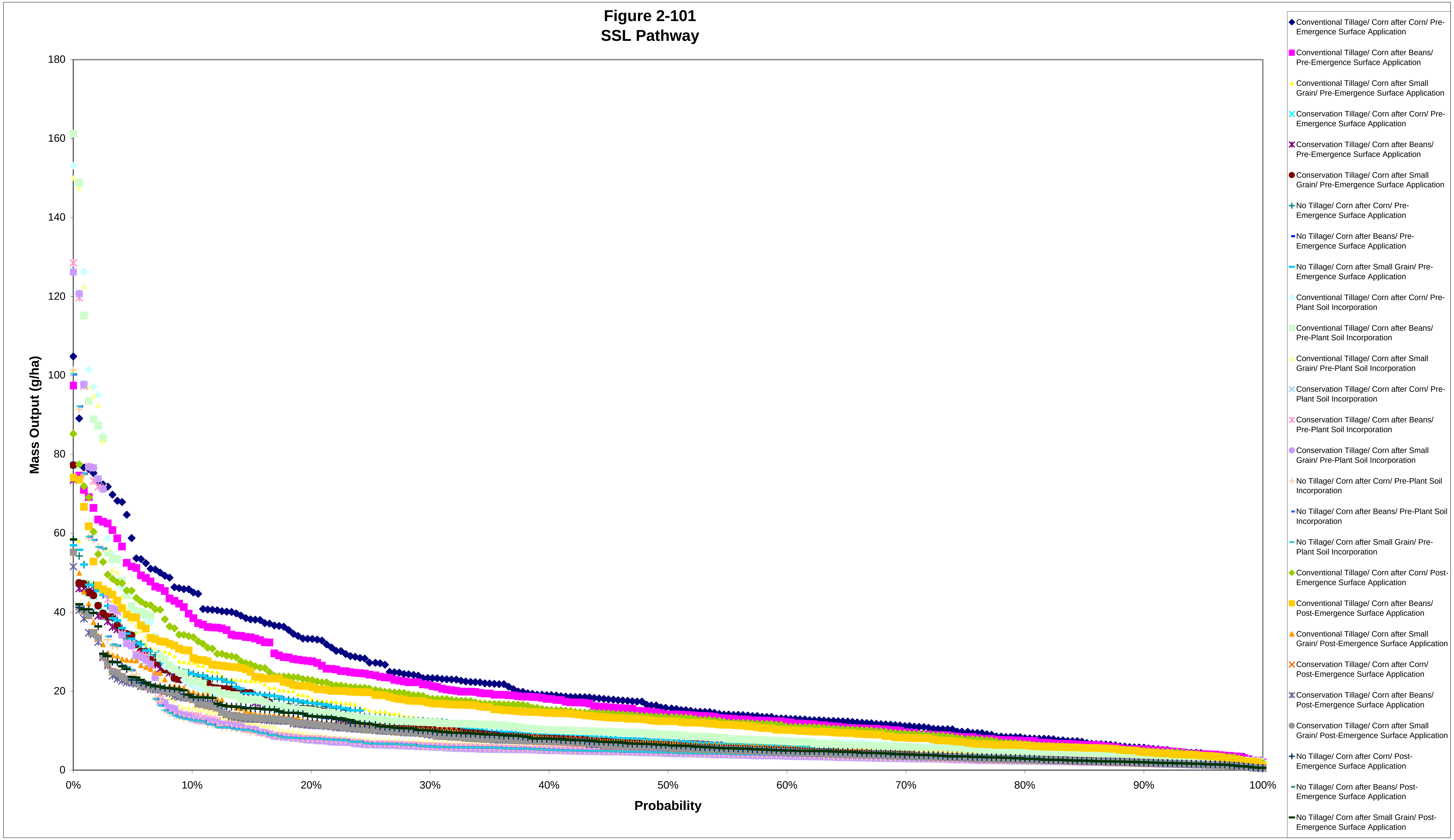


Figure 2-101
SSL Pathway

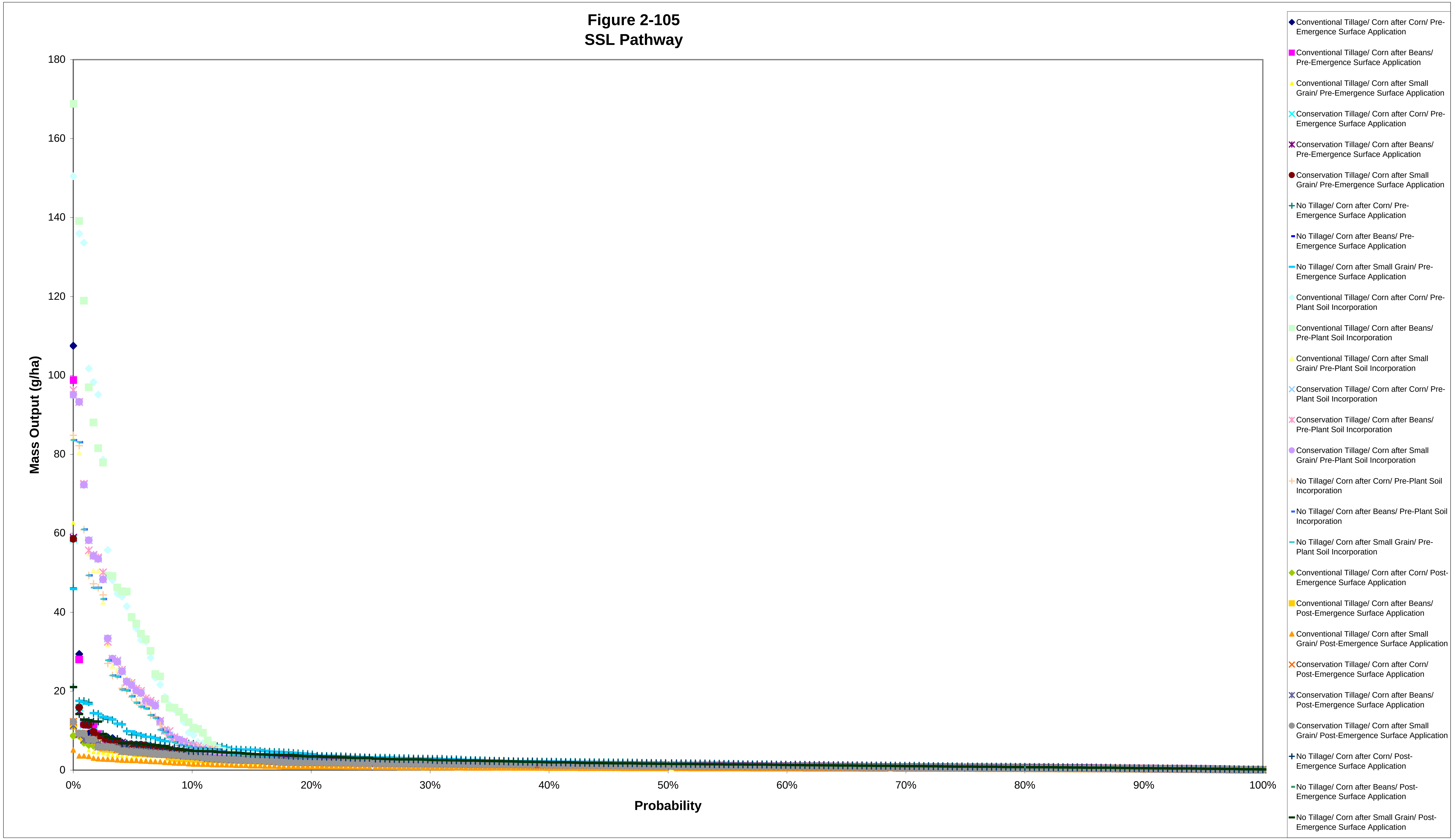


Figure 2-105
SSL Pathway

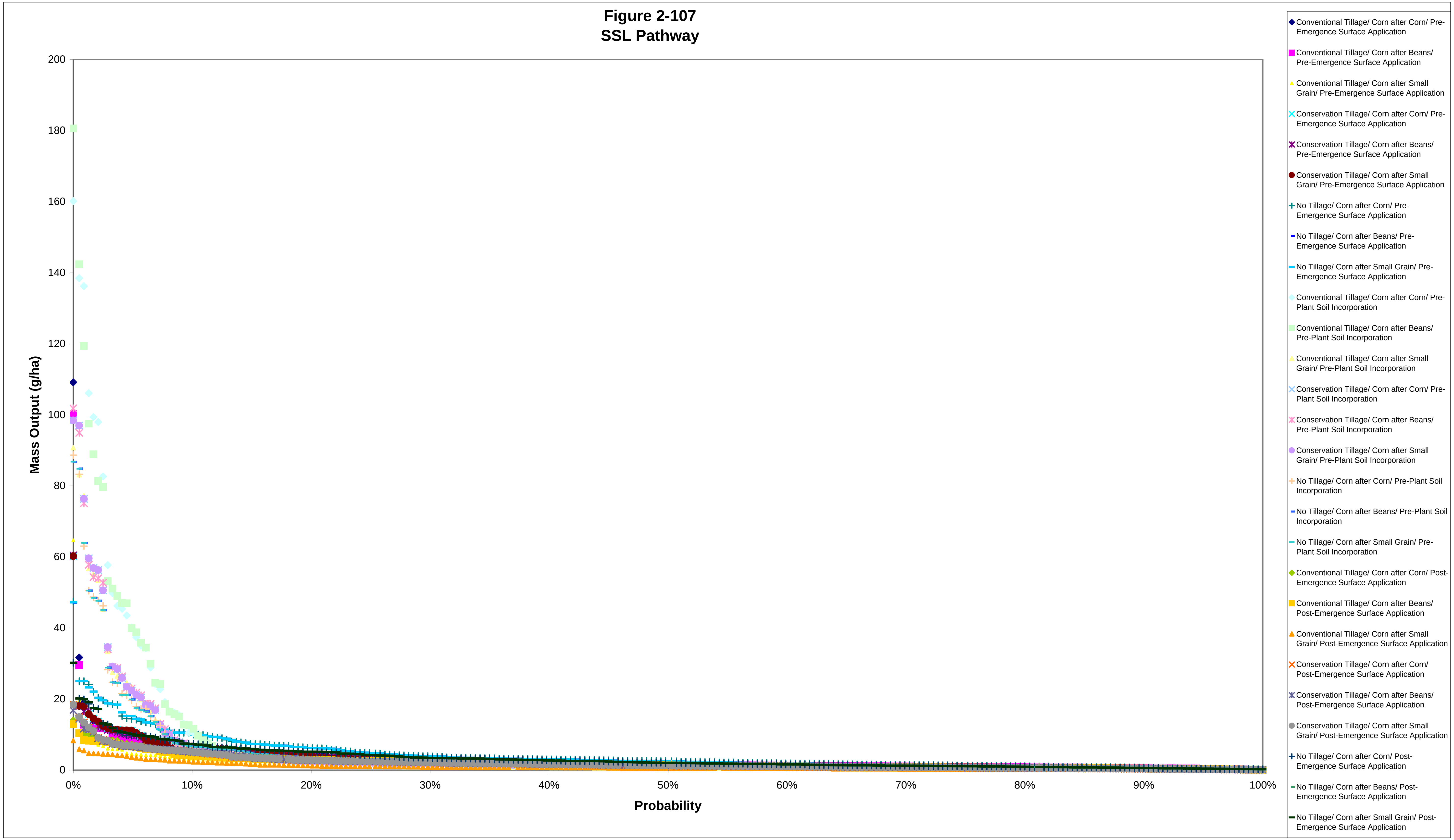


Figure 2-107
SSL Pathway

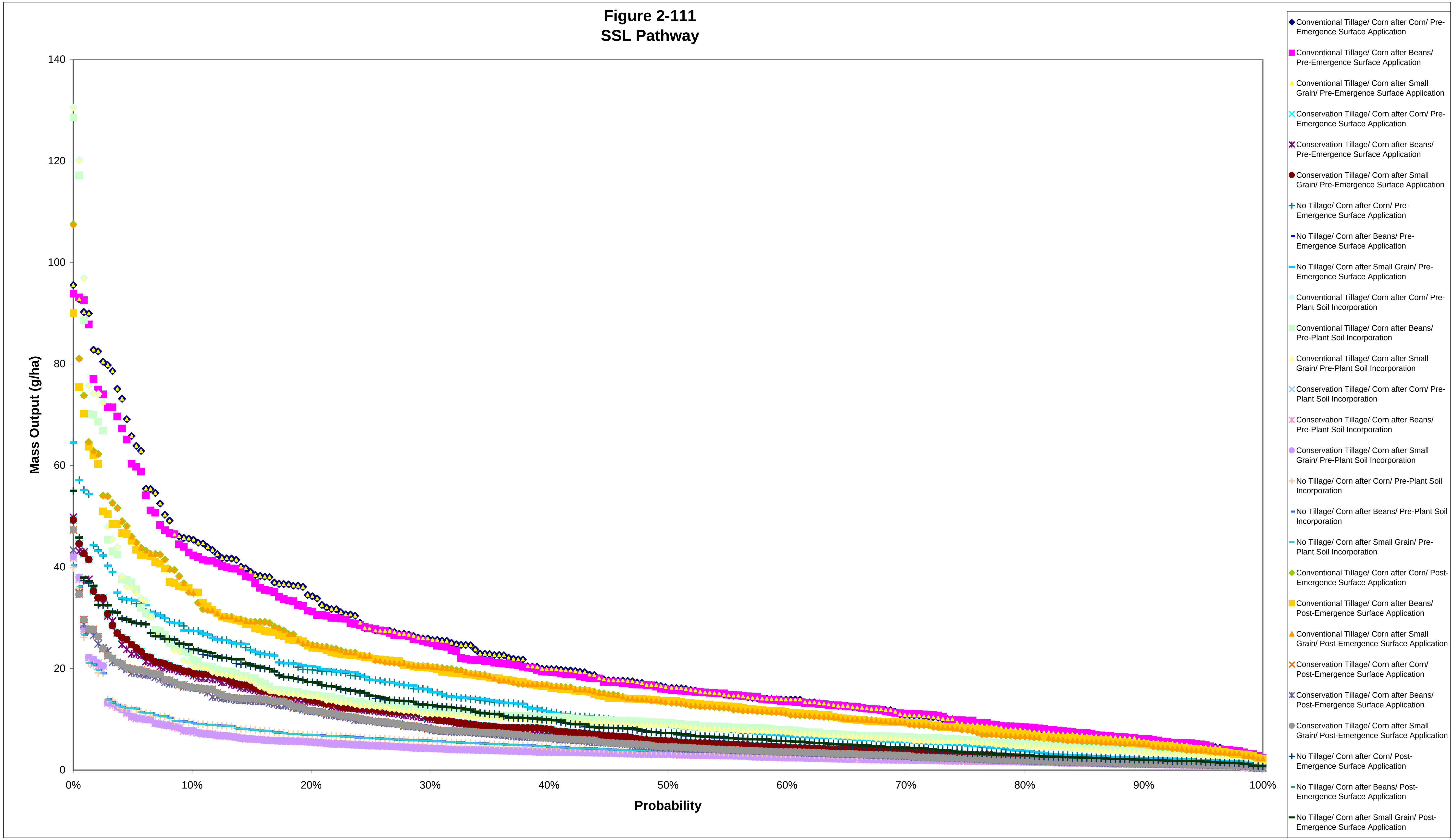


Figure 2-111
SSL Pathway

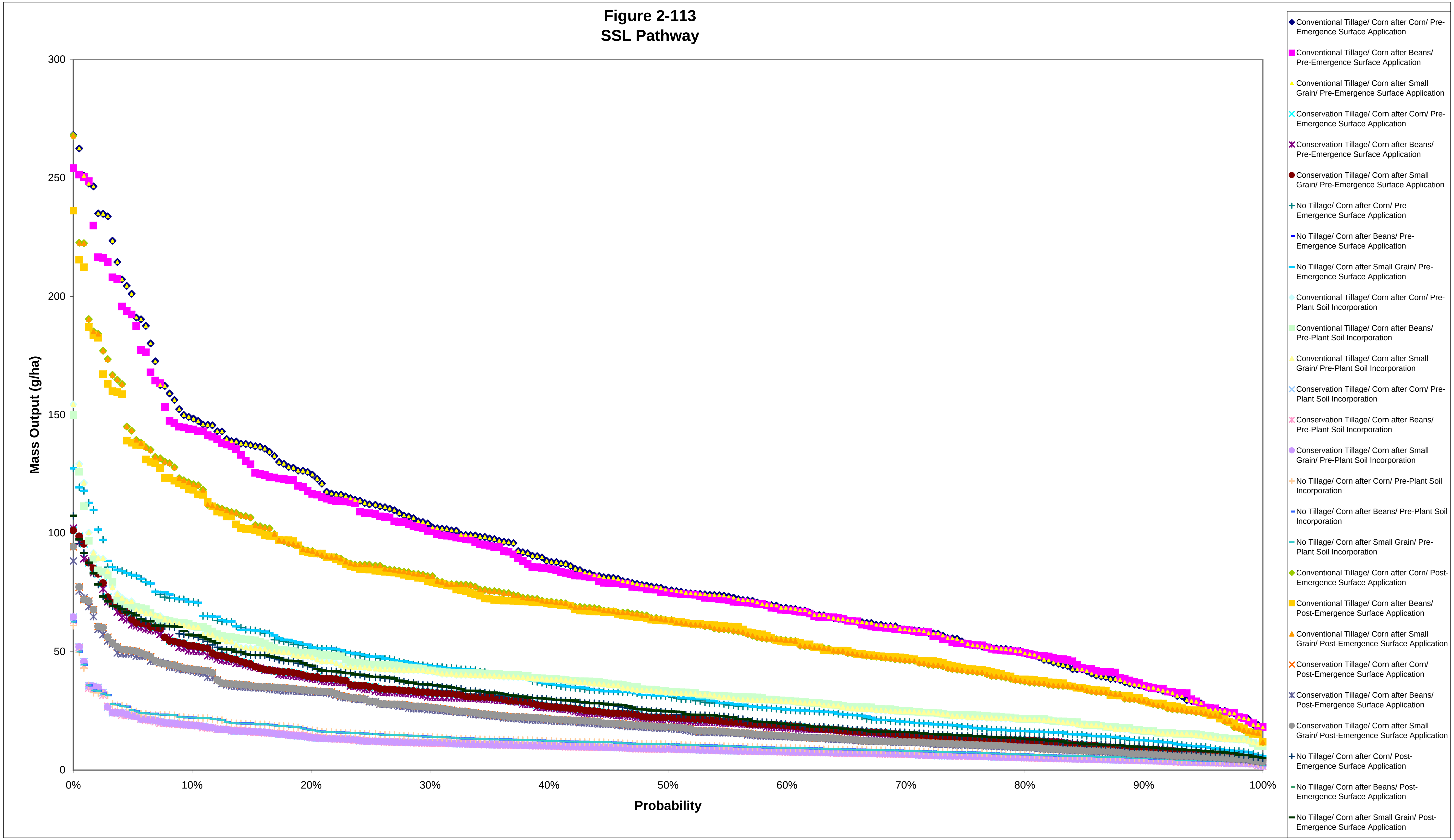


Figure 2-113
SSL Pathway

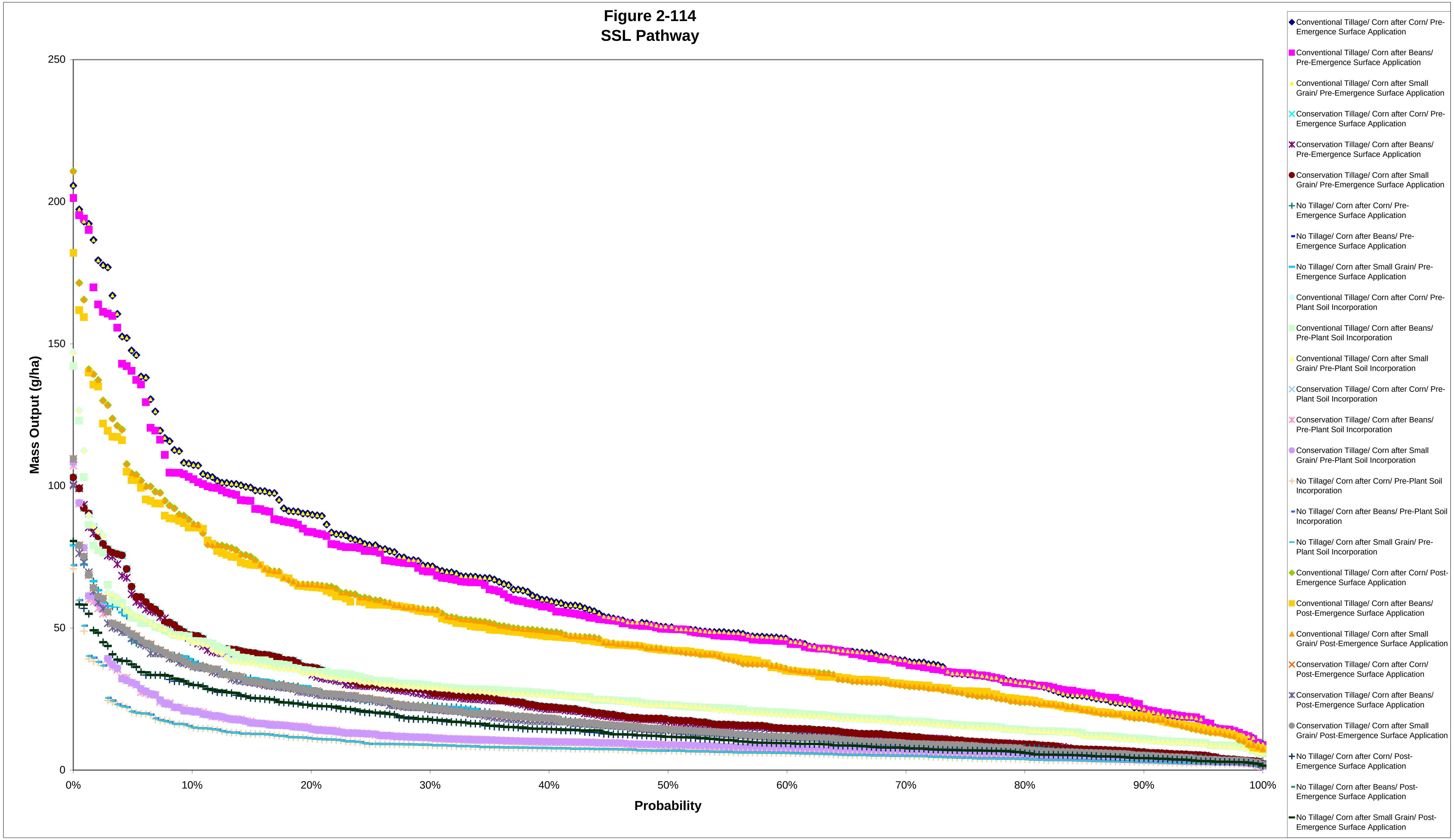
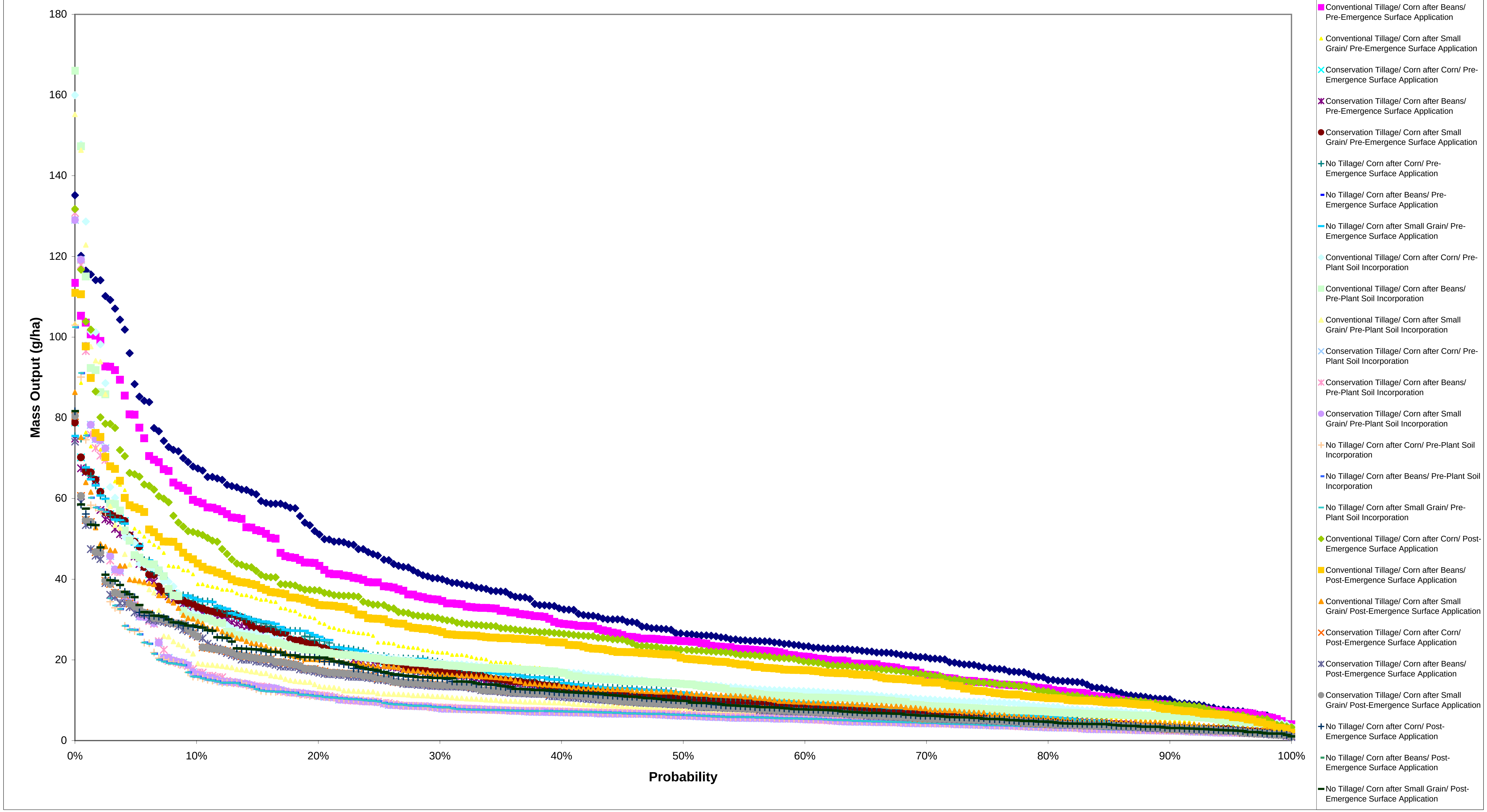


Figure 2-114
SSL Pathway

Figure 2-131
SSL Pathway



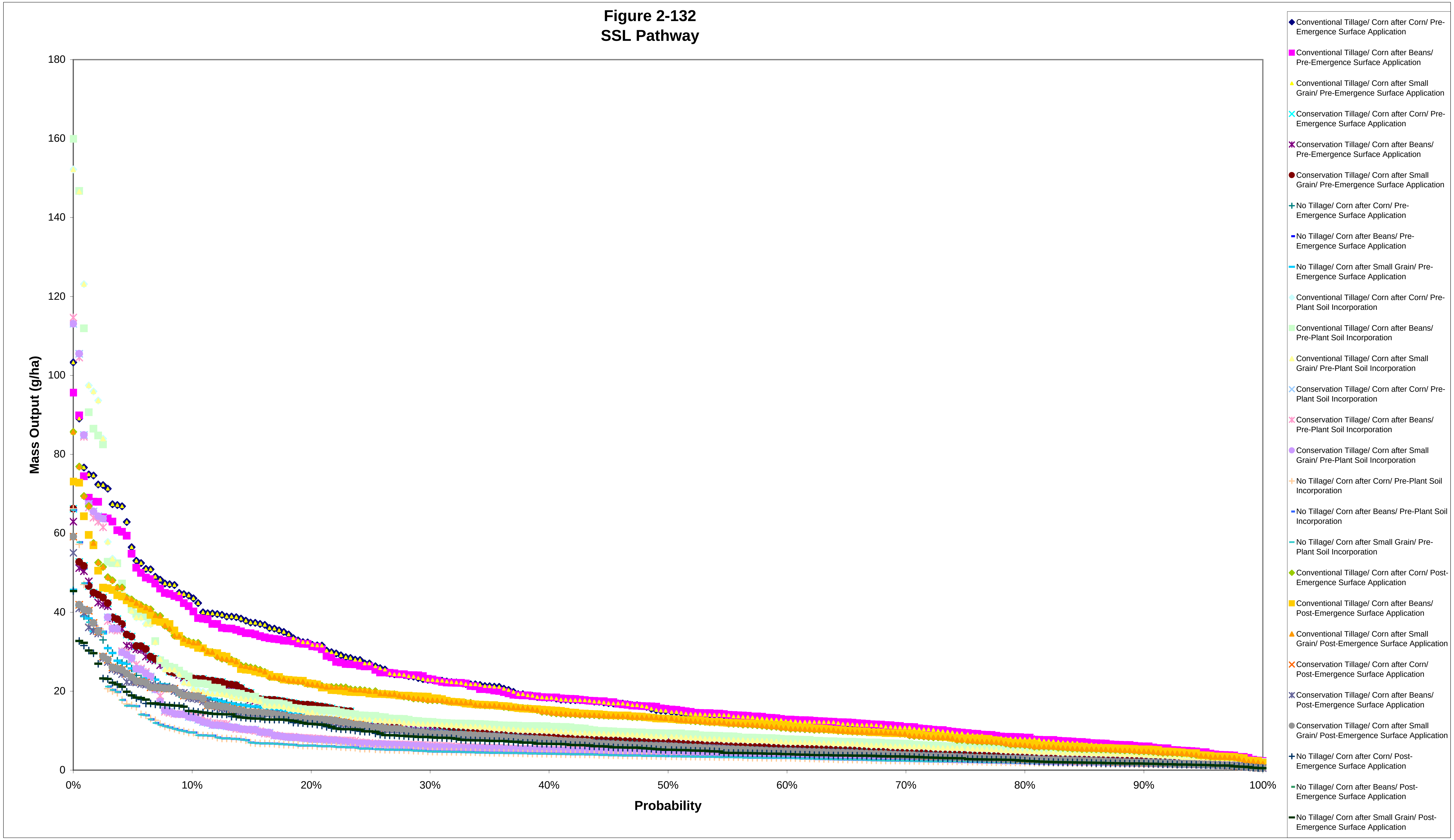


Figure 2-132
SSL Pathway

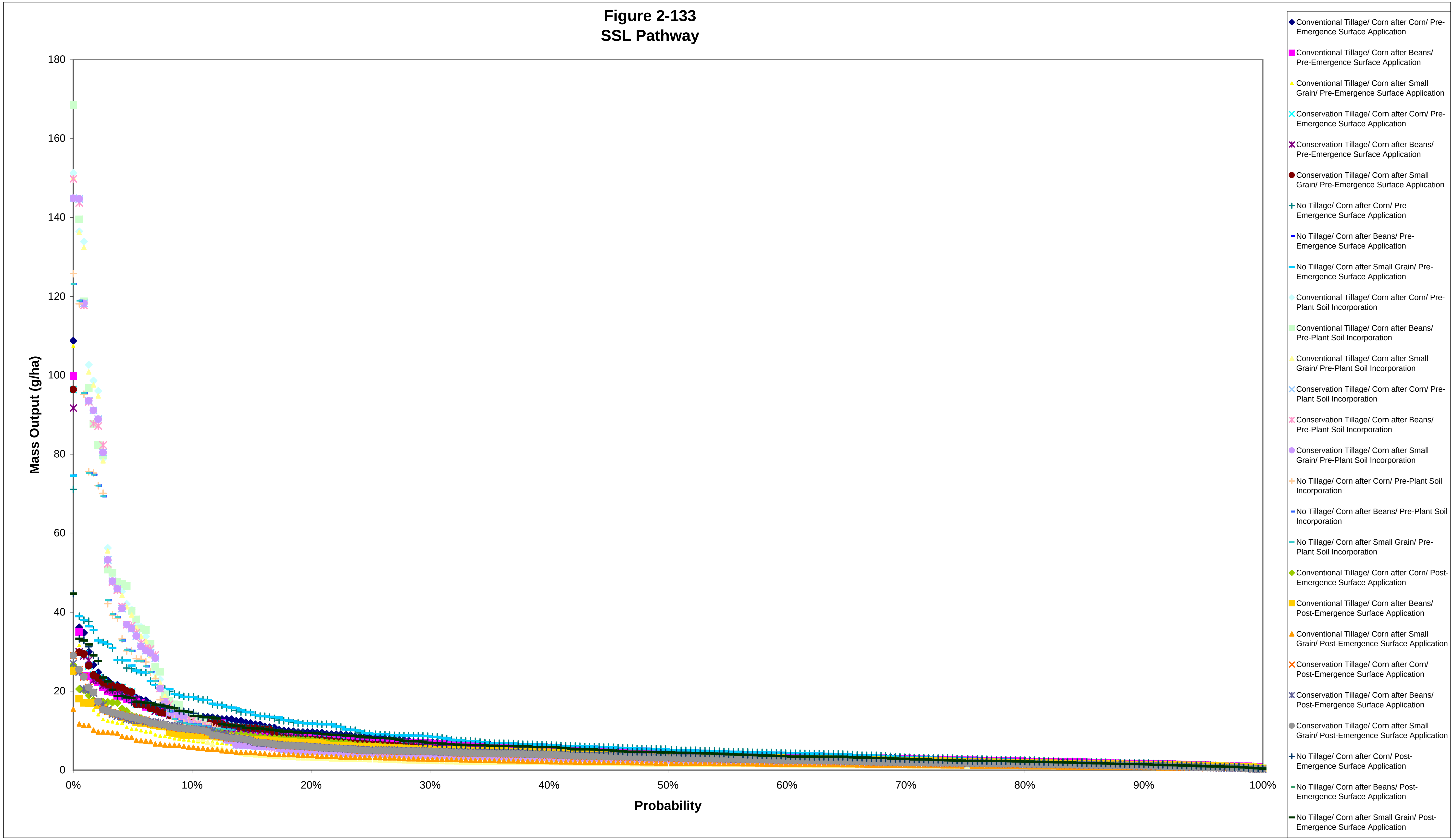


Figure 2-133
SSL Pathway

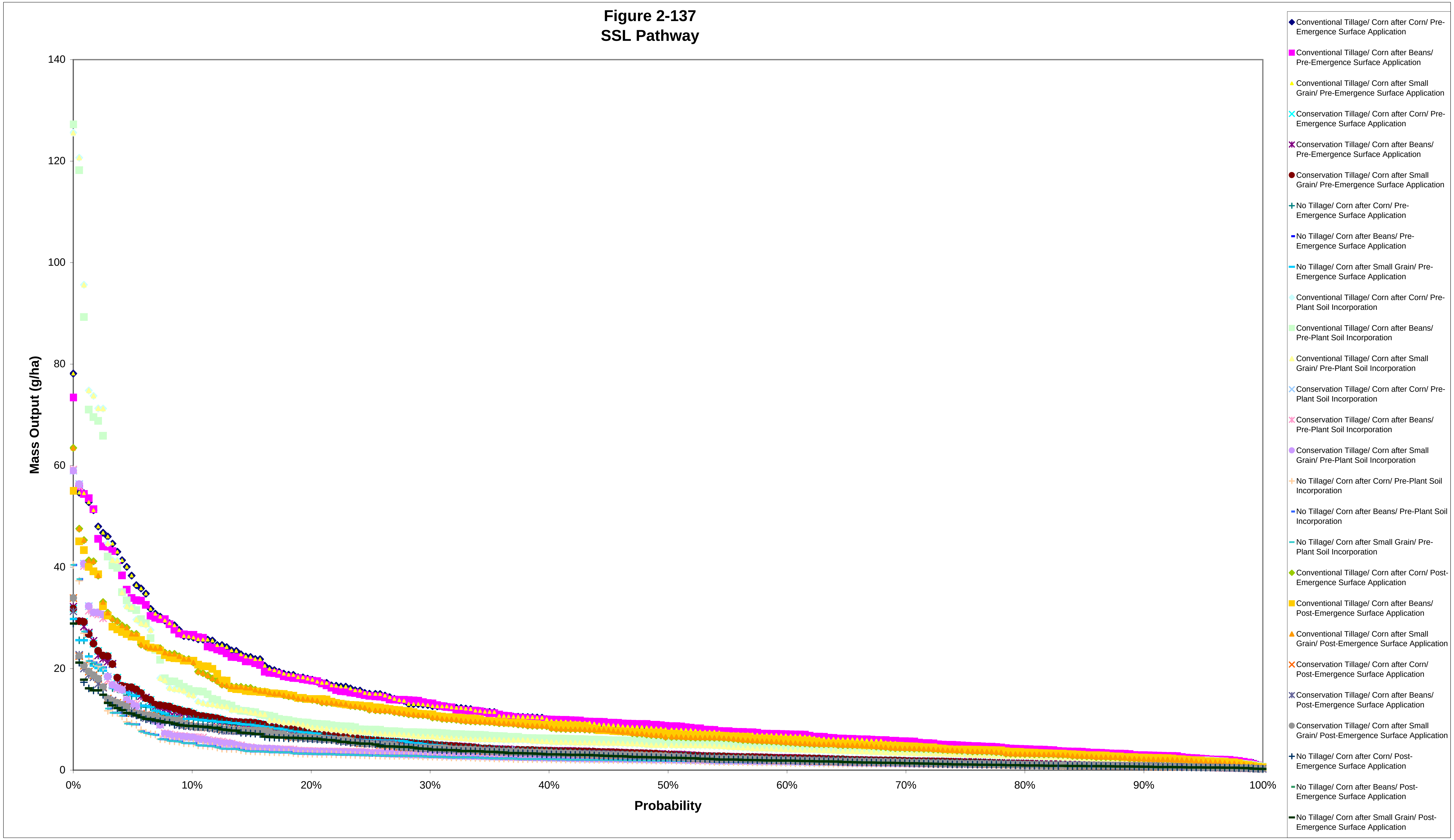
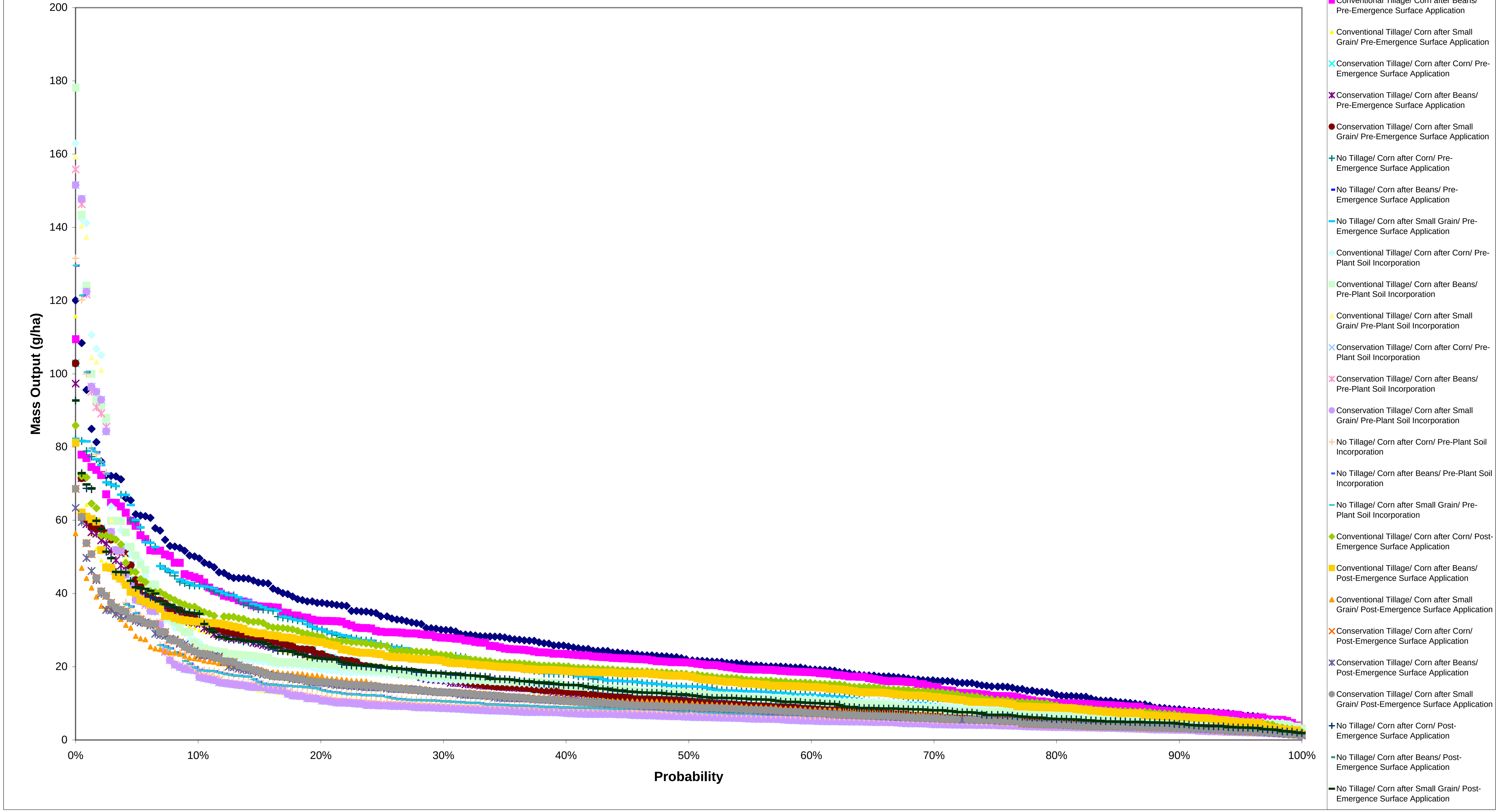


Figure 2-137
SSL Pathway

Figure 2-139
SSL Pathway



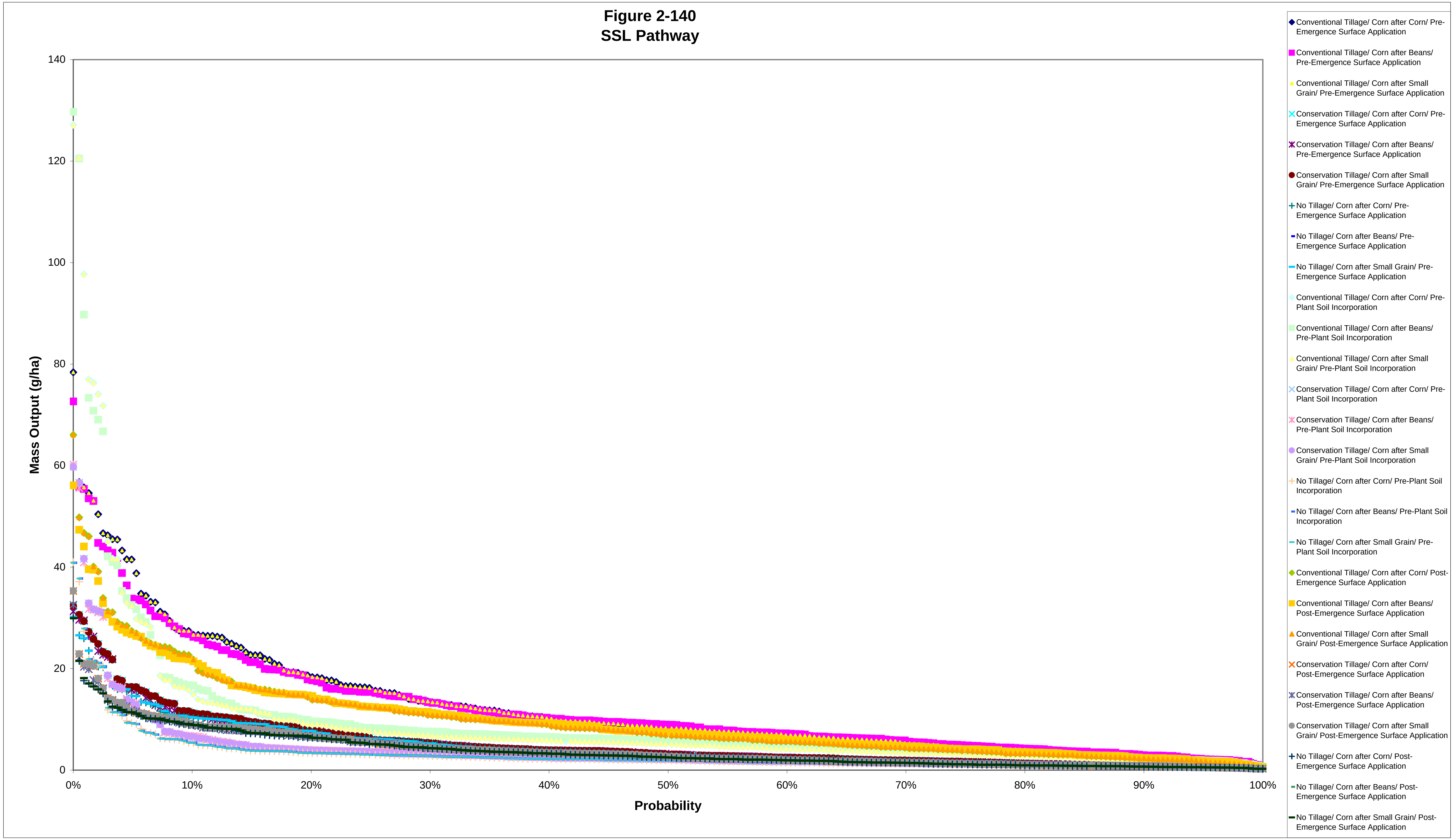


Figure 2-140
SSL Pathway

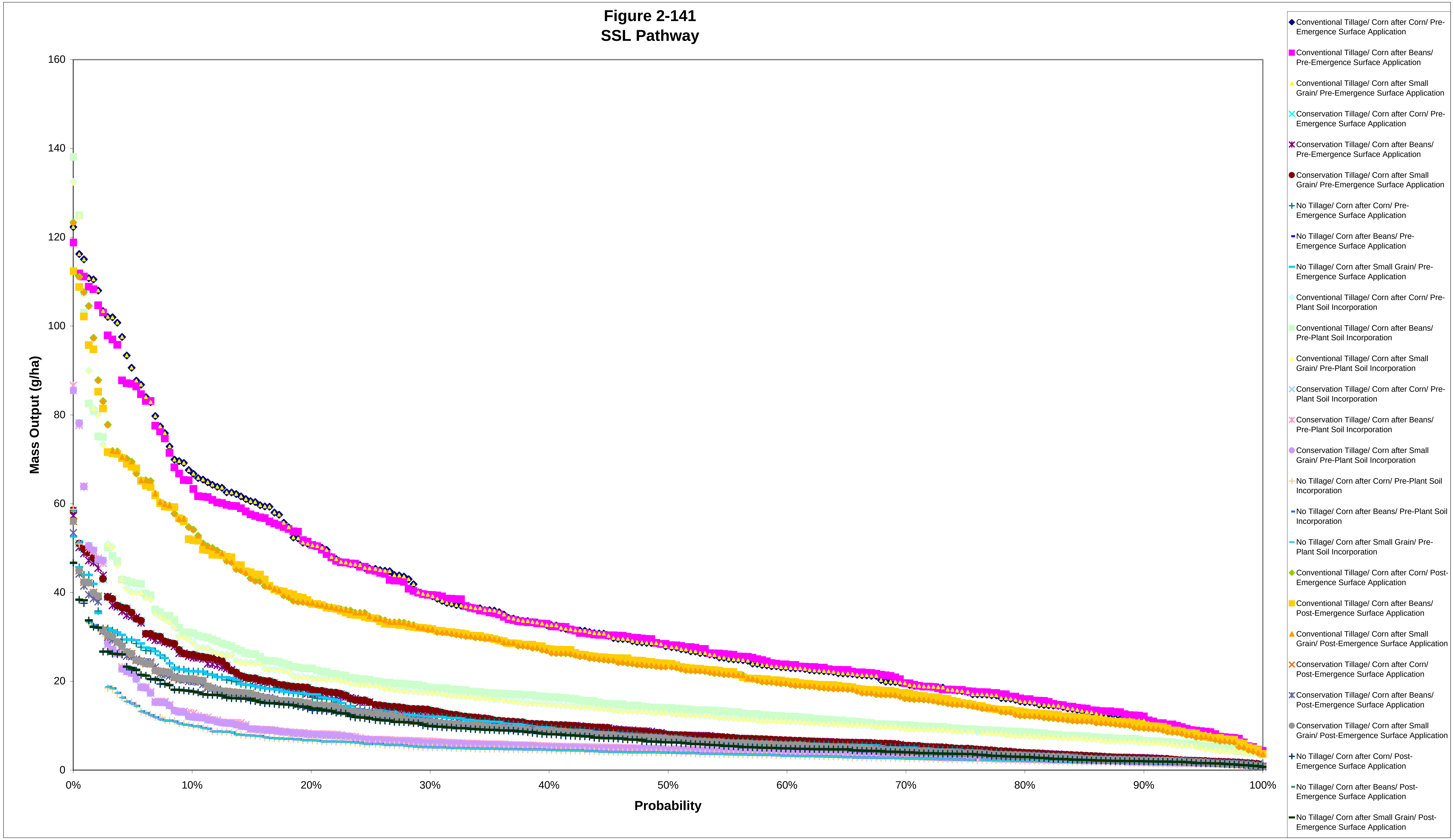


Figure 2-141
SSL Pathway

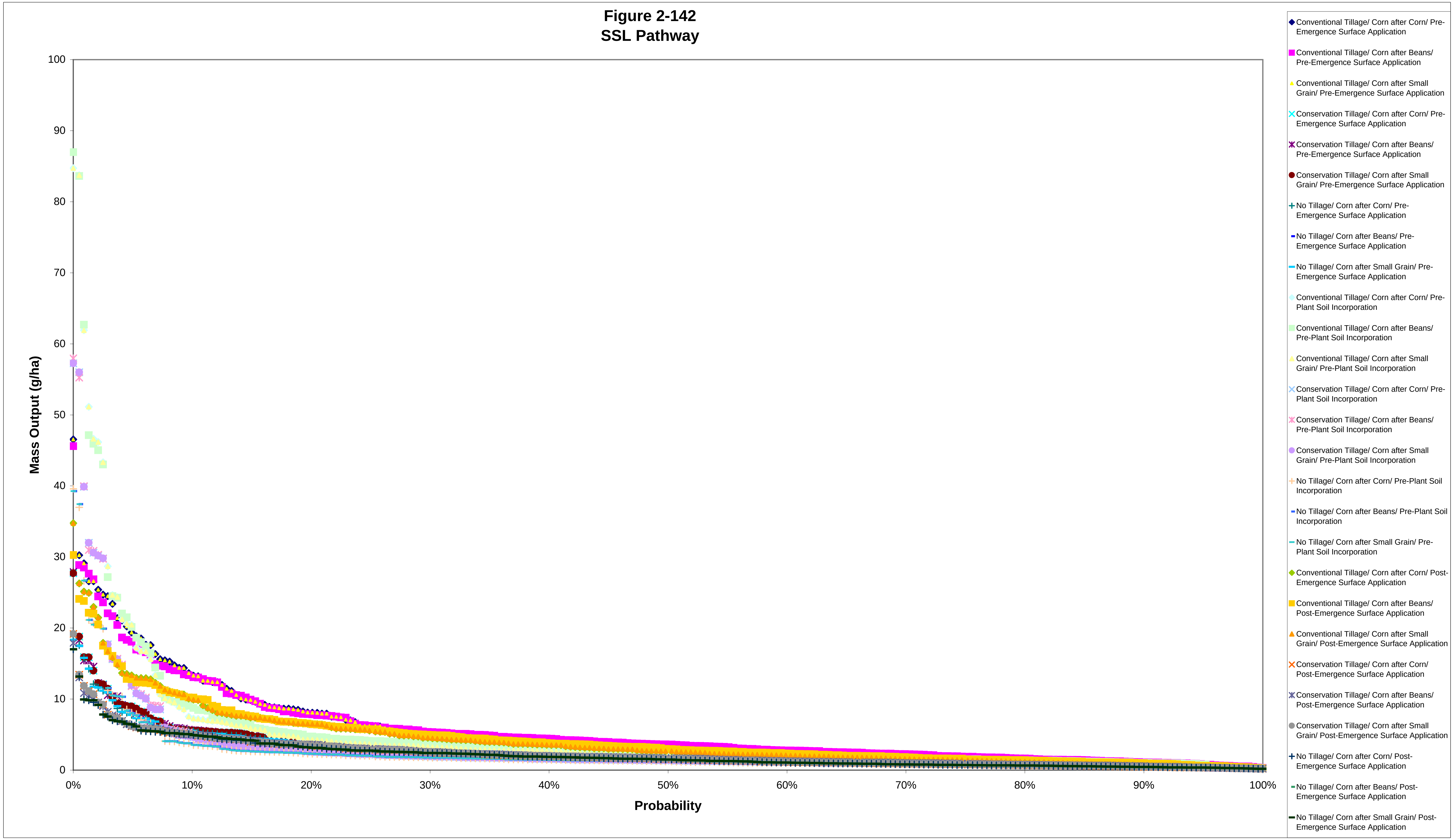


Figure 2-142
SSL Pathway

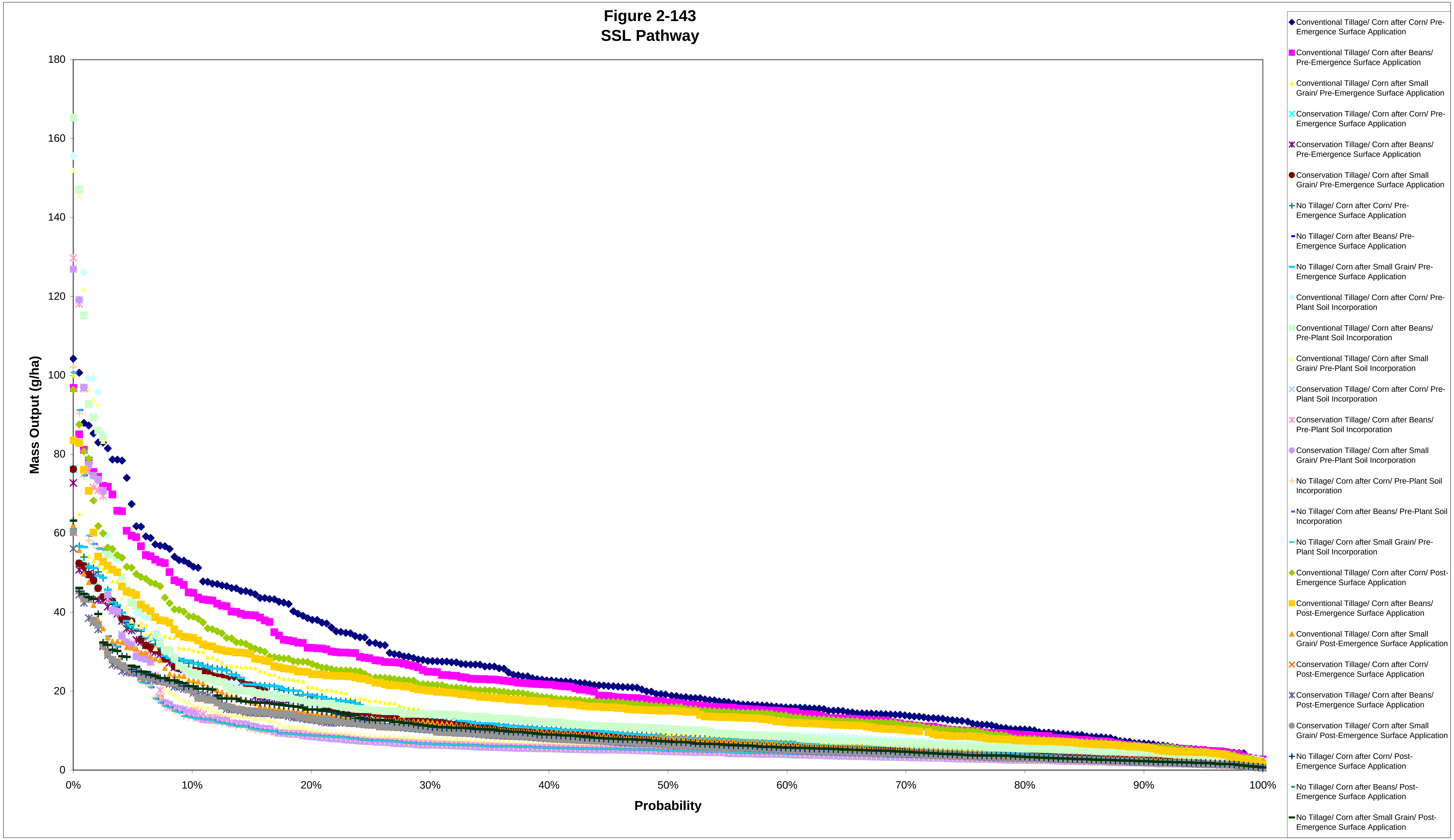


Figure 2-143
SSL Pathway

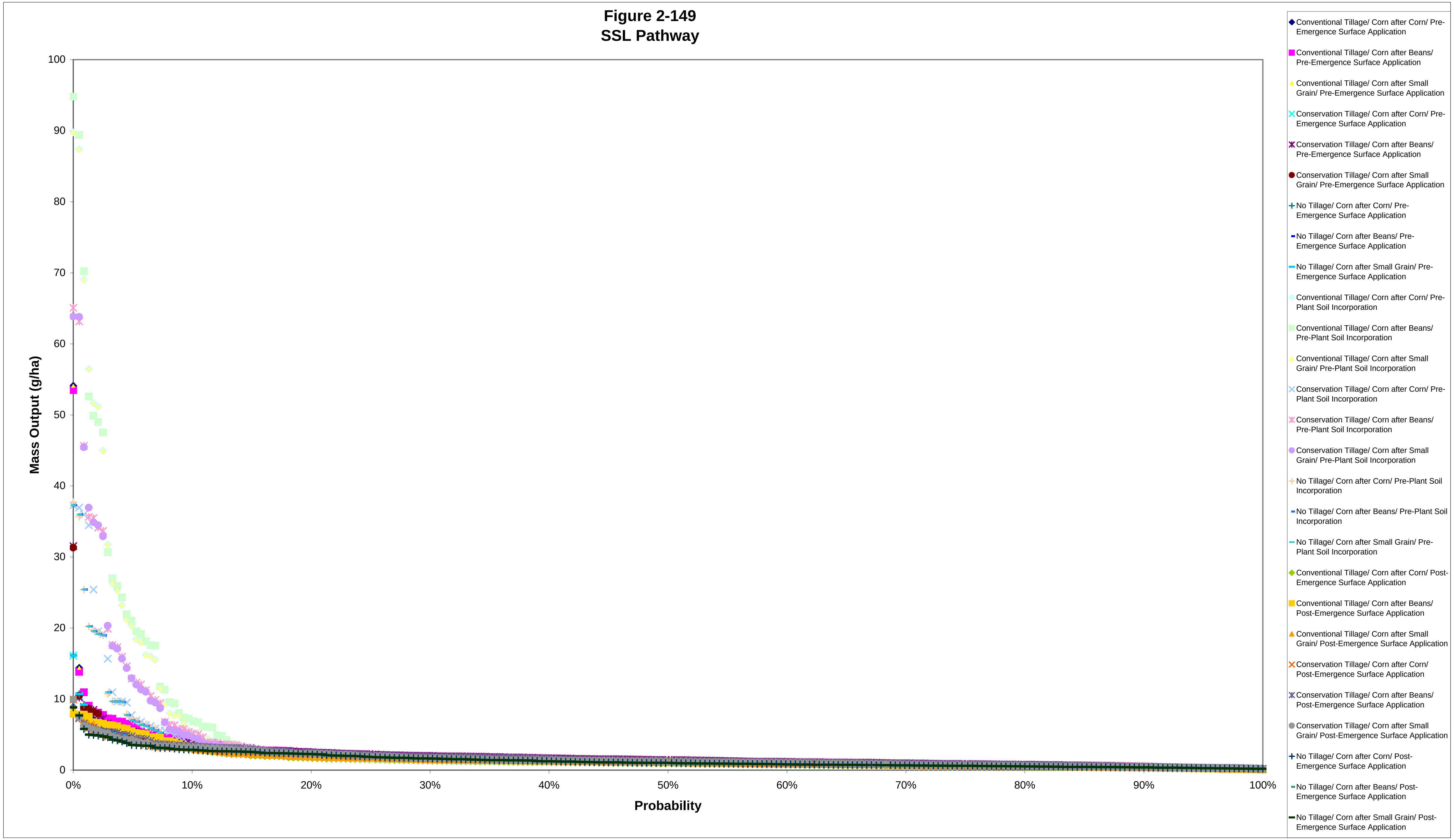


Figure 2-149
SSL Pathway

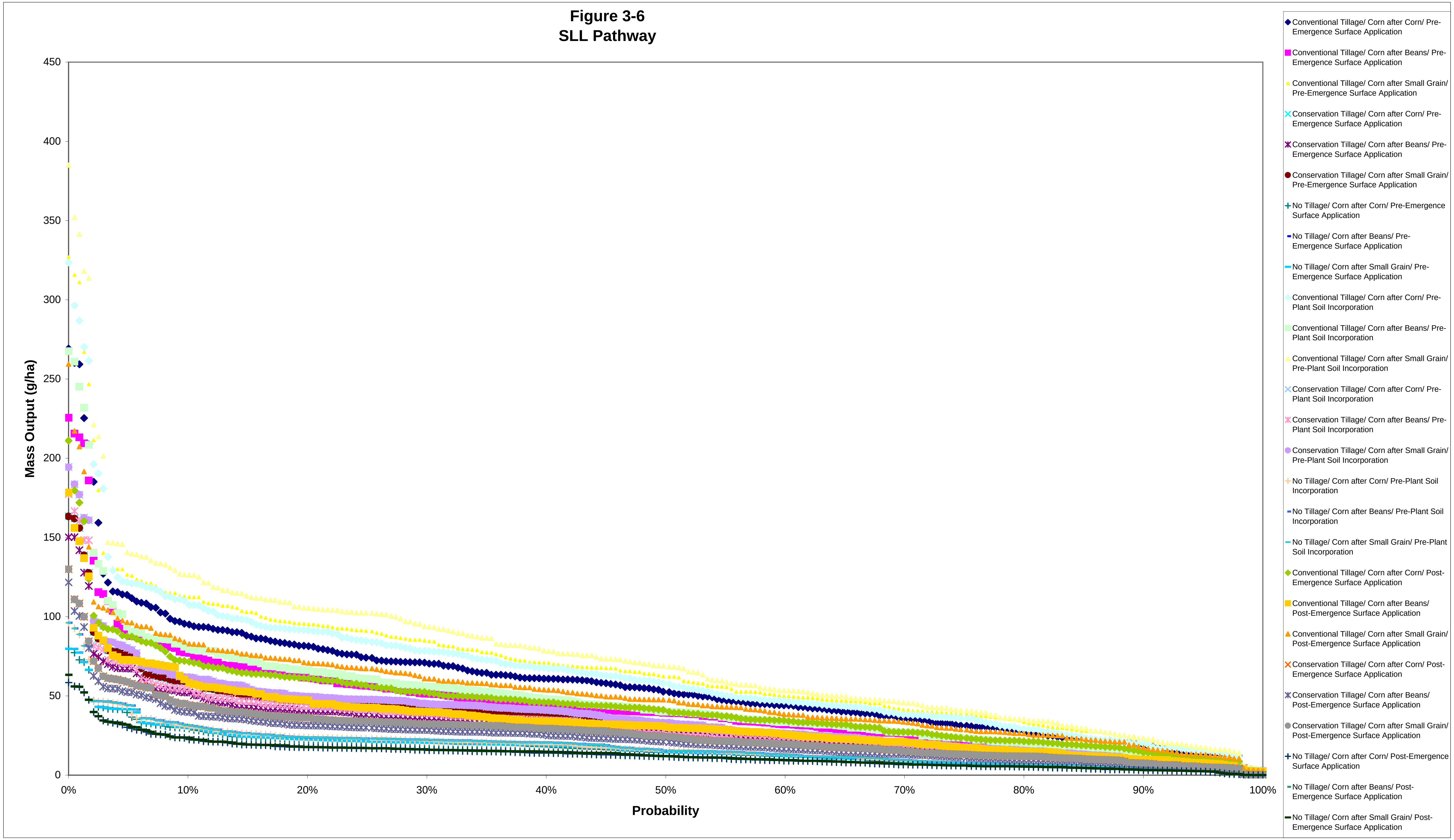


Figure 3-6
SLL Pathway

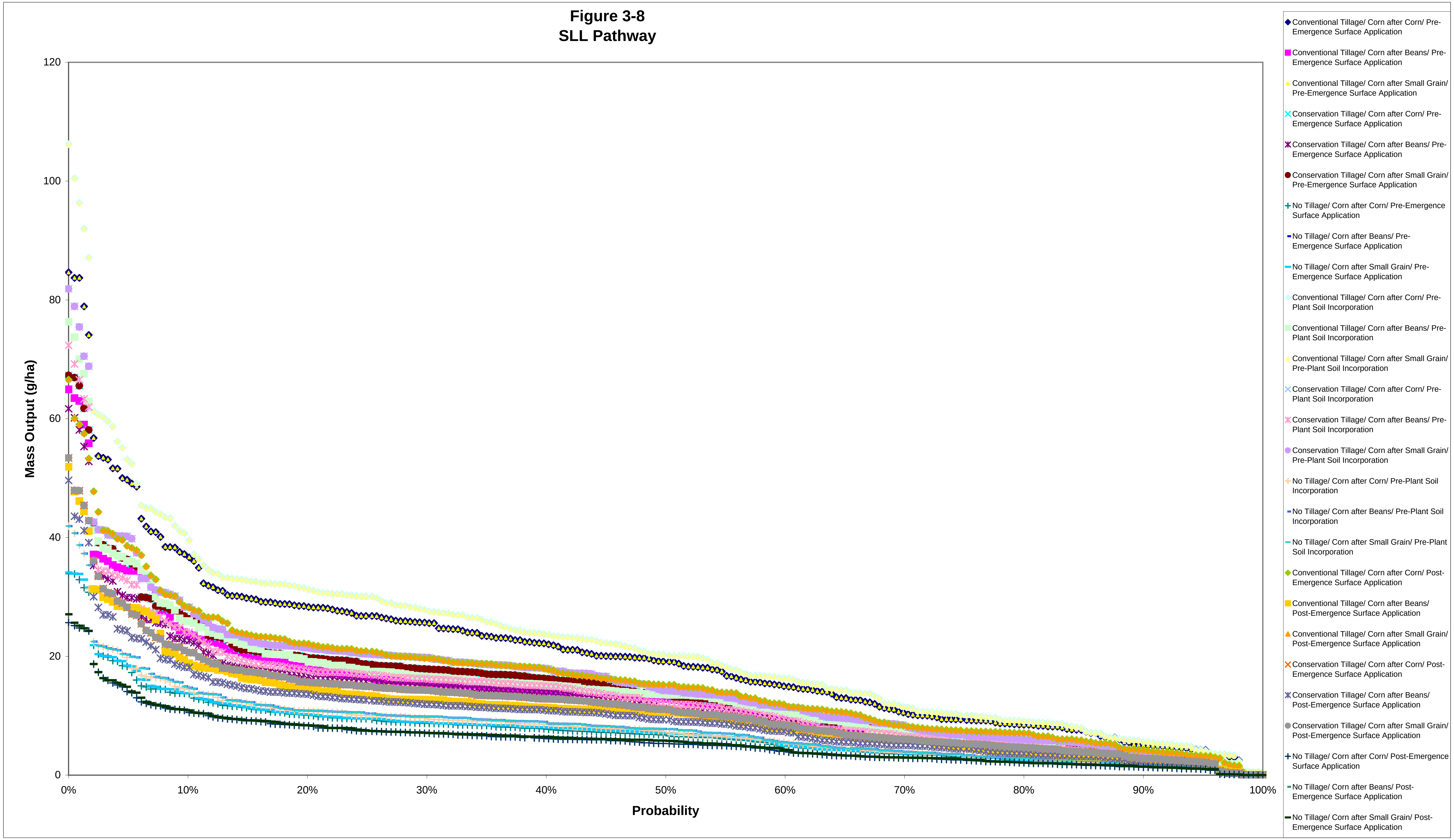


Figure 3-8
SLL Pathway

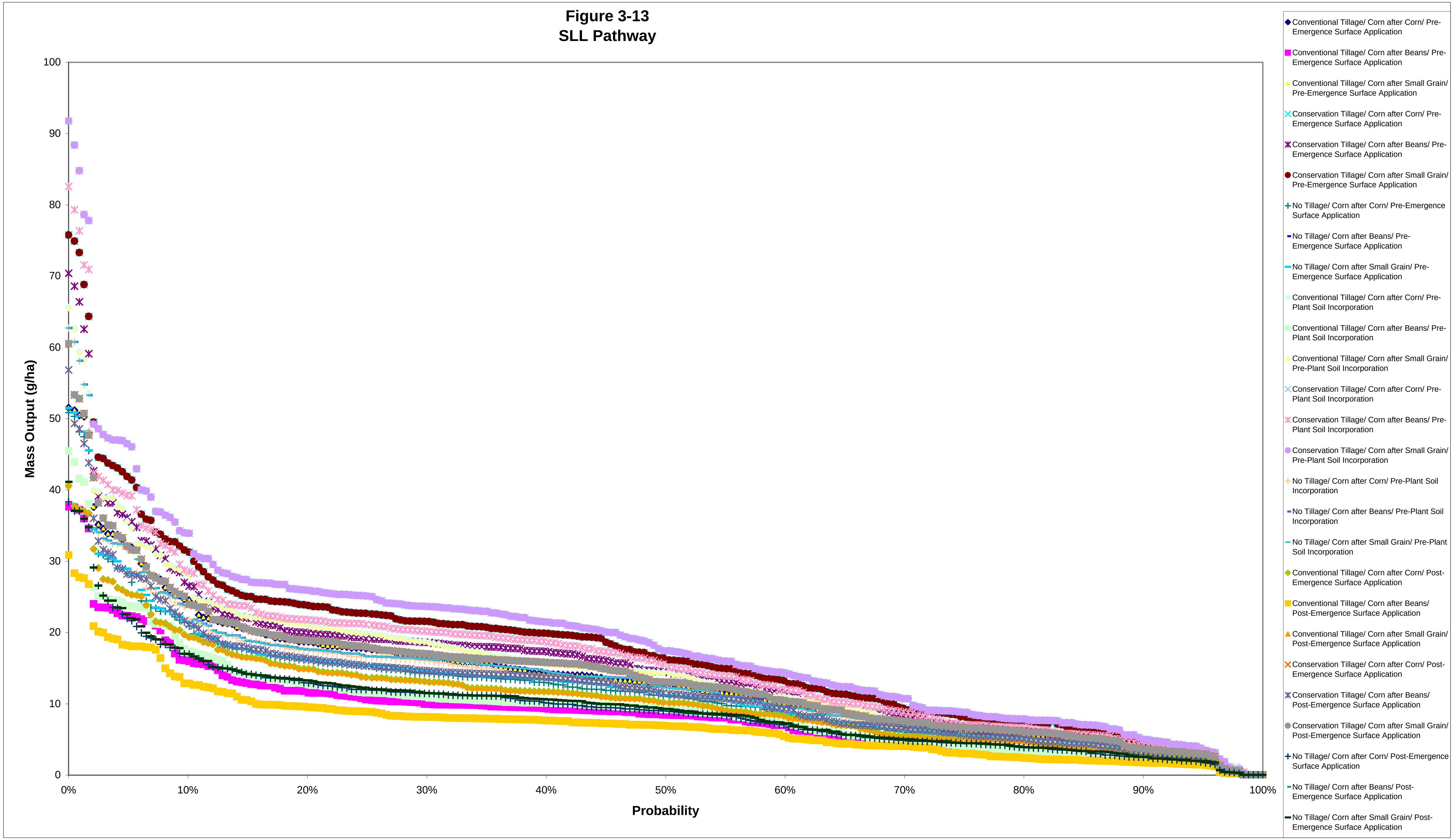


Figure 3-13
SLL Pathway

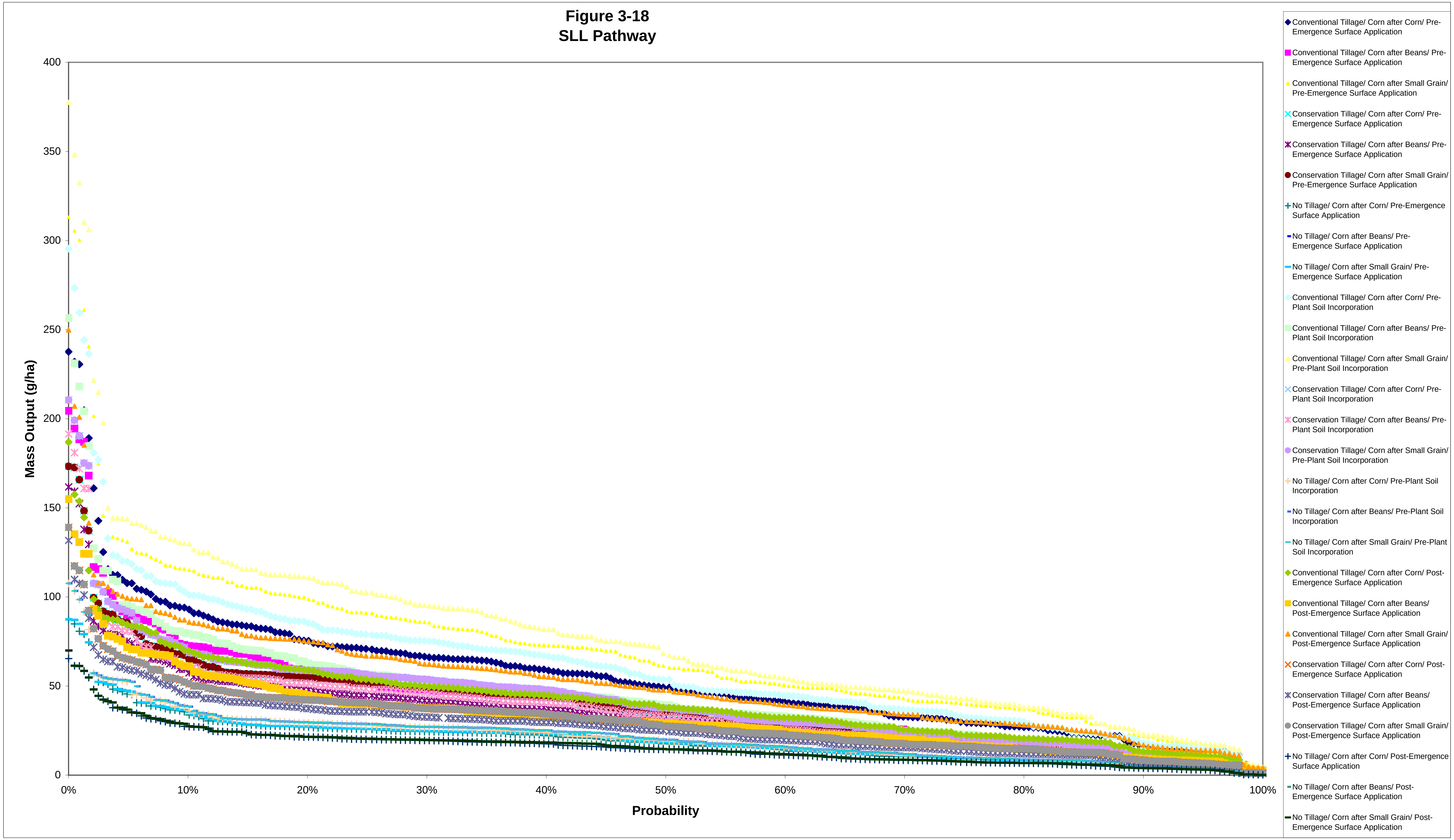


Figure 3-18
SLL Pathway

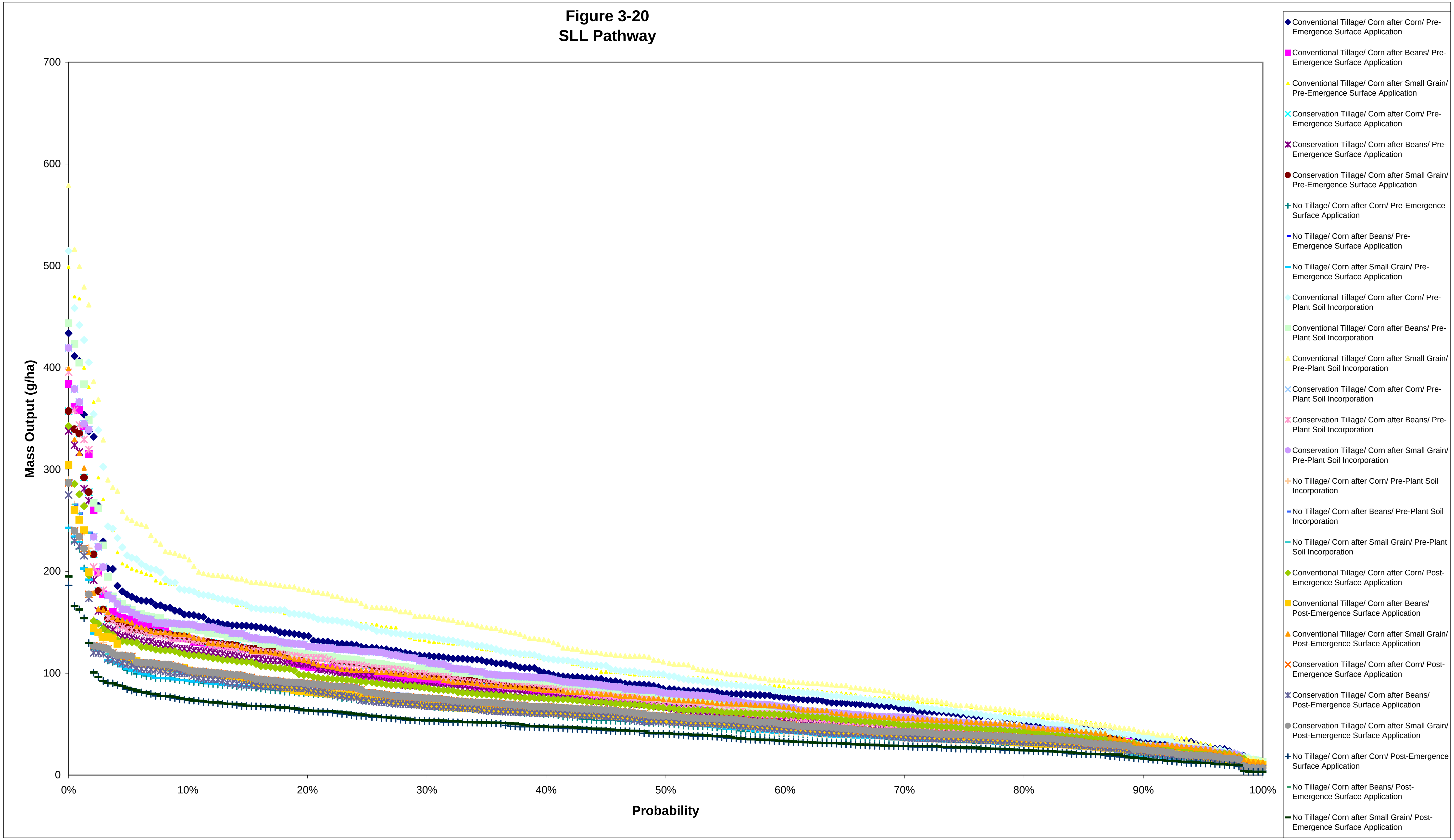


Figure 3-20
SLL Pathway

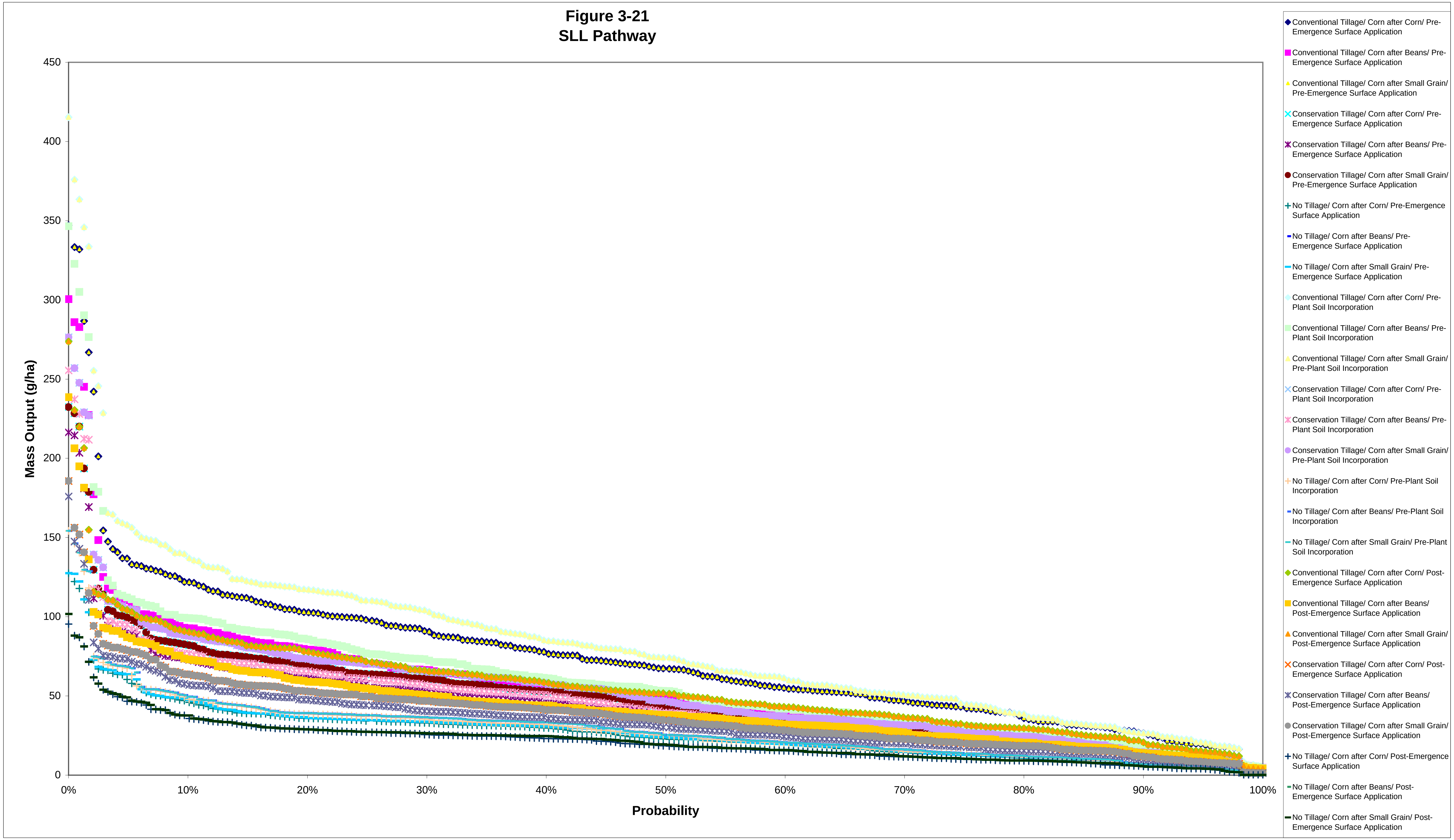


Figure 3-21
SLL Pathway

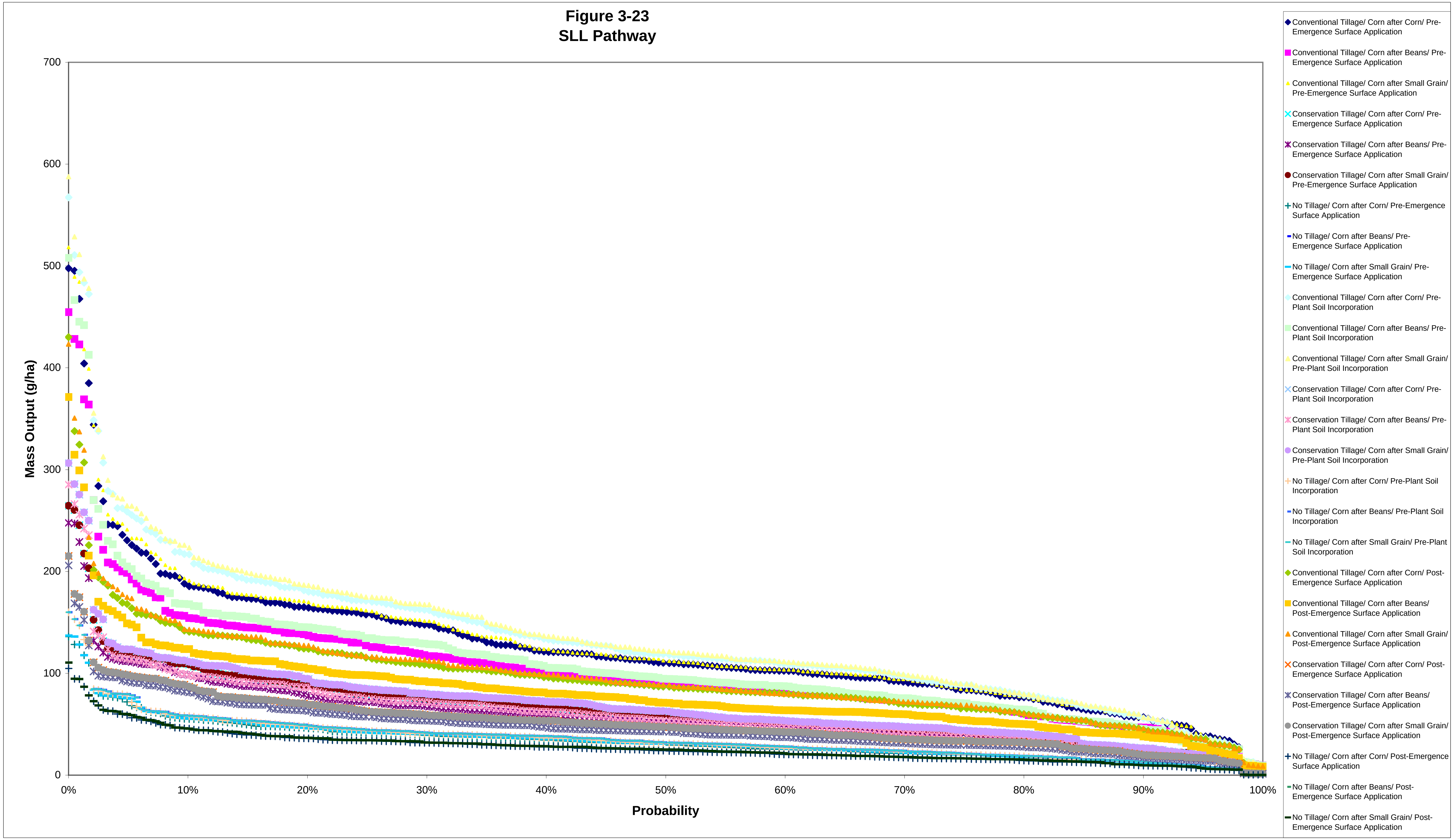


Figure 3-23
SLL Pathway

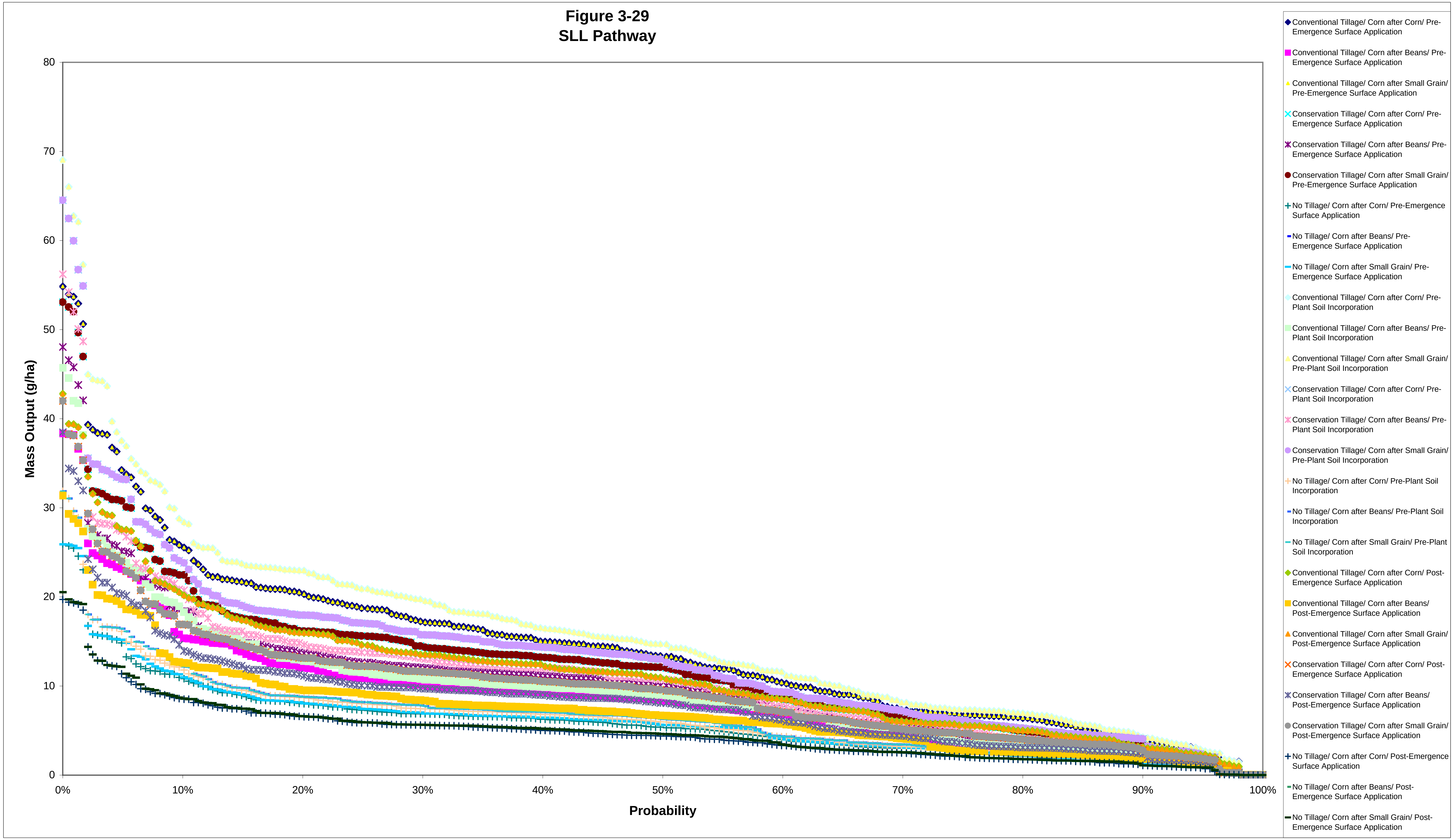


Figure 3-29
SLL Pathway

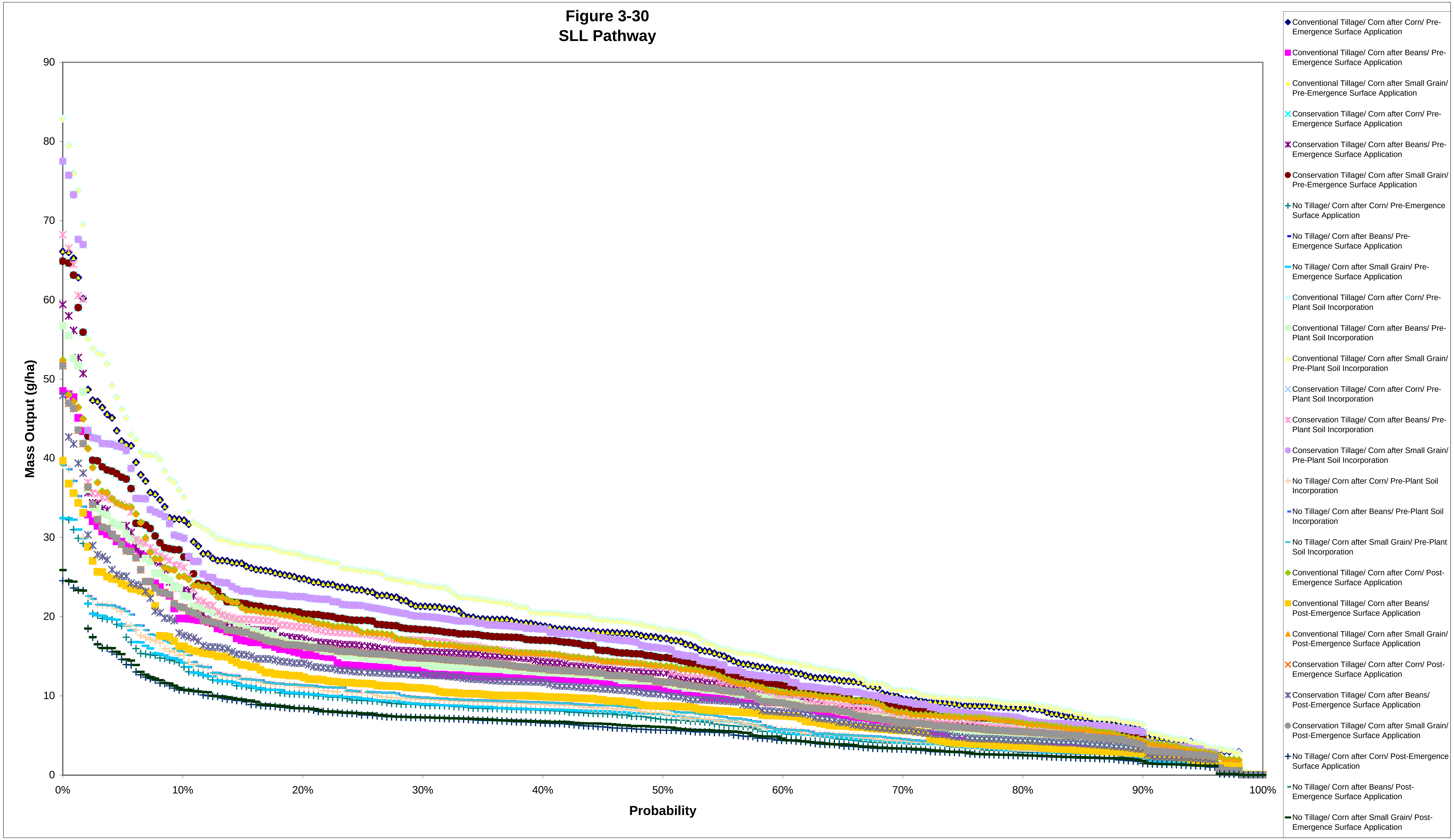


Figure 3-30
SLL Pathway

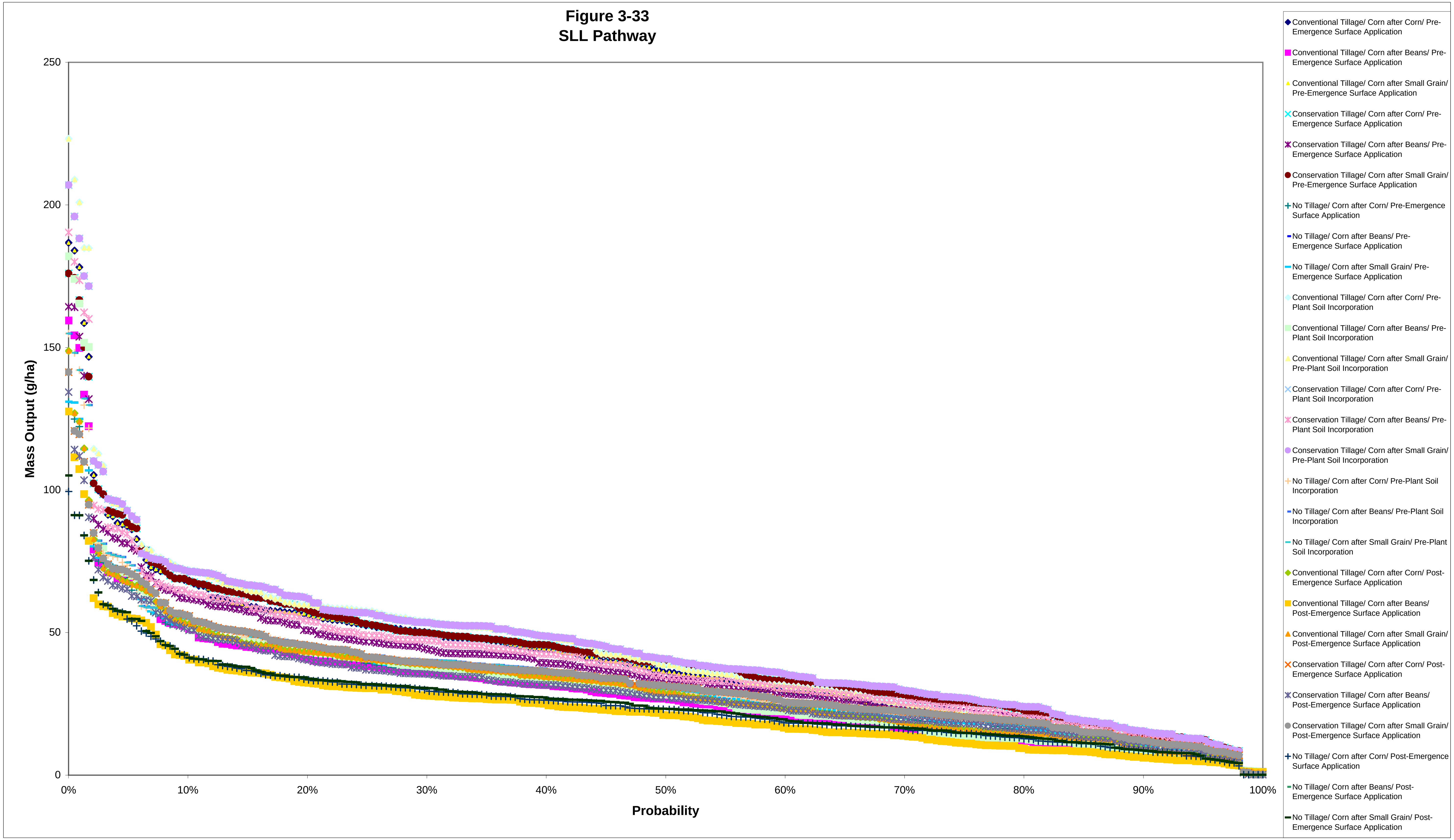


Figure 3-33
SLL Pathway

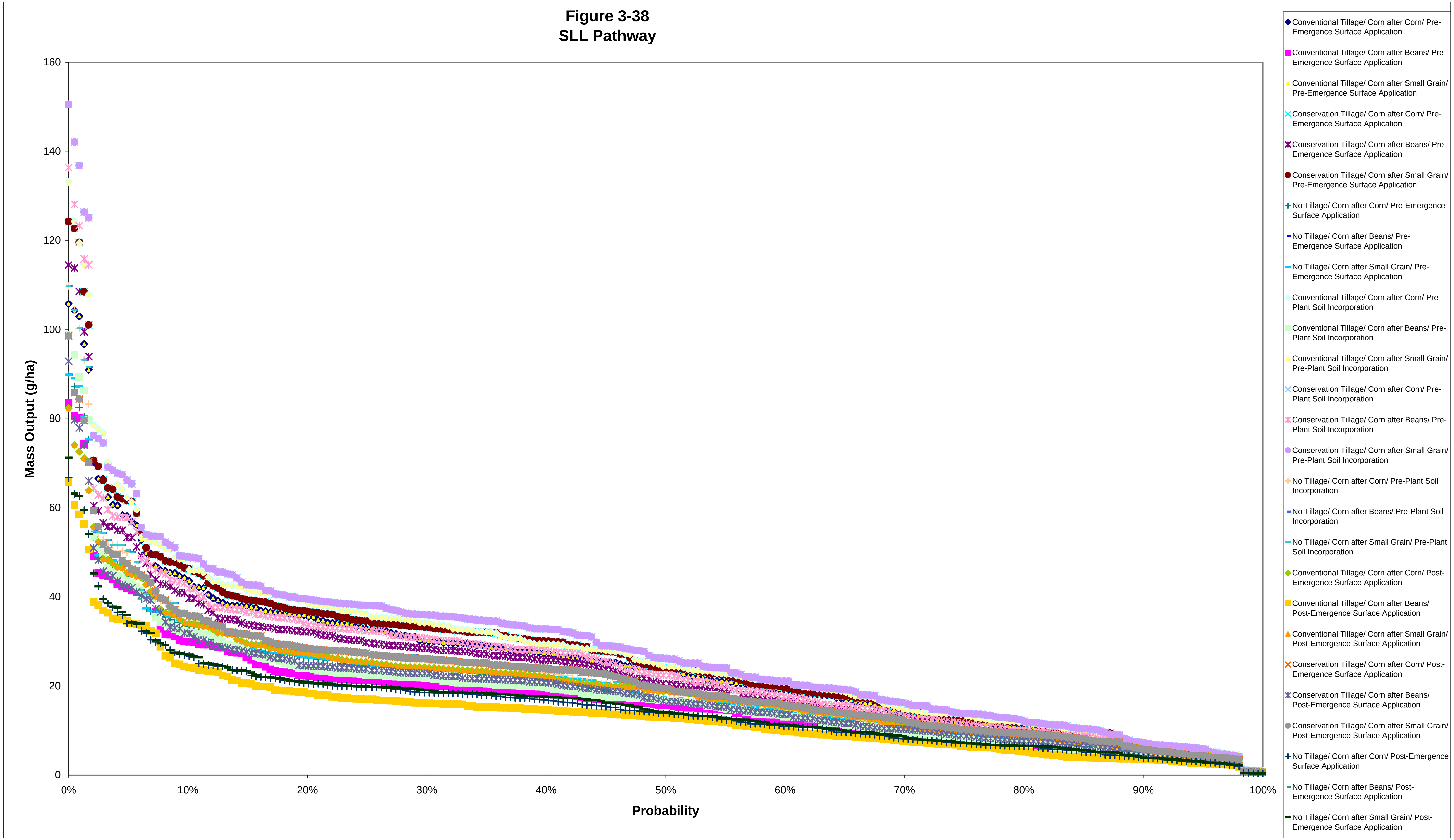


Figure 3-38
SLL Pathway

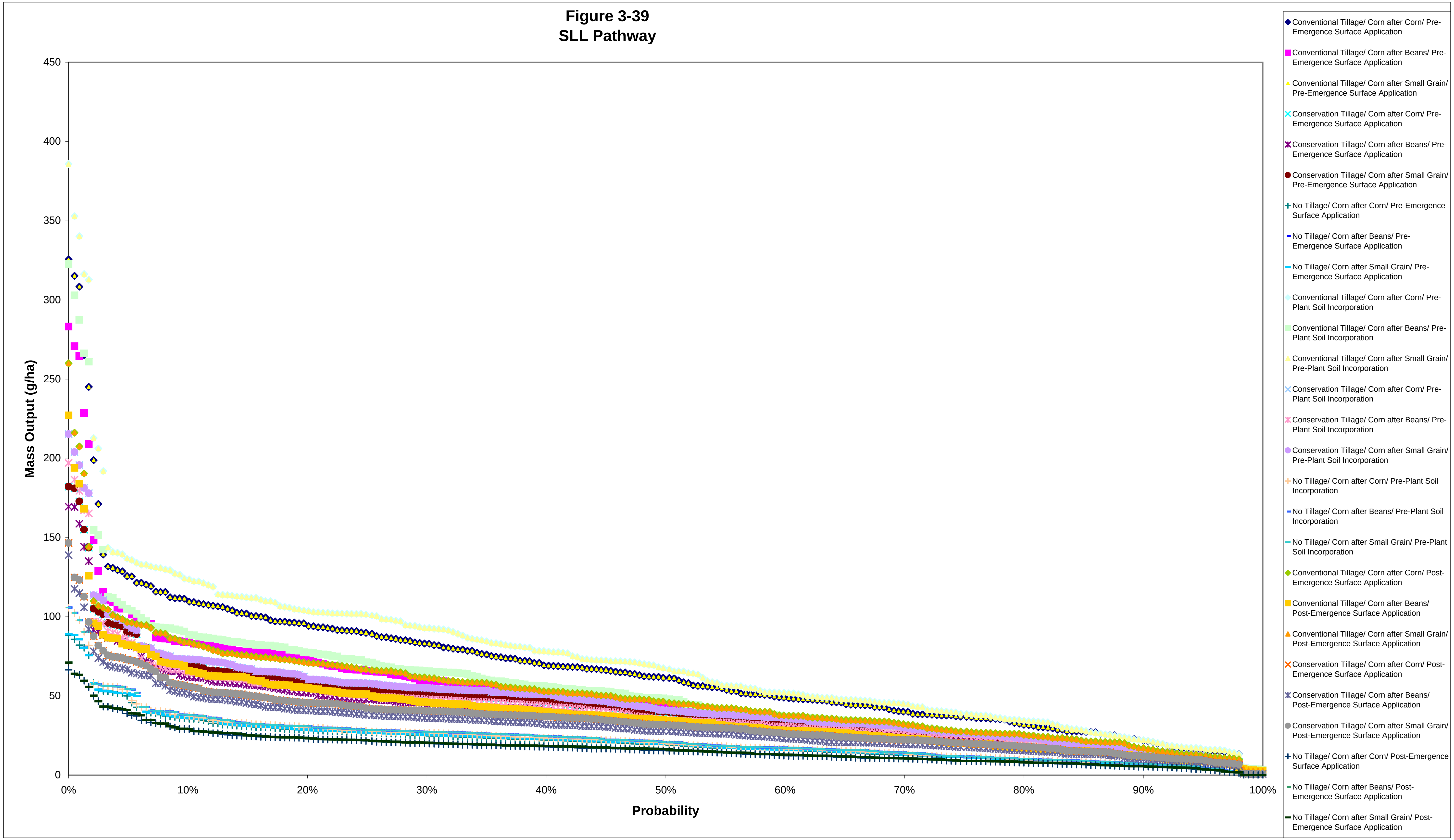


Figure 3-39
SLL Pathway
Mass Output (g/ha)
450
400
350
300
250
200
150
100
50
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Probability
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application
No Tillage/ Corn after Corn/ Post-Emergence Surface Application
No Tillage/ Corn after Beans/ Post-Emergence Surface Application
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application

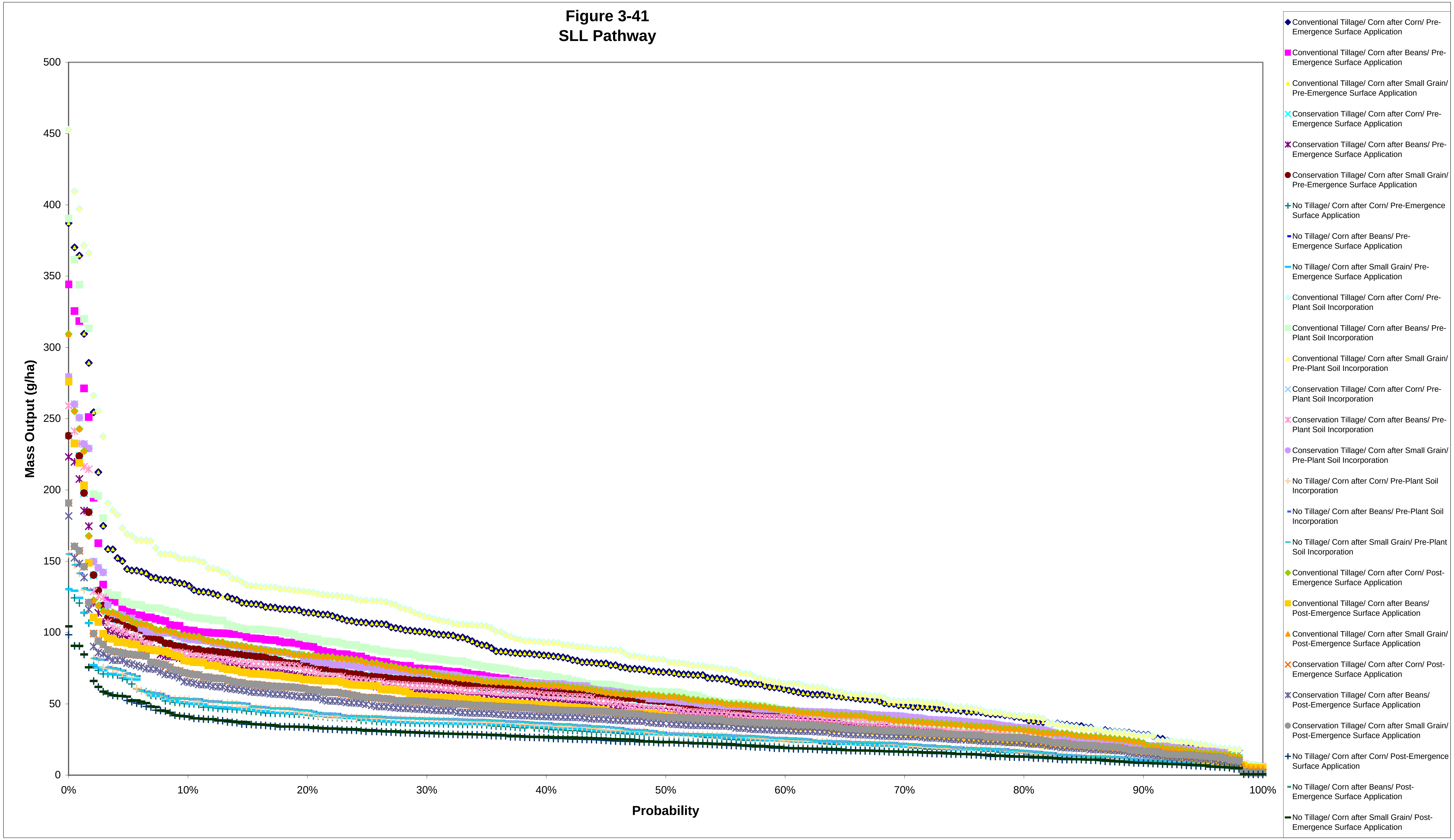


Figure 3-41
SLL Pathway

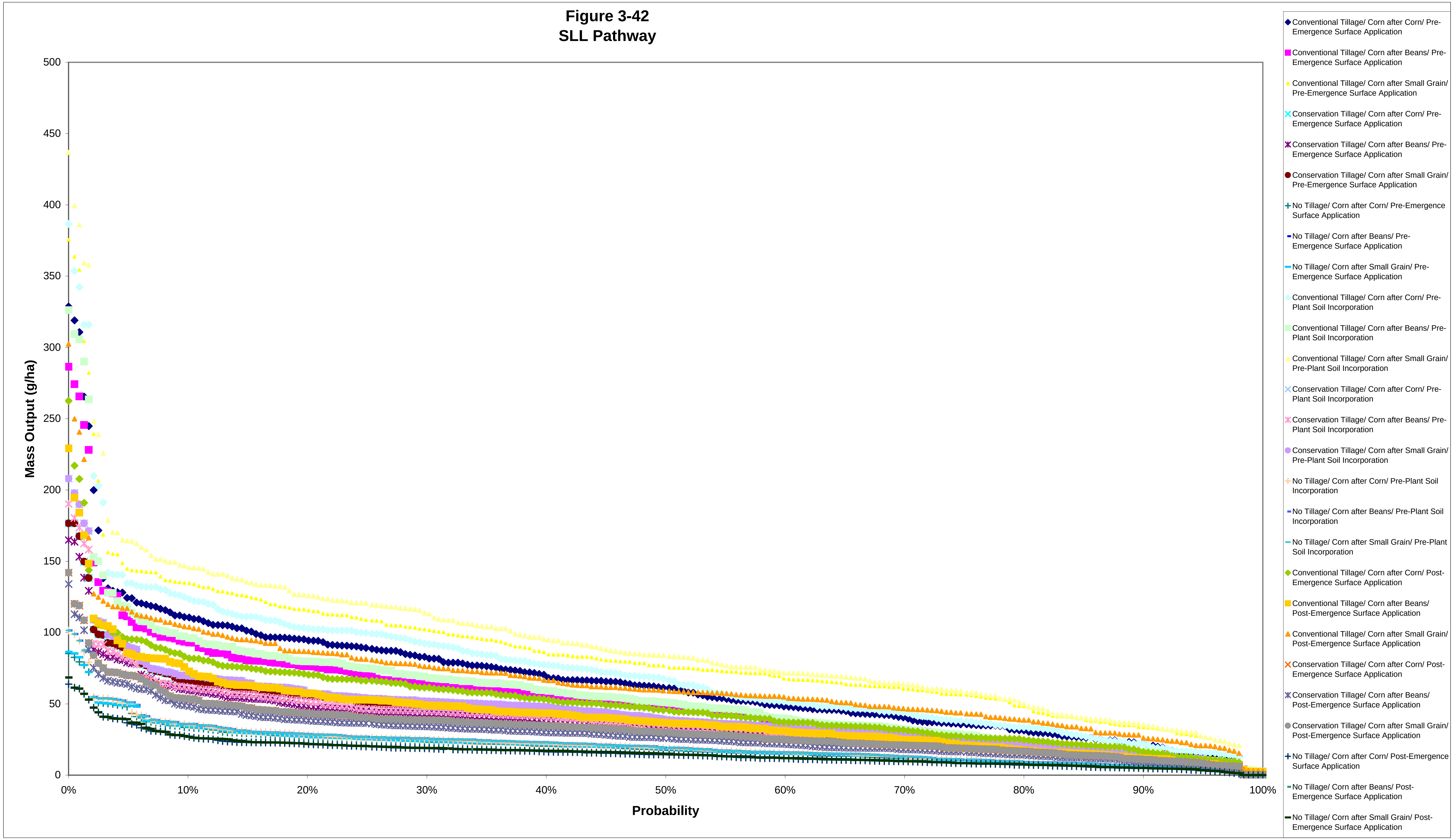


Figure 3-42
SLL Pathway

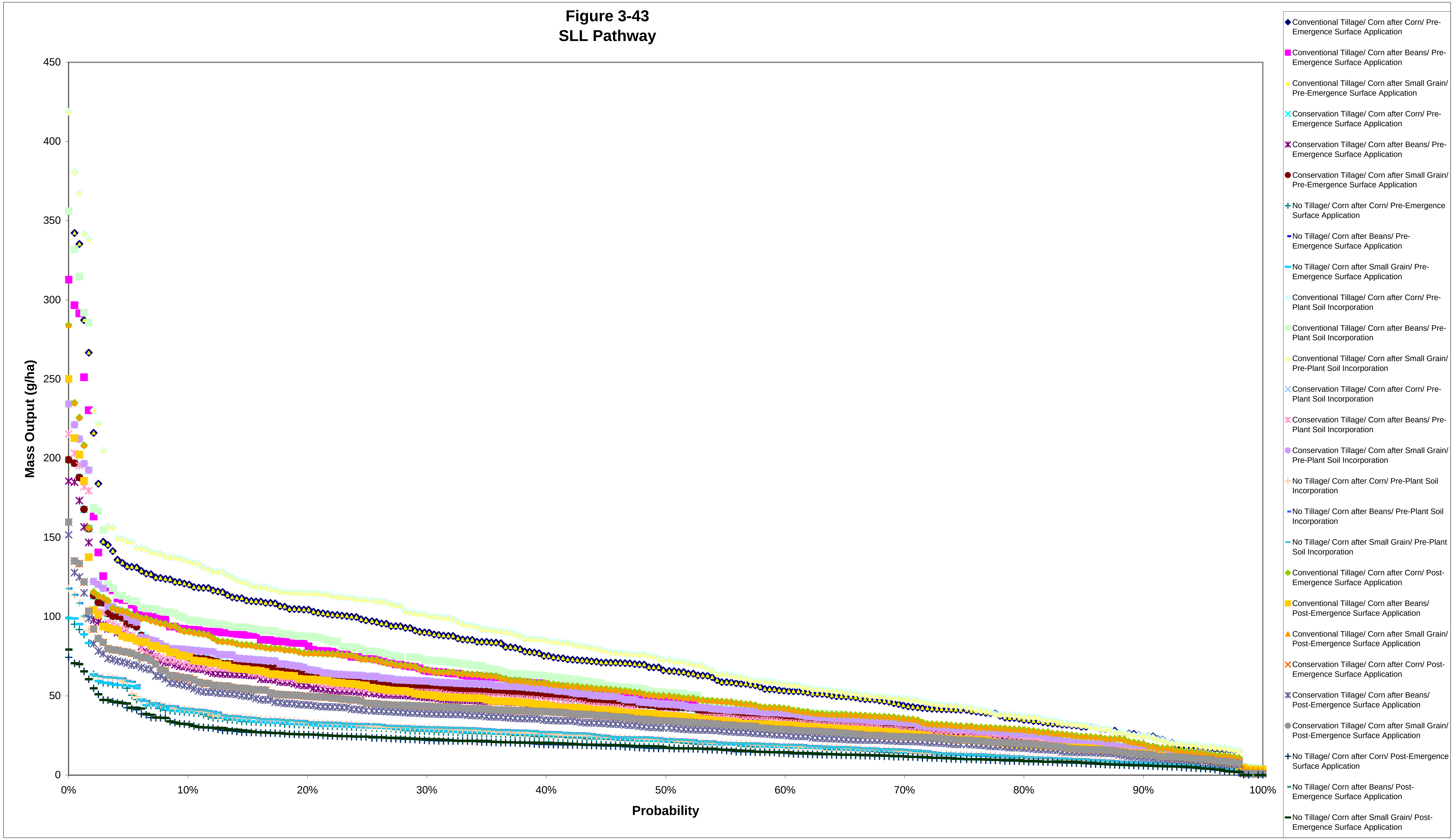


Figure 3-43
SLL Pathway

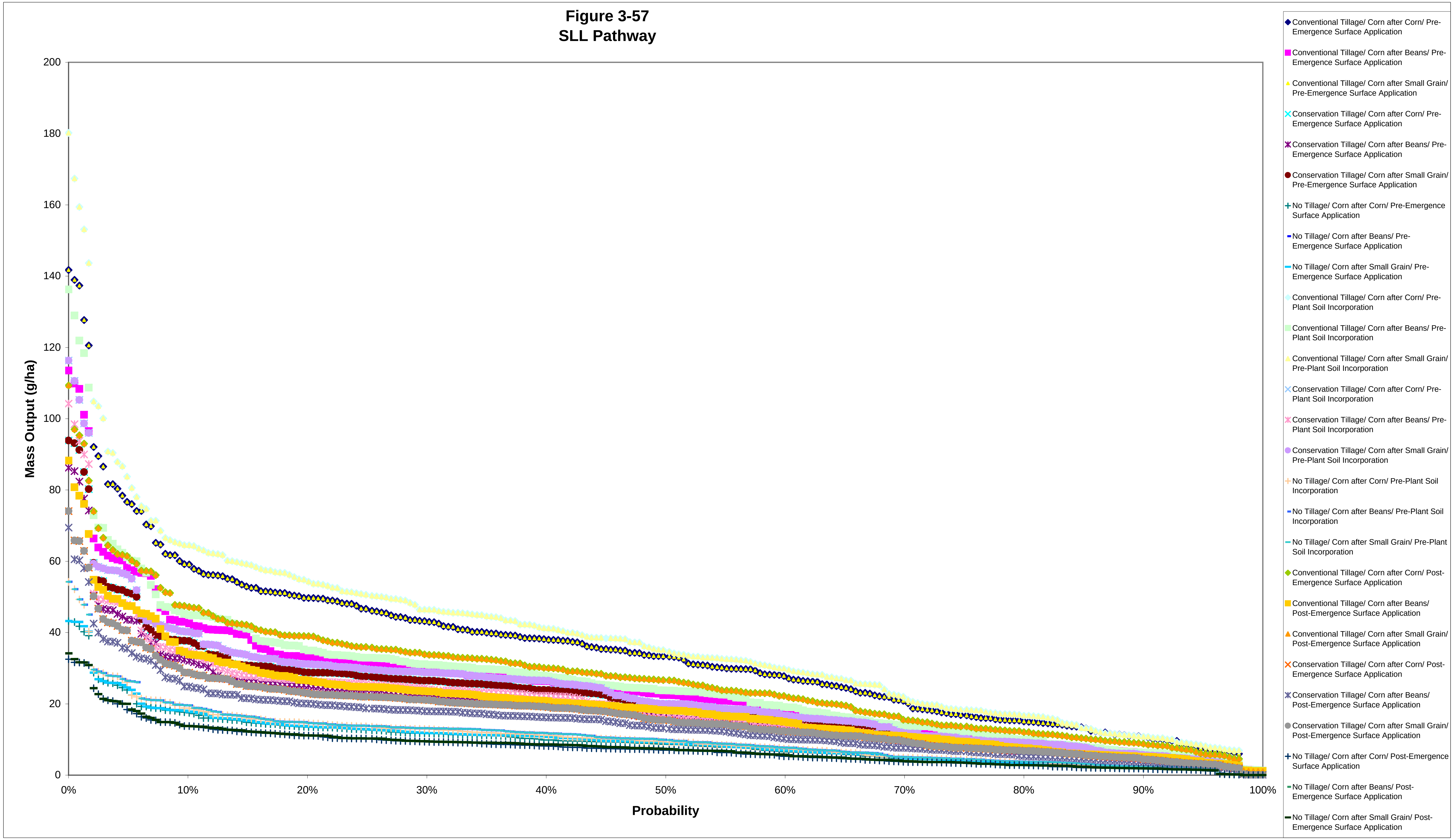


Figure 3-57
SLL Pathway

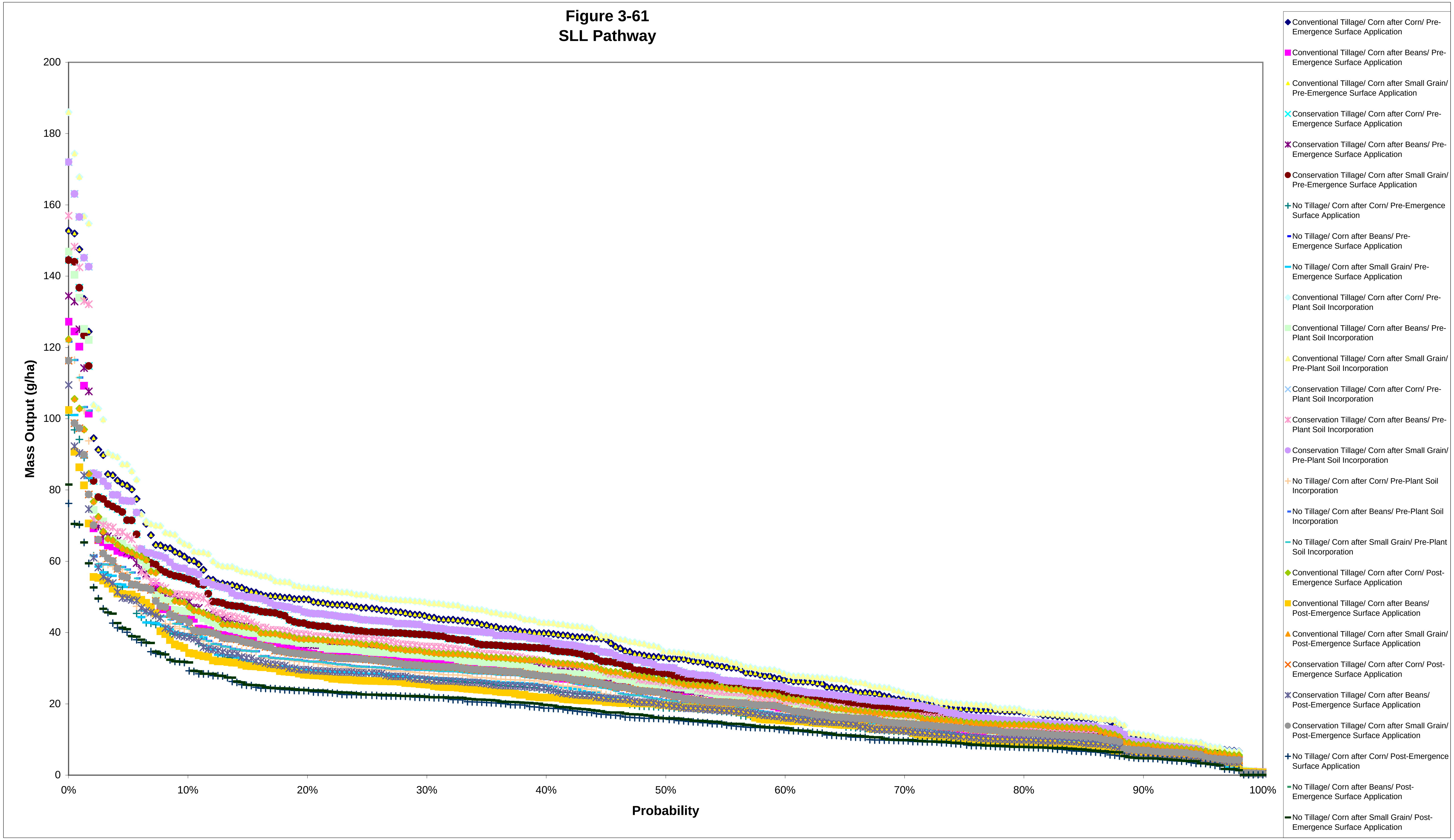


Figure 3-61
SLL Pathway

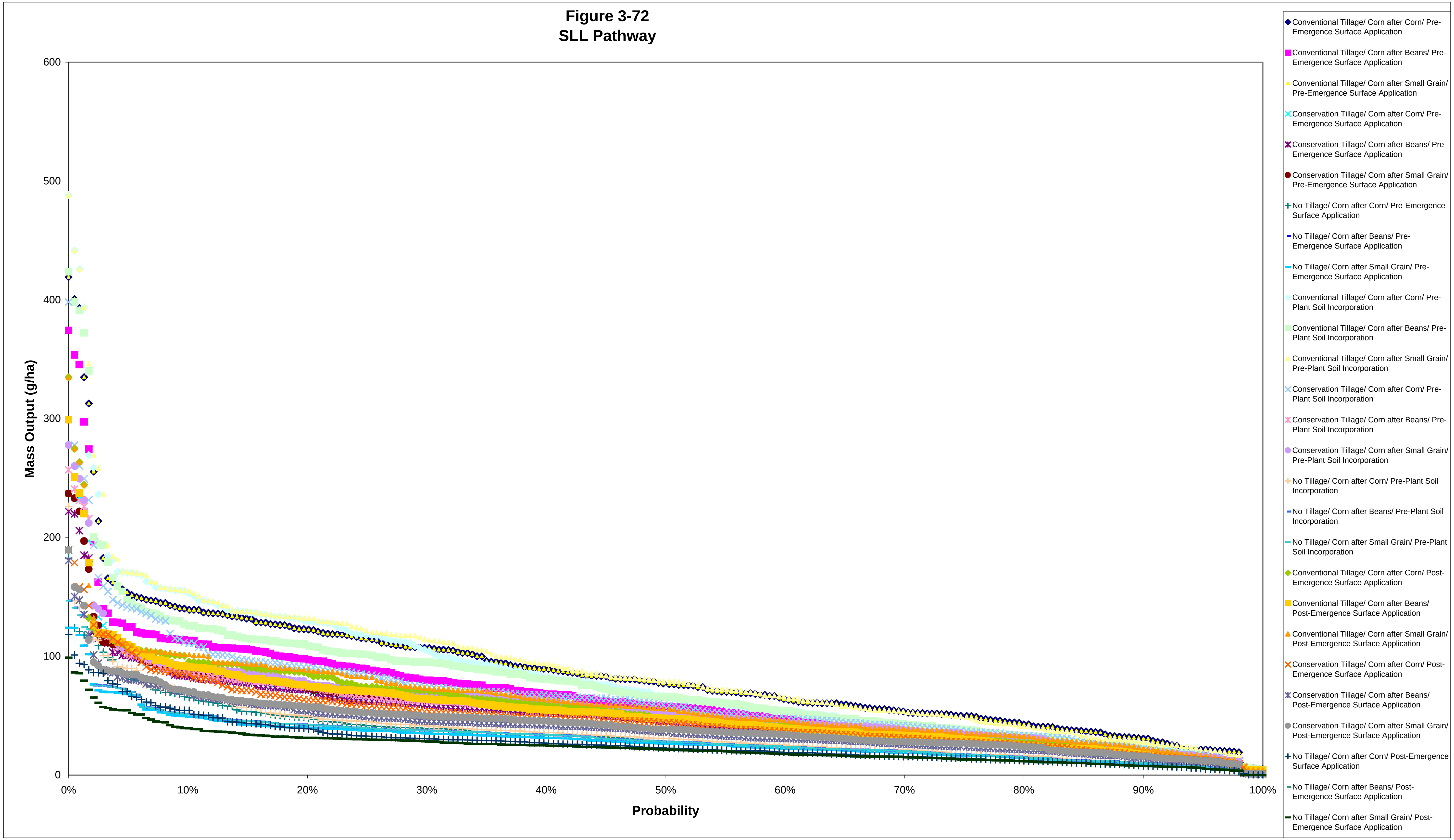


Figure 3-72
SLL Pathway

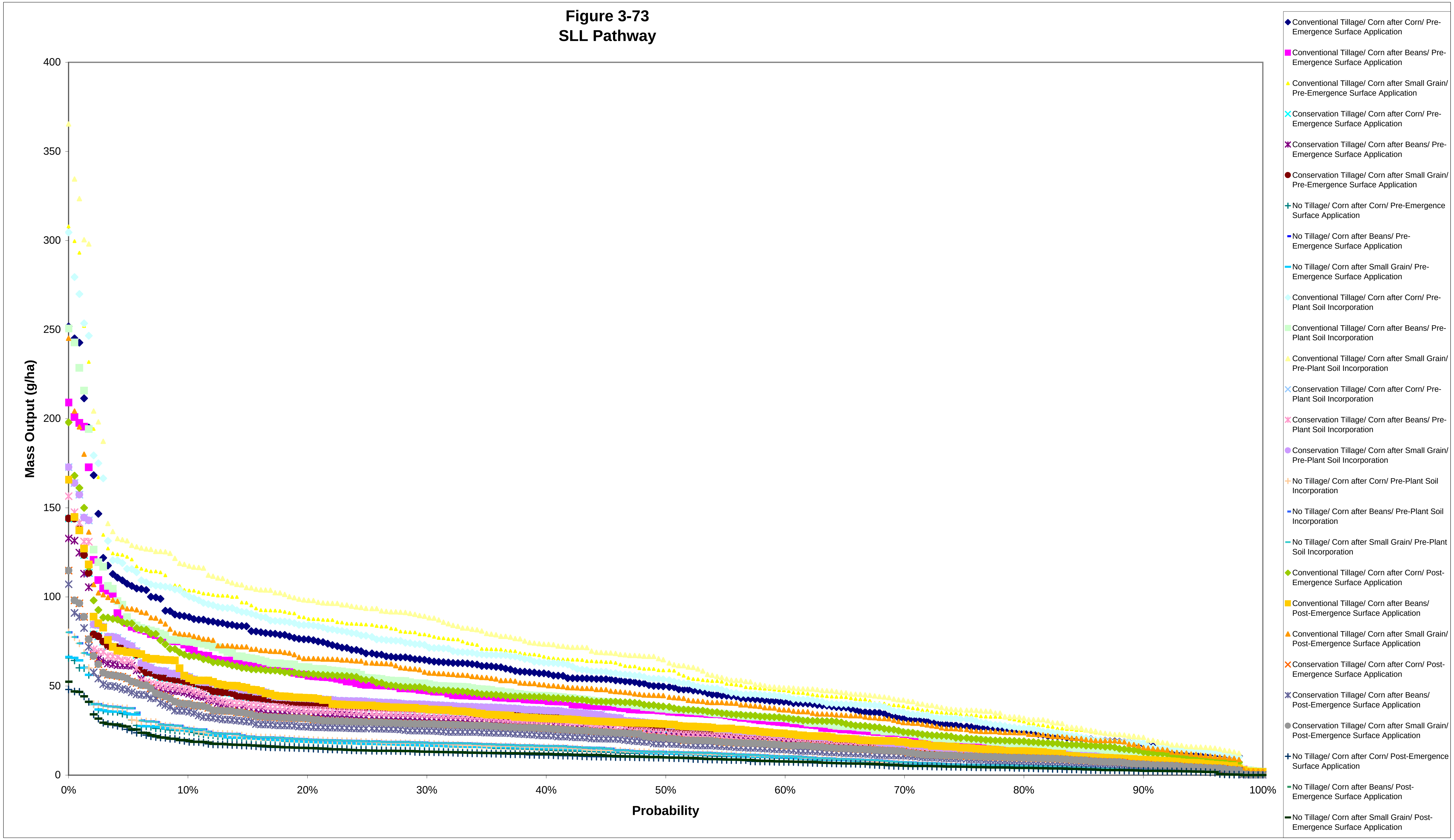


Figure 3-73
SLL Pathway

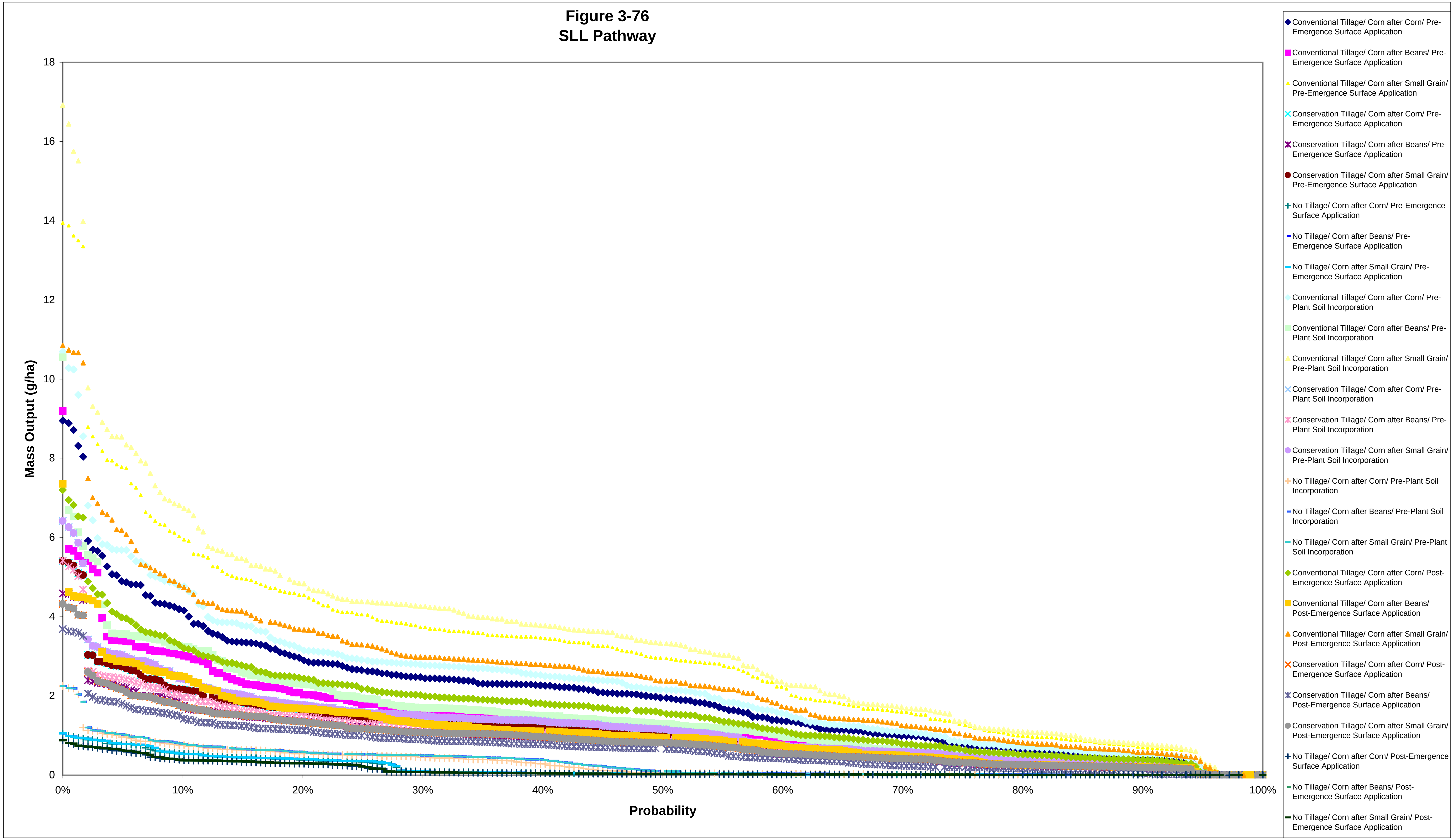


Figure 3-76
SLL Pathway

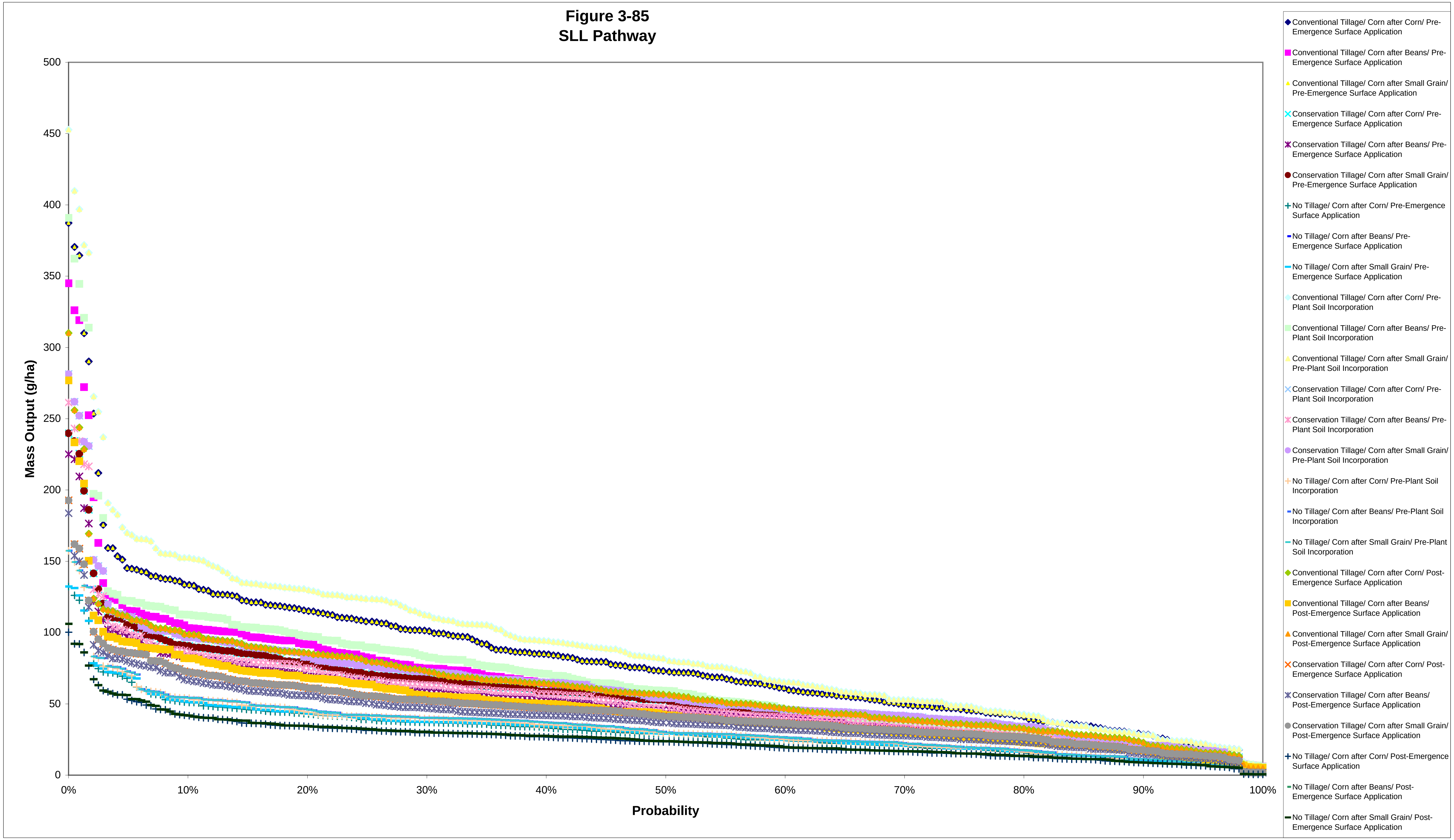


Figure 3-85
SLL Pathway

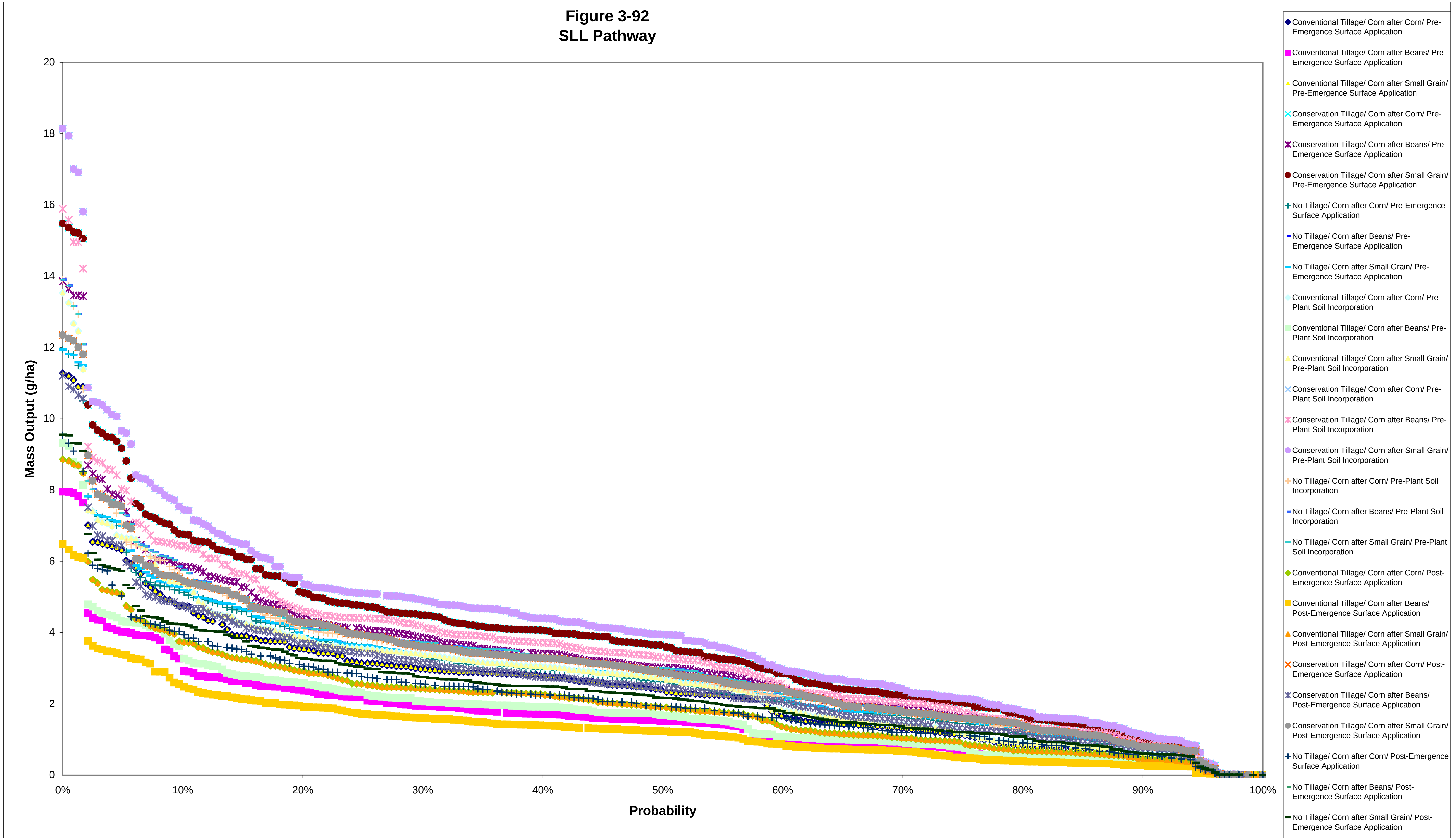


Figure 3-92
SLL Pathway

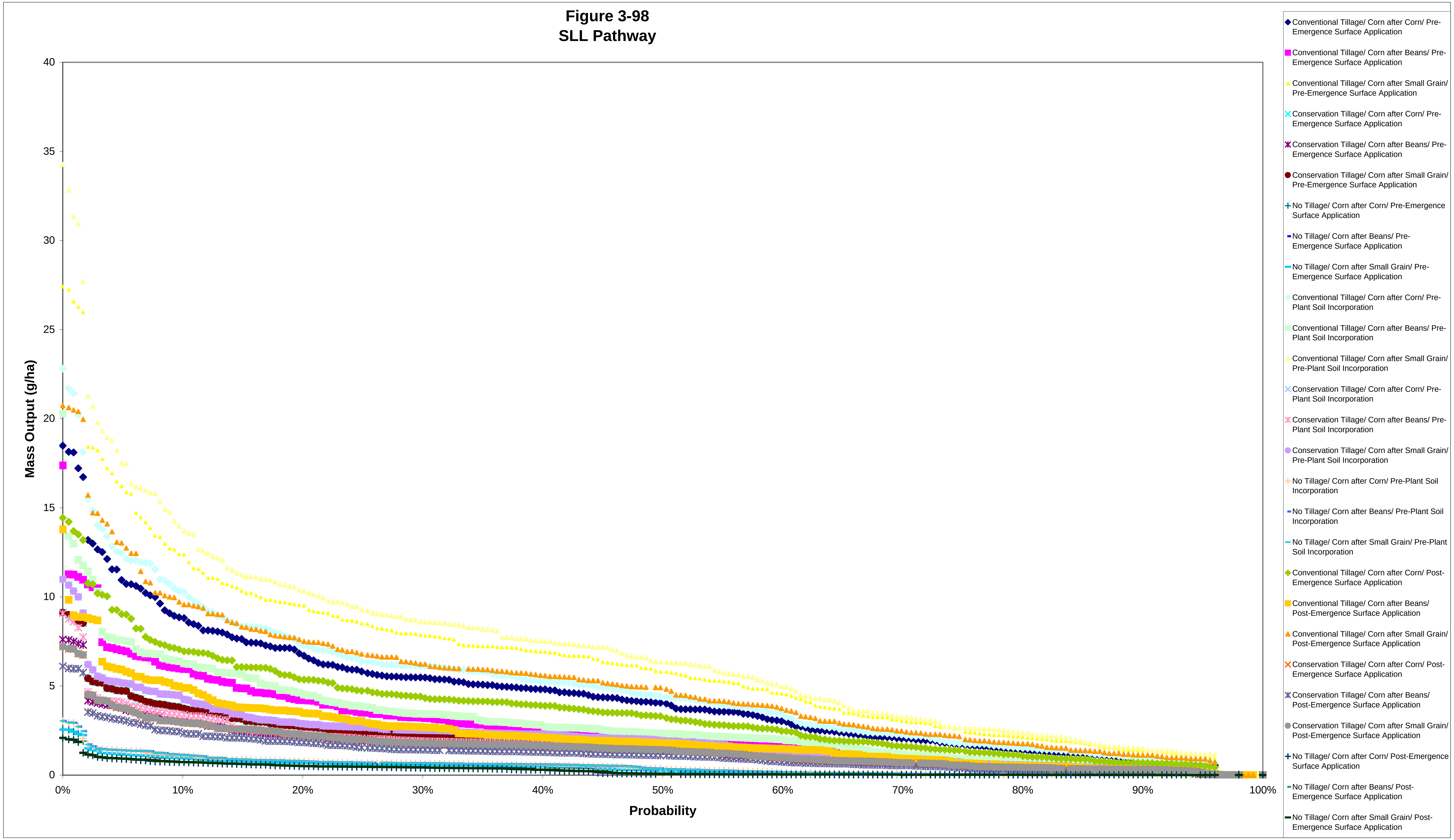


Figure 3-98
SLL Pathway

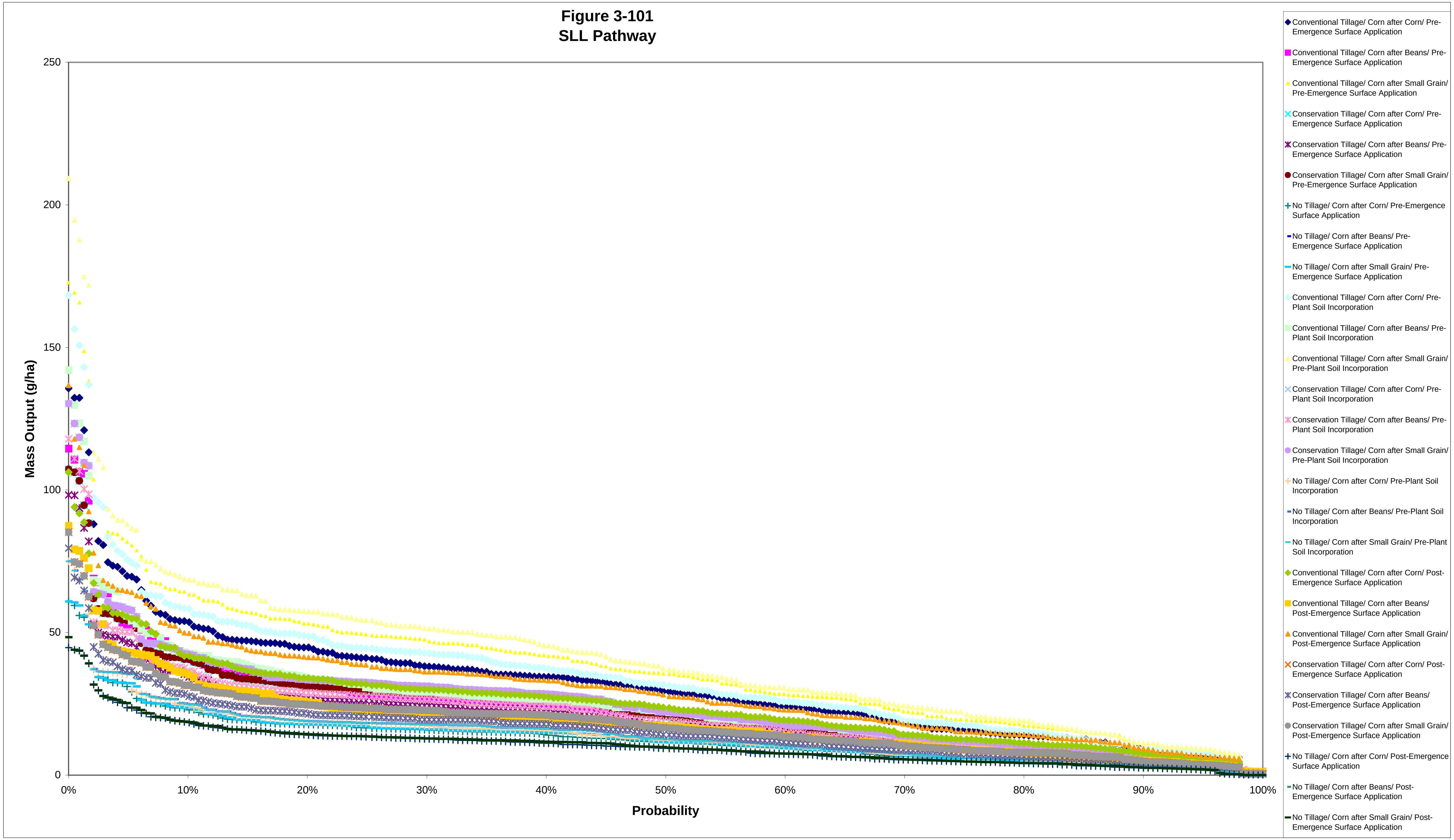


Figure 3-101
SLL Pathway

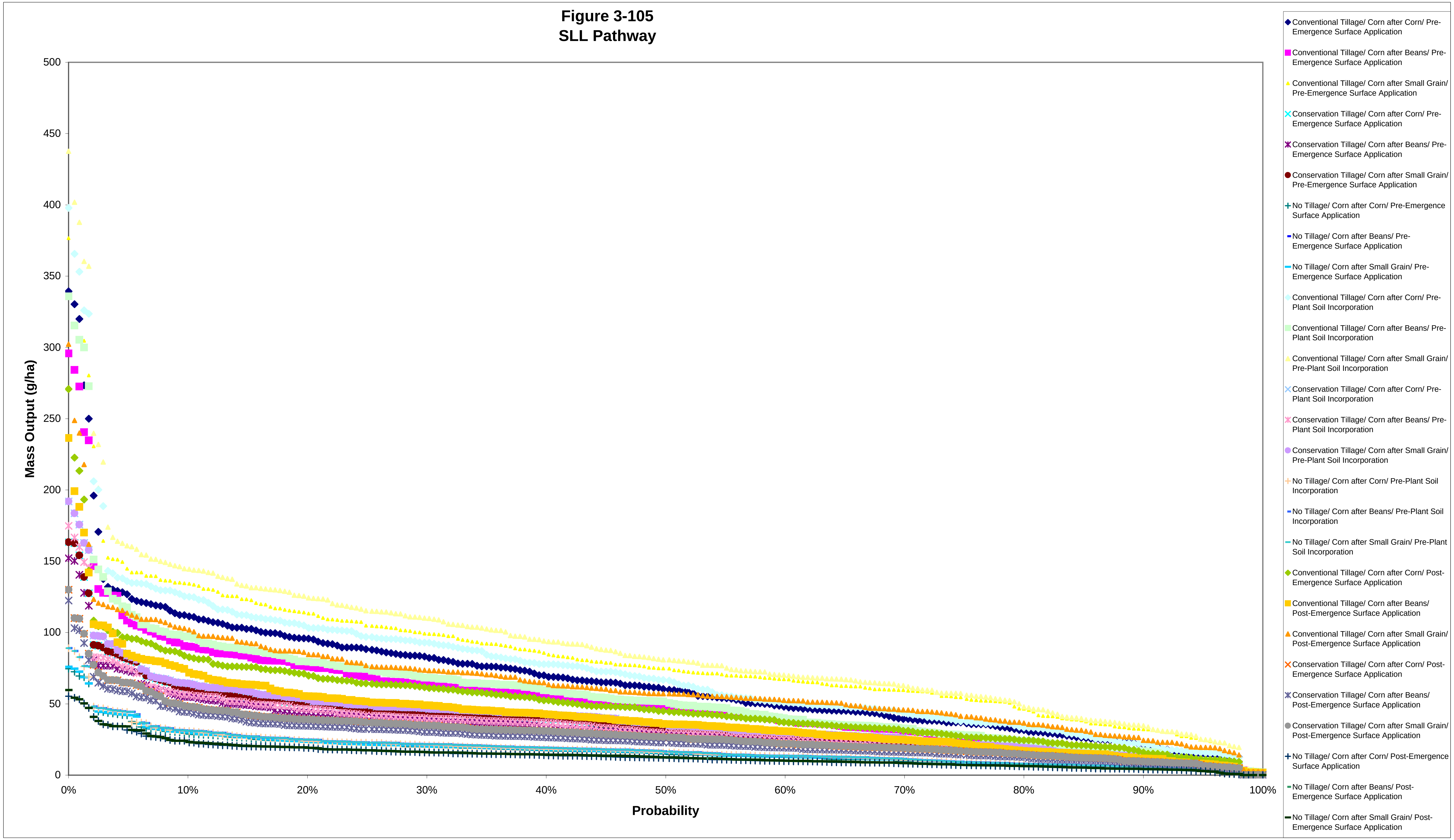


Figure 3-105
SLL Pathway

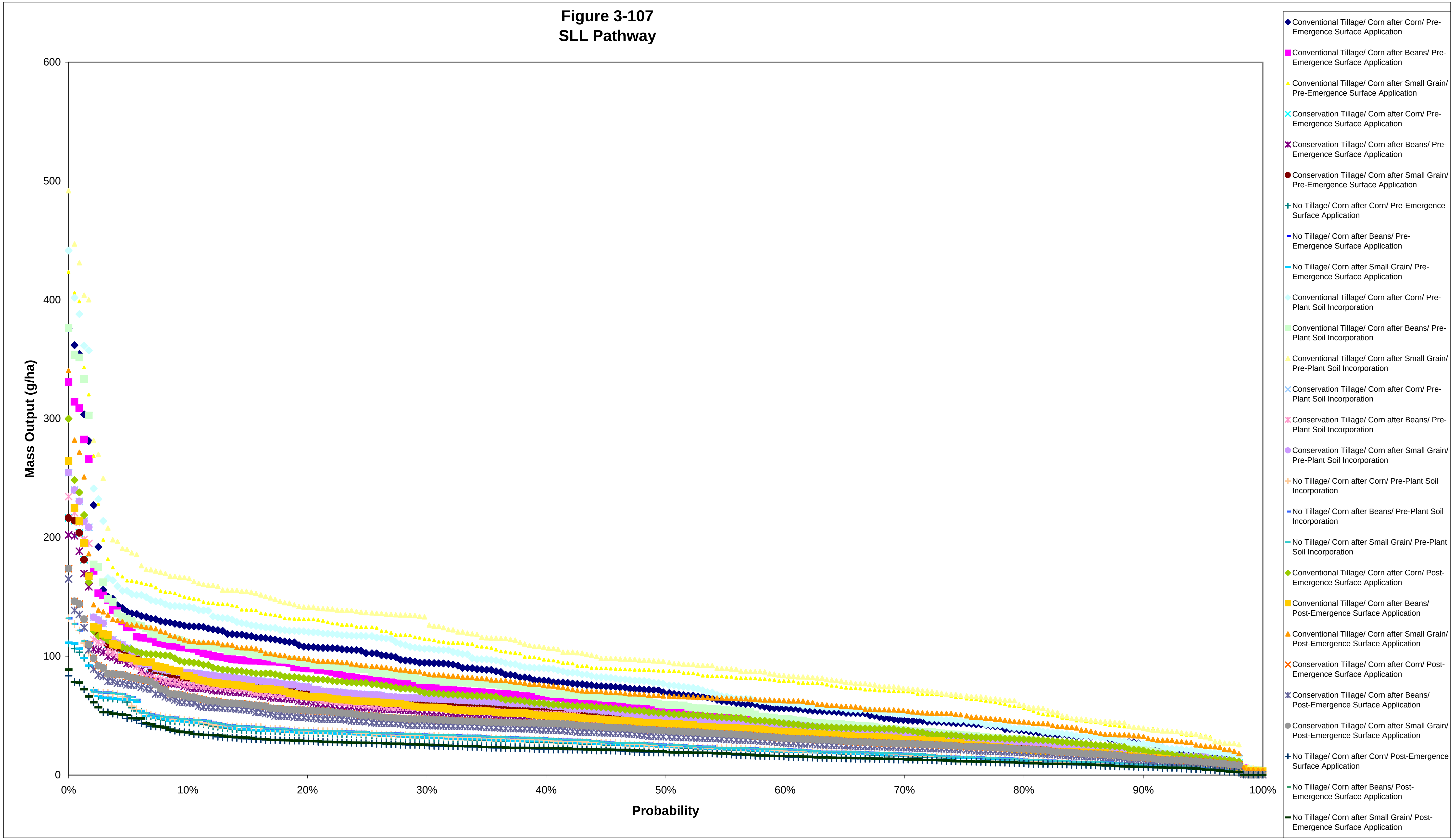
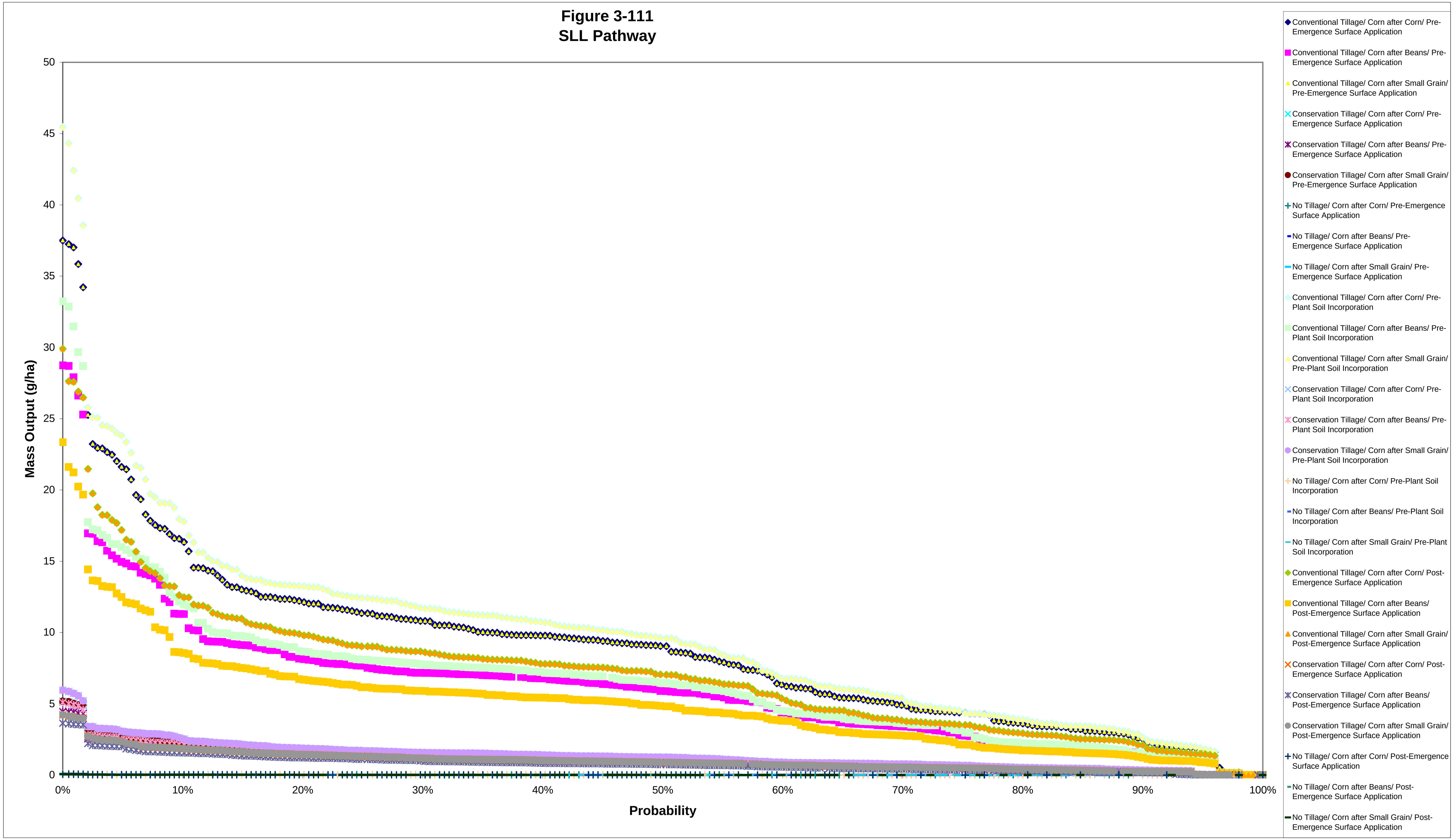


Figure 3-107
SLL Pathway

Figure 3-111
SLL Pathway



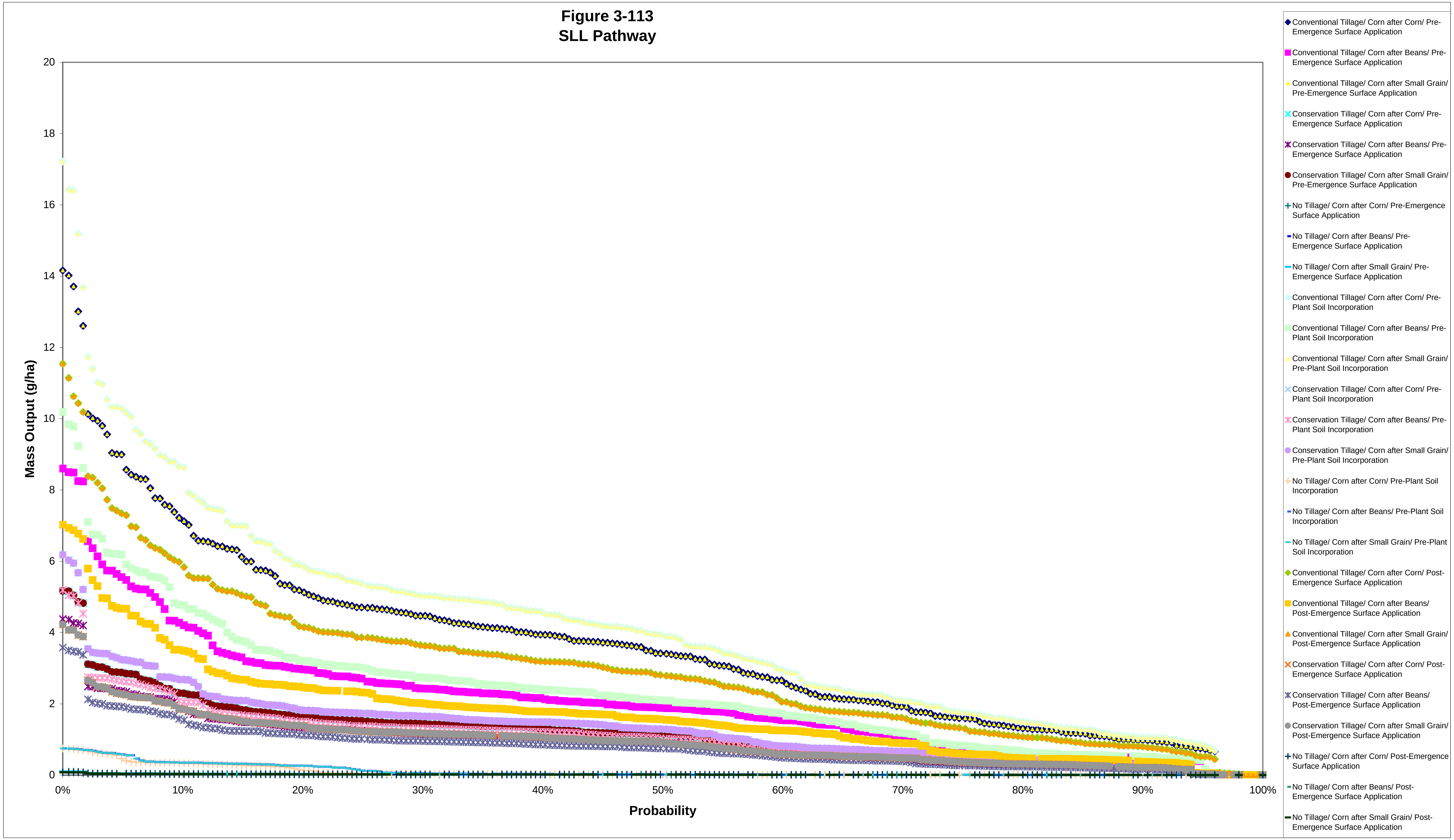
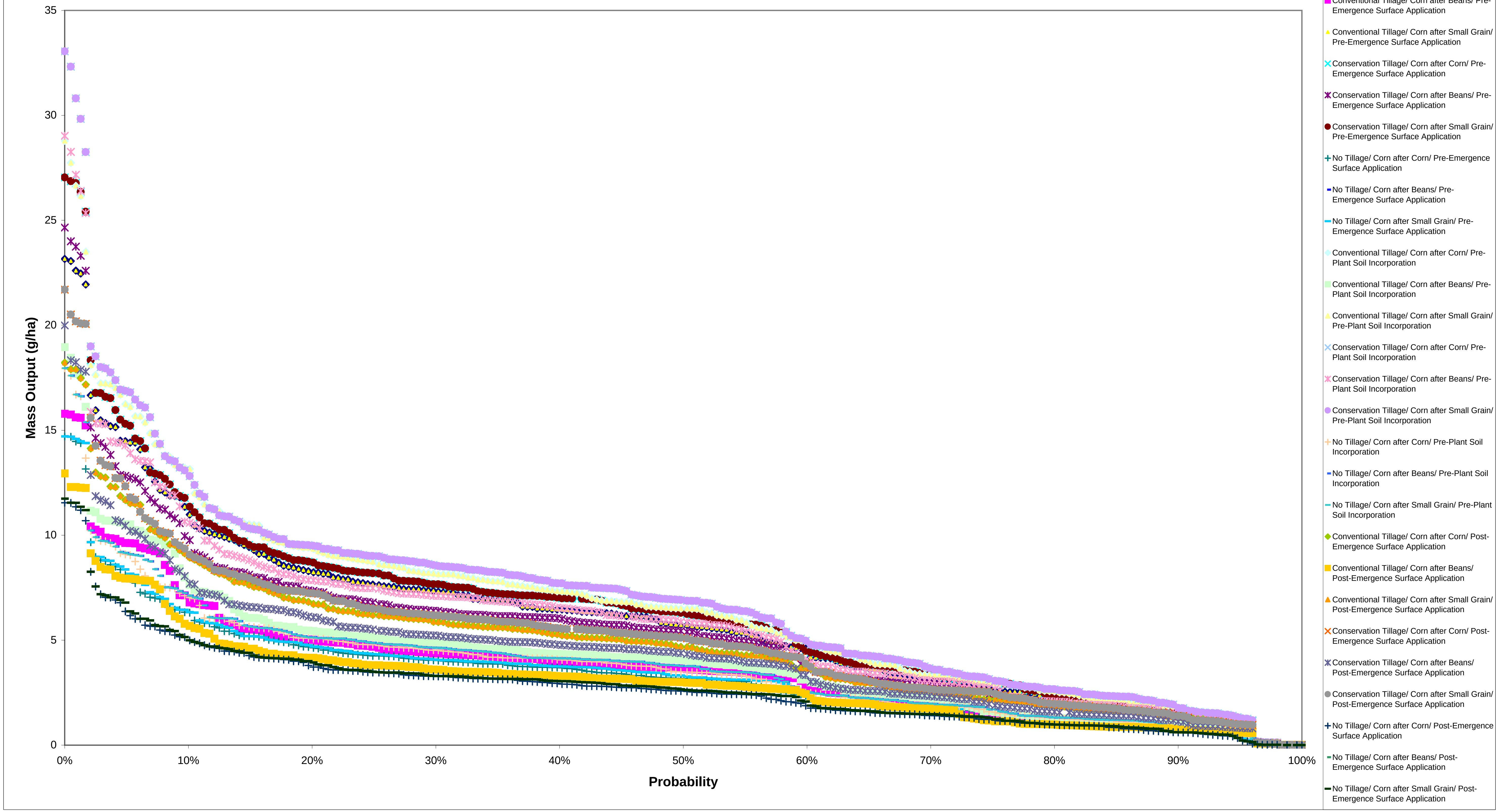


Figure 3-113
SLL Pathway

Figure 3-114
SLL Pathway



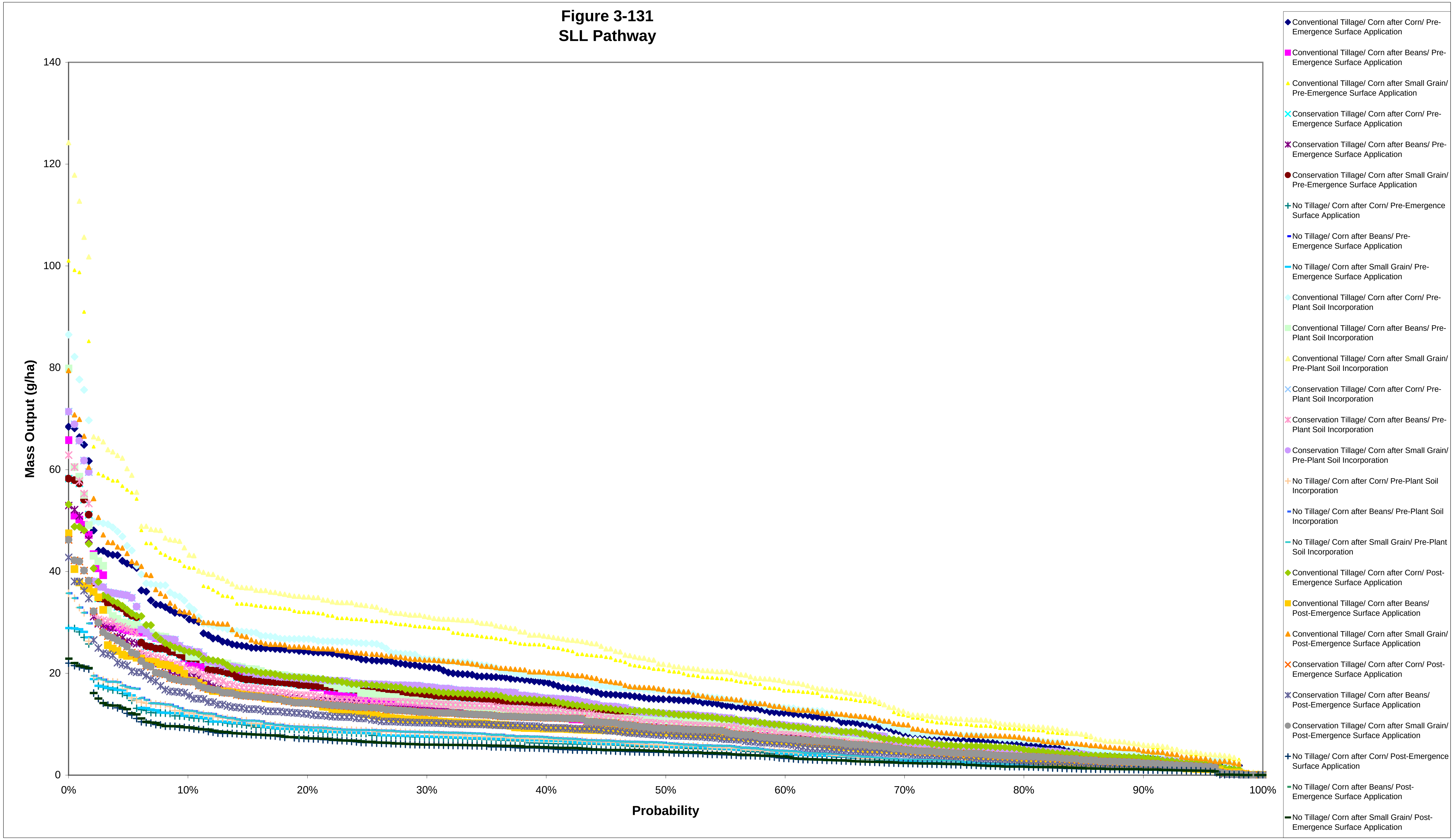


Figure 3-131
SLL Pathway

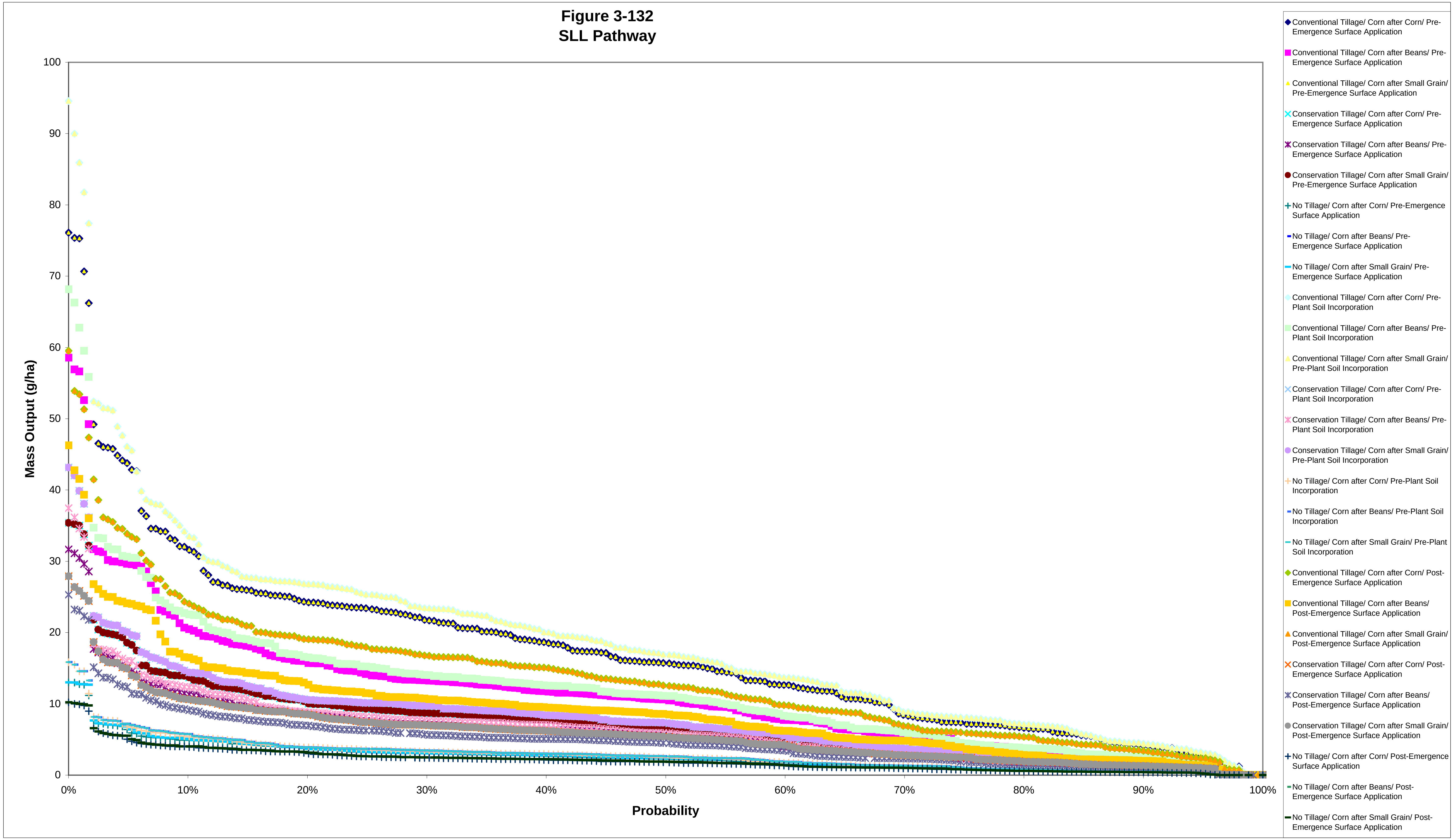


Figure 3-132
SLL Pathway

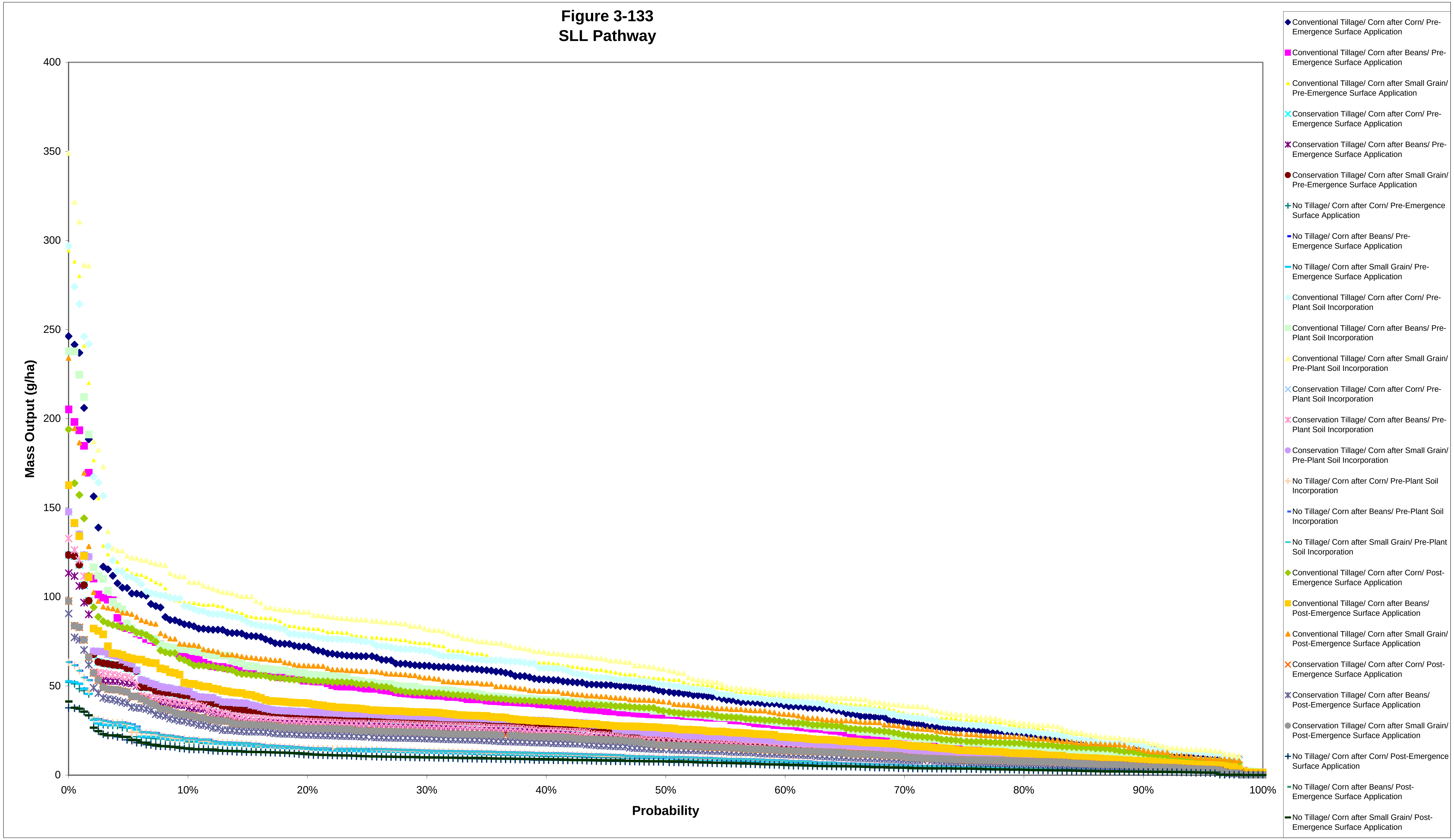


Figure 3-133
SLL Pathway

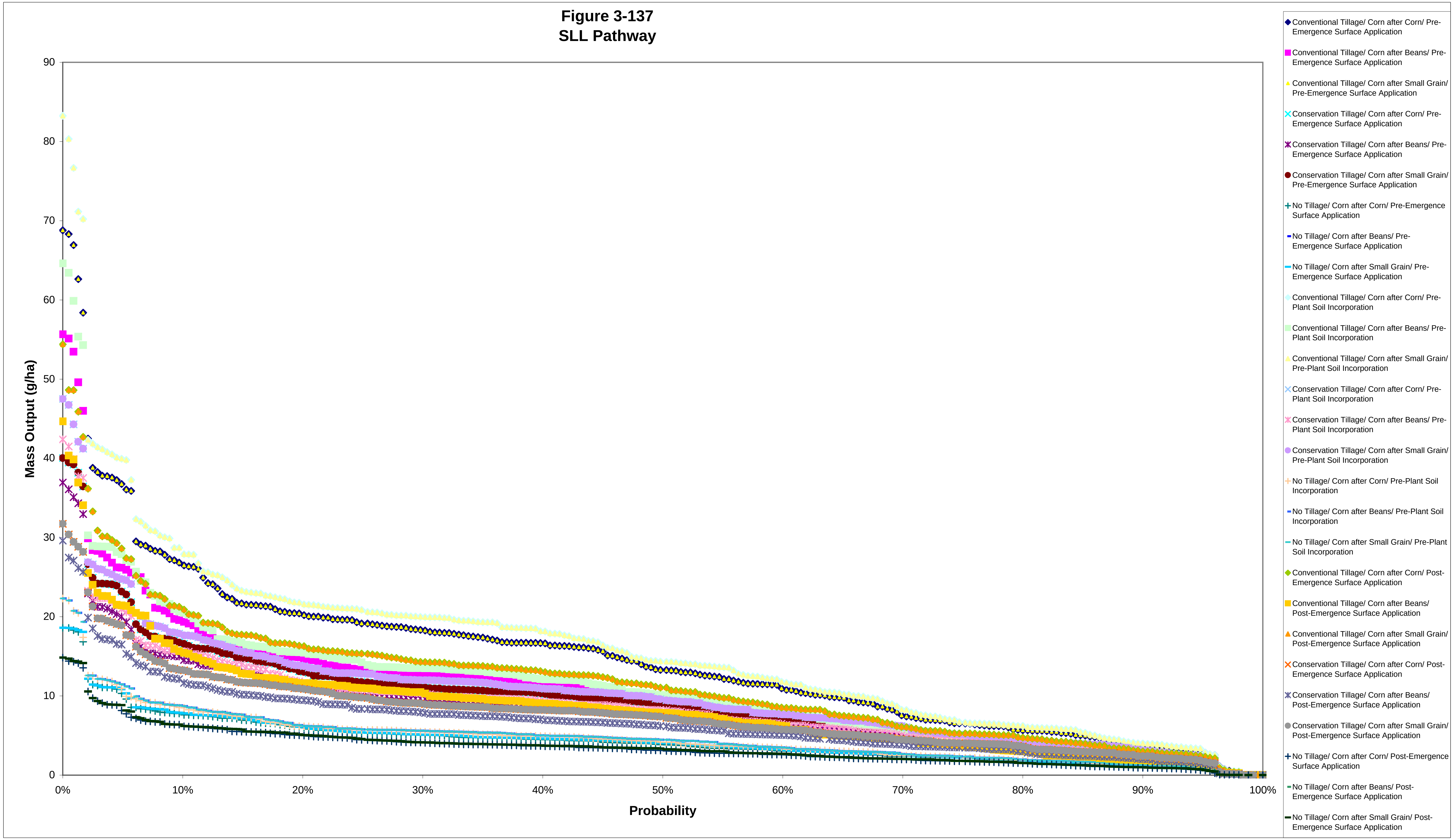


Figure 3-137
SLL Pathway

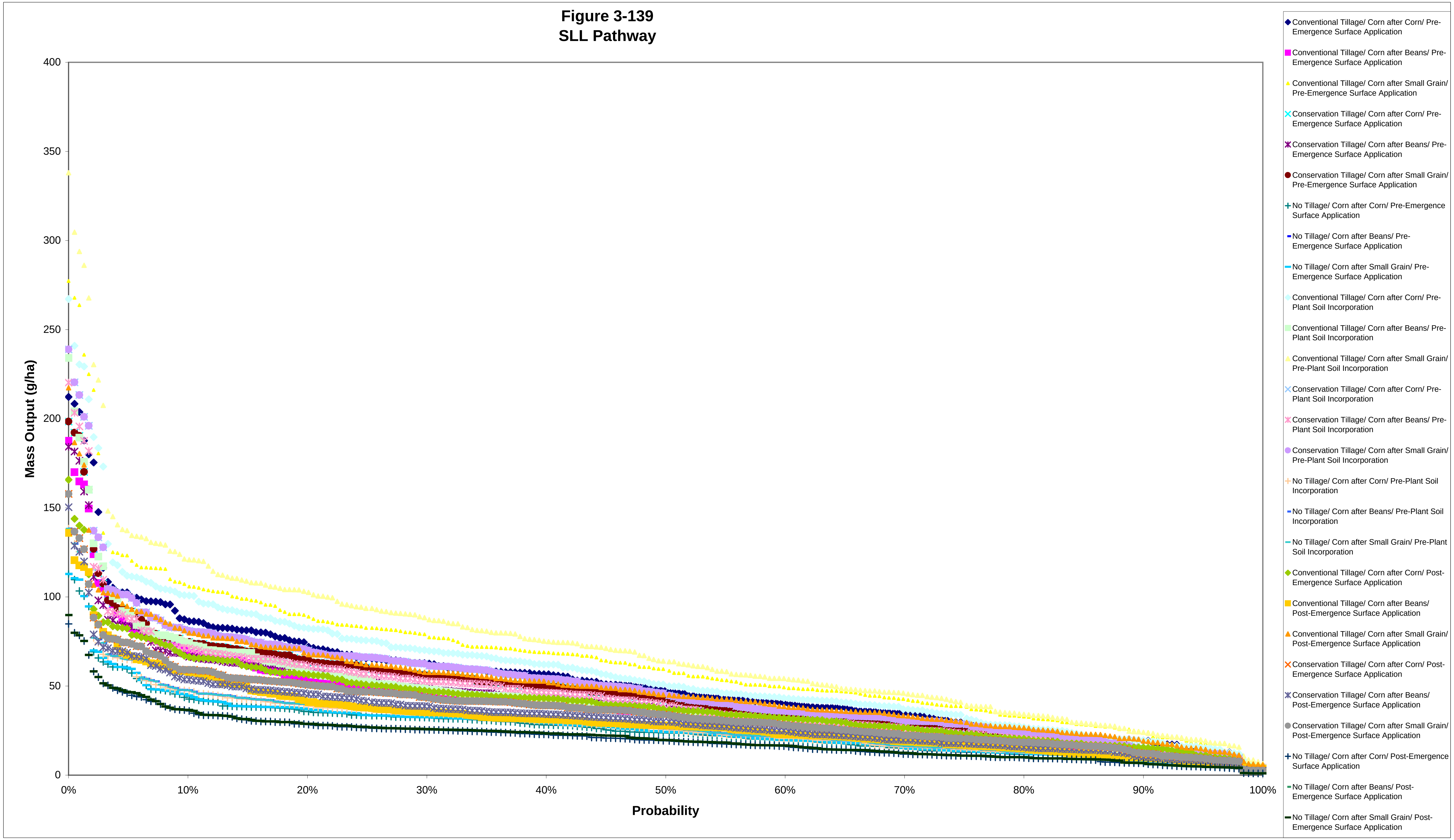


Figure 3-139
SLL Pathway

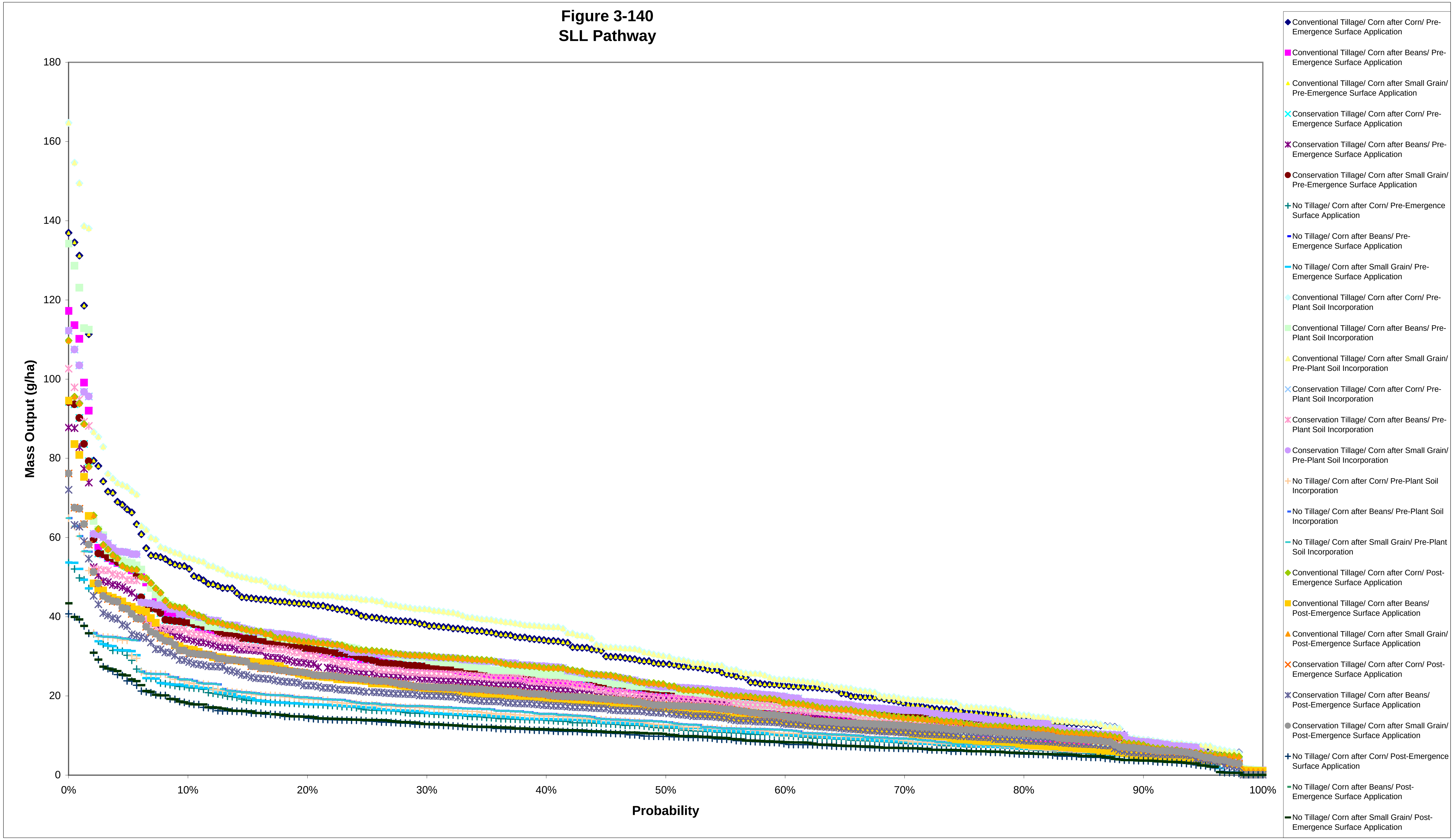


Figure 3-140
SLL Pathway

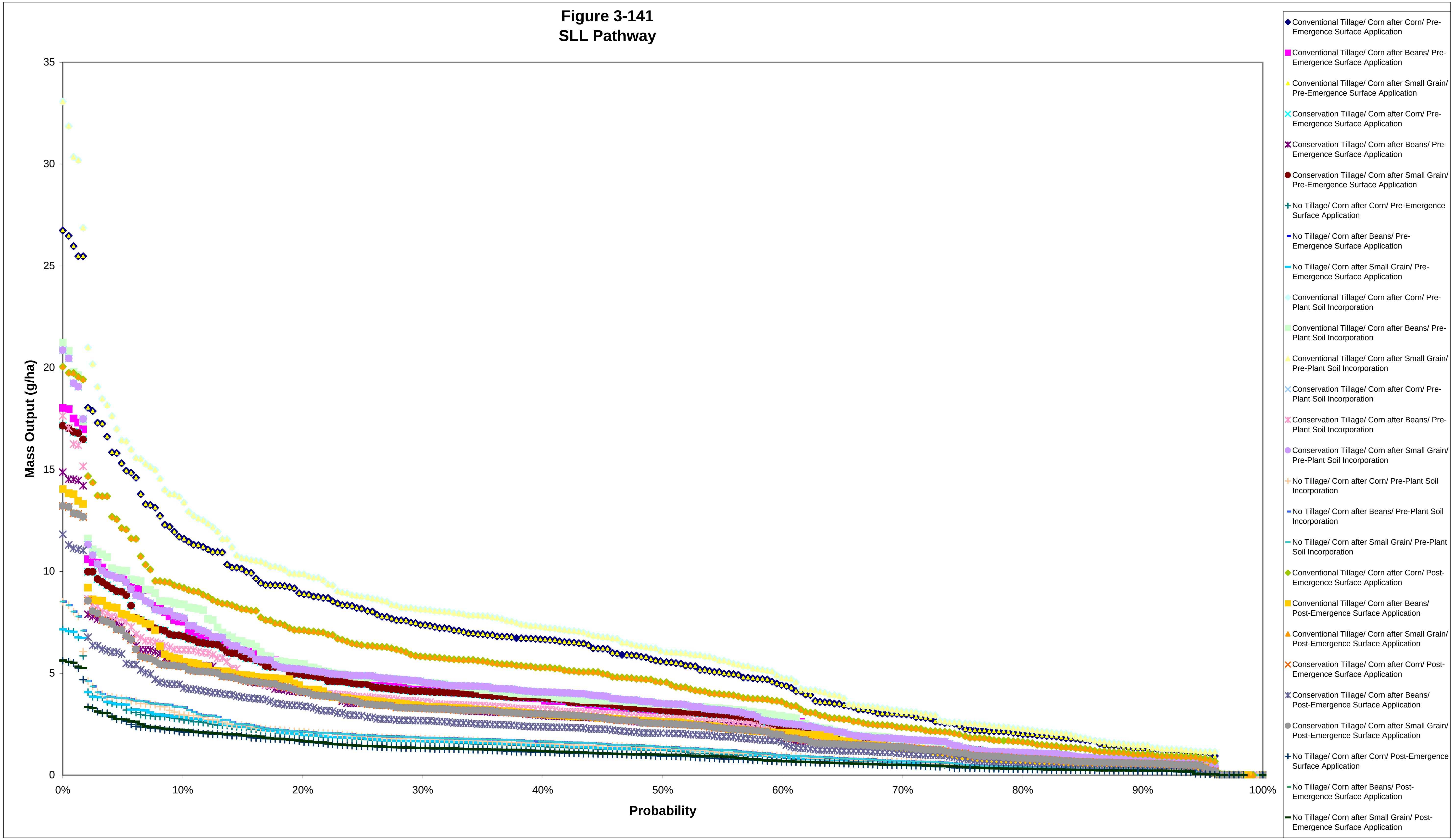


Figure 3-141
SLL Pathway

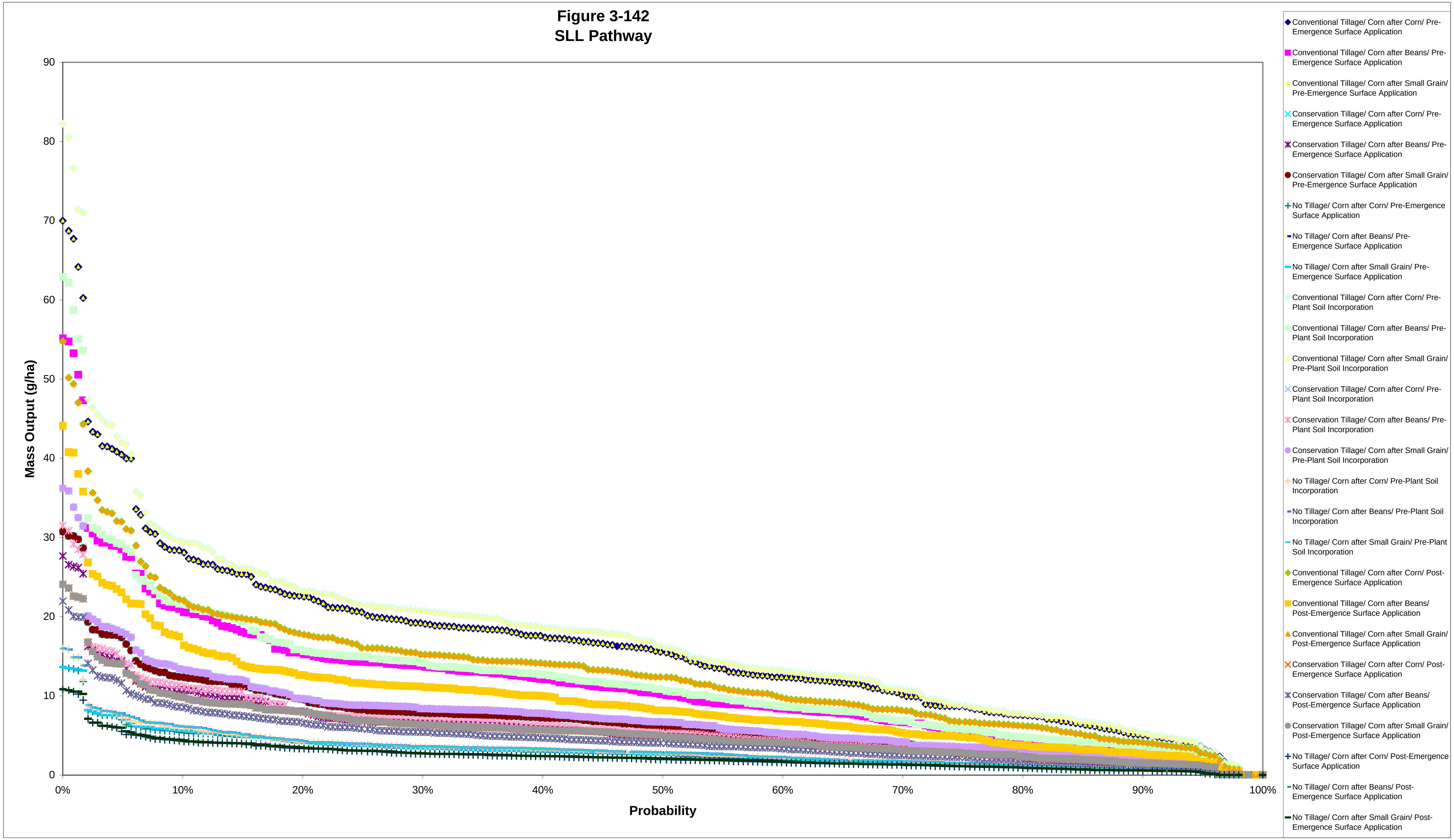


Figure 3-142
SLL Pathway

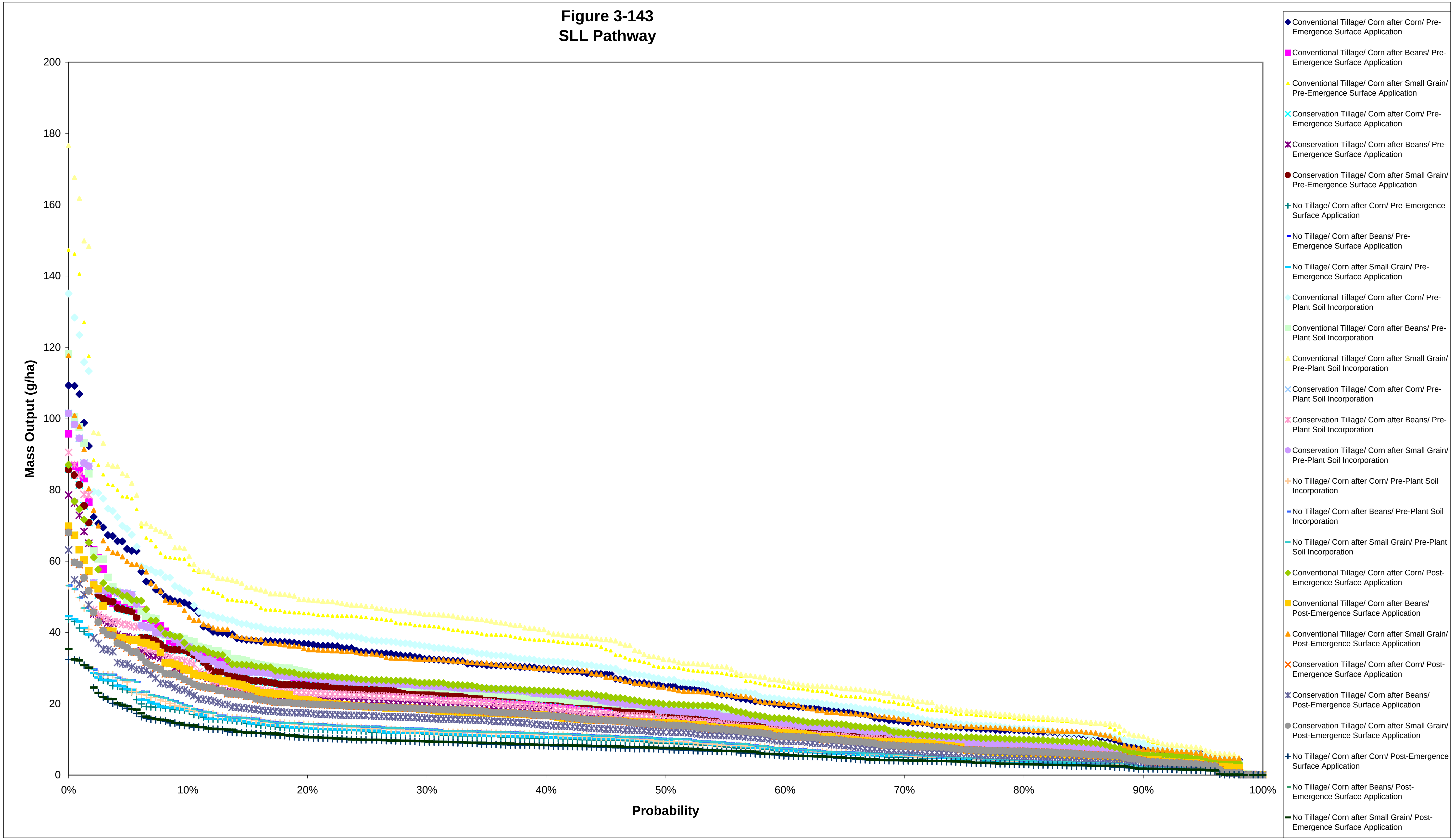


Figure 3-143
SLL Pathway

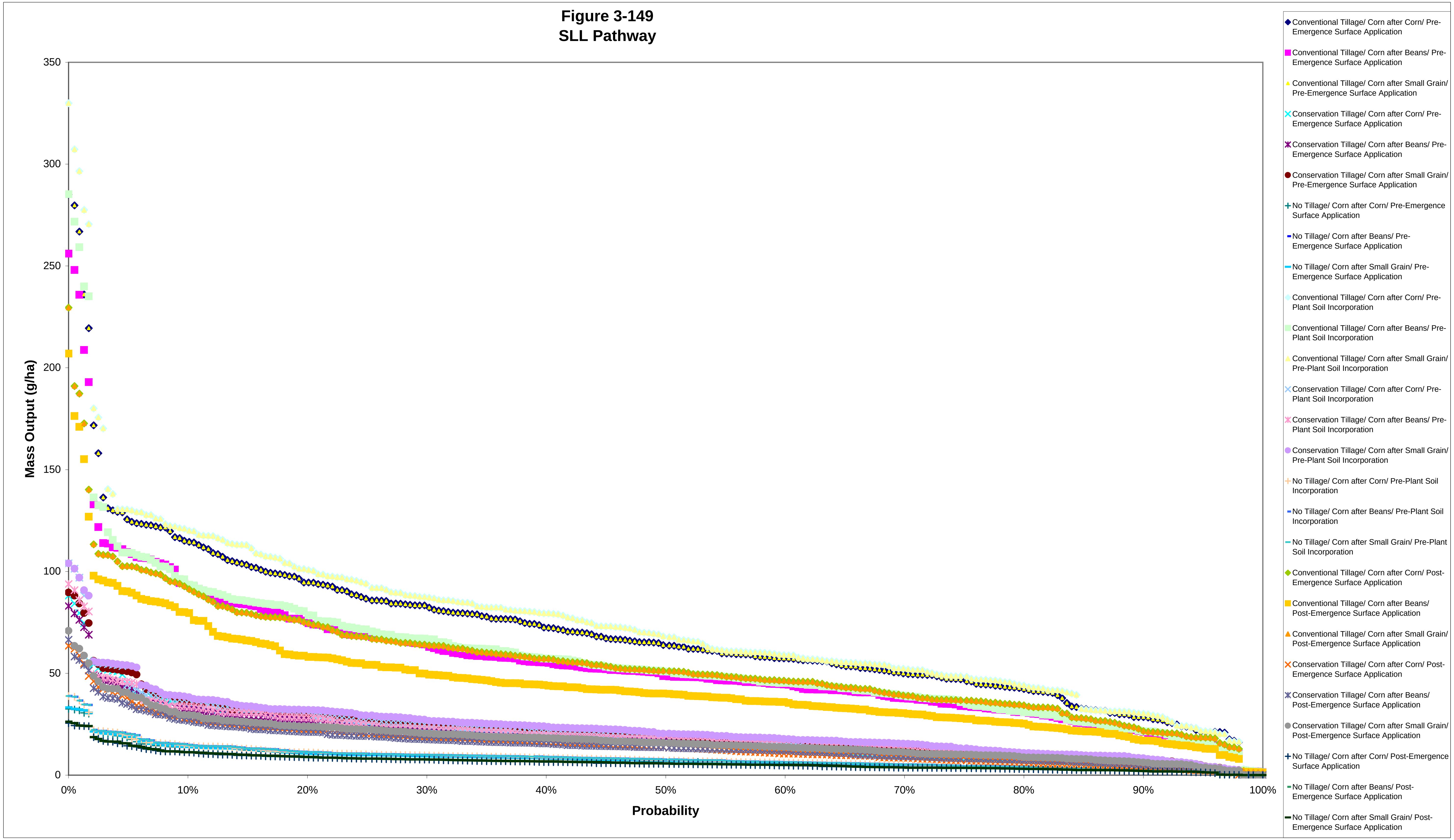


Figure 3-149
SLL Pathway

Table 1-6

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	16.87	99.01	0.52	98.48	185.59	13.62	11.99	26.12
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	17.33	103.88	0.51	103.36	193.44	13.91	12.73	26.80
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.37	104.33	0.51	103.82	195.66	13.99	12.73	26.96
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	20.86	119.42	0.60	118.82	330.38	18.18	14.74	32.78
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	21.44	120.63	0.61	120.03	345.25	18.58	15.01	33.61
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	21.50	121.12	0.61	120.51	350.00	18.71	15.09	33.63
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.26	148.25	0.49	147.76	354.62	18.83	15.83	35.81
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	25.73	156.17	0.48	155.69	413.93	20.35	17.42	40.23
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	25.91	157.73	0.48	157.25	419.49	20.48	17.60	40.29
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	29.27	175.25	0.60	174.66	649.34	25.48	20.07	46.12
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	30.69	195.40	0.61	194.79	999.34	31.61	20.32	48.92
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	32.81	187.91	0.80	187.11	772.50	27.79	22.47	51.95
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	33.05	189.38	0.81	188.57	786.00	28.04	22.65	52.06
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	33.95	201.55	5.06	196.49	690.93	26.29	22.74	50.52
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	34.68	204.06	0.59	203.47	1,124.83	33.54	23.10	53.66
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	34.86	204.61	0.60	204.00	1,157.02	34.01	23.42	53.88
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	42.93	234.85	5.17	229.68	912.28	30.20	28.61	63.58
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	43.19	244.79	4.49	240.31	1,292.57	35.95	28.26	66.58
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	45.09	273.66	3.75	269.91	1,776.06	42.14	29.23	71.24
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	45.60	272.23	3.78	268.46	1,146.52	33.86	31.34	70.15
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	56.21	288.43	4.62	283.81	1,840.11	42.90	37.70	84.64
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	59.85	334.11	4.09	330.02	2,497.79	49.98	40.66	95.52
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	60.09	337.23	3.88	333.35	2,345.07	48.43	41.79	94.60
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	66.68	390.72	3.65	387.07	3,287.49	57.34	44.77	107.17

Table 1-8

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	13.83	76.08	0.79	75.29	144.86	12.04	9.14	21.98
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.05	79.23	0.81	78.41	147.90	12.16	9.33	22.46
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.06	79.31	0.82	78.50	148.17	12.17	9.35	22.47
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	16.49	97.88	0.70	97.18	179.33	13.39	11.92	26.02
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	16.93	88.71	0.98	87.73	240.96	15.52	11.04	26.89
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.20	88.96	0.99	87.97	246.34	15.70	11.28	27.02
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.22	89.06	0.99	88.07	247.04	15.72	11.28	27.06
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	17.59	147.74	0.74	147.00	379.55	19.48	11.68	26.72
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	17.97	102.45	0.73	101.72	208.63	14.44	13.08	27.30
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	18.00	102.73	0.73	101.99	209.79	14.48	13.09	27.34
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	19.51	146.69	0.76	145.93	418.55	20.46	12.58	29.15
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	19.53	146.94	0.76	146.19	419.78	20.49	12.59	29.19
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	20.25	109.23	0.86	108.37	313.17	17.70	13.76	31.58
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	22.21	116.62	0.90	115.72	366.59	19.15	15.24	35.37
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	22.25	116.91	0.90	116.01	368.66	19.20	15.27	35.42
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	26.32	184.21	3.43	180.78	551.83	23.49	17.57	37.93
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	28.60	137.33	5.24	132.10	394.63	19.87	20.41	41.19
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	32.41	180.13	3.68	176.46	709.14	26.63	20.93	47.82
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	32.45	180.53	3.69	176.84	711.53	26.67	20.97	47.88
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	33.10	155.07	6.64	148.42	523.56	22.88	24.40	49.41
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	33.17	155.43	6.65	148.79	526.48	22.95	24.46	49.47
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	35.28	145.67	6.20	139.48	657.18	25.64	24.60	52.65
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	41.50	167.73	6.75	160.98	903.90	30.06	28.53	63.57
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	41.58	168.08	6.77	161.31	908.53	30.14	28.59	63.65

Table 1-13

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.54	117.20	2.11	115.08	325.15	18.03	15.58	34.20
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	22.87	117.31	2.22	115.09	331.12	18.20	15.93	34.69
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	22.87	117.33	2.22	115.11	331.14	18.20	15.94	34.70
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.31	122.85	1.96	120.90	314.01	17.72	17.01	35.09
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	23.39	168.05	1.30	166.76	495.40	22.26	15.83	34.78
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	25.07	128.27	2.05	126.22	358.86	18.94	18.42	38.34
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	25.08	128.37	2.05	126.31	359.43	18.96	18.42	38.36
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	25.60	168.82	1.38	167.44	547.21	23.39	17.11	37.97
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	25.61	168.90	1.38	167.52	547.64	23.40	17.12	37.98
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	28.05	127.66	2.38	125.29	560.16	23.67	18.76	43.31
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	28.47	127.76	2.38	125.38	568.30	23.84	19.11	43.52
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	28.48	127.78	2.38	125.39	568.55	23.84	19.12	43.54
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	28.99	134.04	2.02	132.02	553.60	23.53	19.72	44.00
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	31.05	179.09	6.01	173.08	503.63	22.44	21.35	43.57
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	31.37	141.96	2.14	139.82	632.90	25.16	21.02	47.77
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	31.38	142.05	2.14	139.91	633.87	25.18	21.03	47.80
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	35.26	183.19	6.47	176.73	610.46	24.71	24.11	49.61
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	35.27	183.32	6.47	176.85	611.25	24.72	24.12	49.63
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	40.81	168.28	7.98	160.30	745.54	27.30	30.60	57.99
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	44.16	196.19	9.25	186.95	910.37	30.17	32.22	63.41
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	44.19	196.48	9.25	187.23	912.40	30.21	32.24	63.45
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	51.05	203.46	10.20	193.26	1,226.37	35.02	36.97	75.66
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	56.10	206.50	11.67	194.82	1,524.15	39.04	40.14	83.76
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	56.13	206.72	11.68	195.04	1,527.13	39.08	40.17	83.82

Table 1-18

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	23.35	125.05	0.93	124.12	350.06	18.71	16.81	36.56
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	23.85	130.61	0.98	129.63	358.17	18.93	17.19	37.29
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.89	131.00	0.98	130.02	360.88	19.00	17.21	37.33
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	29.39	148.52	1.22	147.30	613.03	24.76	19.21	46.51
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	29.60	173.57	1.51	172.07	523.05	22.87	20.78	44.80
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	30.05	148.77	1.23	147.55	628.25	25.06	19.84	47.83
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	30.10	149.18	1.23	147.95	632.92	25.16	19.88	47.88
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	32.88	181.71	1.56	180.16	605.97	24.62	22.90	49.58
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	32.94	182.06	1.56	180.50	607.98	24.66	22.96	49.64
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	37.27	228.34	1.59	226.75	1,225.20	35.00	24.38	60.17
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	37.41	194.91	6.50	188.41	722.45	26.88	24.81	55.64
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	37.45	199.08	1.72	197.36	941.96	30.69	24.85	57.33
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	41.96	213.77	1.79	211.97	1,113.03	33.36	28.11	64.44
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	42.04	214.09	1.80	212.30	1,117.81	33.43	28.15	64.52
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	42.08	226.41	1.64	224.77	1,402.48	37.45	27.97	66.58
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	42.13	226.53	1.64	224.89	1,406.44	37.50	27.98	66.65
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	46.96	229.41	7.28	222.13	962.40	31.02	32.16	69.72
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	47.44	269.71	4.84	264.87	1,713.56	41.40	30.80	73.29
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	47.81	229.82	5.76	224.07	1,306.69	36.15	31.08	73.15
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	49.82	272.46	5.71	266.74	1,216.76	34.88	34.04	74.53
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	61.68	275.08	6.68	268.40	1,875.70	43.31	40.89	92.48
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	62.07	314.20	5.79	308.41	2,384.53	48.83	42.71	94.30
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	65.63	331.57	5.94	325.63	2,441.62	49.41	45.13	100.35
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	70.99	387.46	5.13	382.33	3,377.84	58.12	49.11	114.36

Table 1-20

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	44.04	225.53	3.70	221.83	884.40	29.74	31.20	68.06
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	44.86	234.44	3.70	230.74	897.08	29.95	32.03	68.11
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	44.88	234.77	3.70	231.07	898.36	29.97	32.05	68.16
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	54.41	301.07	6.82	294.25	1,401.58	37.44	38.04	81.11
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	54.69	282.48	4.23	278.25	1,574.23	39.68	38.69	83.22
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	55.76	282.72	4.23	278.49	1,606.96	40.09	39.12	84.19
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	55.79	283.06	4.23	278.83	1,609.73	40.12	39.12	84.23
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	57.41	326.24	13.36	312.89	1,686.27	41.06	39.31	81.61
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	59.41	313.13	6.95	306.19	1,519.86	38.99	42.72	89.60
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	59.44	313.34	6.95	306.39	1,521.36	39.00	42.74	89.64
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	68.38	362.42	7.72	354.70	2,581.78	50.81	47.85	104.06
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	69.41	365.65	13.56	352.09	2,002.94	44.75	49.75	97.94
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	73.12	405.36	7.45	397.91	3,391.33	58.24	49.59	115.98
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	73.62	401.79	14.52	387.28	3,317.38	57.60	50.16	105.90
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	73.90	411.77	13.27	398.50	2,516.90	50.17	54.17	105.11
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	75.25	382.10	7.93	374.17	2,894.25	53.80	52.66	116.30
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	75.30	382.29	7.93	374.36	2,897.74	53.83	52.68	116.35
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	79.01	454.60	13.87	440.72	4,420.24	66.48	52.41	120.91
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	81.17	428.97	7.59	421.38	3,863.10	62.15	55.59	129.26
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	81.20	429.04	7.59	421.45	3,867.01	62.19	55.62	129.29
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	91.40	452.26	14.76	437.50	4,323.80	65.76	65.47	134.20
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	98.01	508.79	14.81	493.98	5,462.29	73.91	68.92	151.75
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	100.22	524.42	14.29	510.13	6,097.30	78.09	67.27	156.52
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	109.98	584.29	14.66	569.63	7,766.57	88.13	74.43	177.84

Table 1-21

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.56	131.20	0.53	130.67	320.81	17.91	15.92	35.15
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	23.04	137.77	0.52	137.25	328.23	18.12	16.39	35.28
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.05	138.07	0.52	137.56	329.01	18.14	16.37	35.28
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	28.03	163.68	0.59	163.09	566.76	23.81	19.56	44.07
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	28.66	163.94	0.60	163.35	583.09	24.15	20.18	44.68
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	28.68	164.26	0.60	163.67	584.71	24.18	20.21	44.71
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	31.74	199.50	1.62	197.88	631.37	25.13	21.74	49.63
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	35.24	209.53	1.60	207.92	720.22	26.84	24.28	54.23
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	35.27	209.74	1.60	208.13	721.25	26.86	24.31	54.27
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	39.86	238.76	1.83	236.93	1,146.81	33.86	28.05	62.37
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	41.33	258.56	6.28	252.28	1,025.18	32.02	27.26	61.07
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	42.46	264.50	1.76	262.74	1,604.86	40.06	28.72	69.71
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	44.67	254.79	1.83	252.96	1,341.23	36.62	31.06	70.11
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	44.70	254.99	1.83	253.16	1,343.55	36.65	31.09	70.23
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	48.03	285.15	1.77	283.38	1,850.80	43.02	33.19	76.34
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	48.06	285.22	1.77	283.45	1,854.14	43.06	33.20	76.36
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	52.42	294.38	6.48	287.90	1,330.60	36.48	36.60	77.69
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	52.45	294.49	6.49	288.00	1,331.39	36.49	36.64	77.71
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	52.75	316.88	6.24	310.64	1,937.15	44.01	34.95	80.43
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	55.71	356.61	5.56	351.05	2,619.15	51.18	35.34	89.22
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	68.84	363.77	6.42	357.35	2,762.44	52.56	48.03	105.75
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	68.88	363.86	6.43	357.43	2,764.09	52.57	48.05	105.76
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	74.85	424.44	5.95	418.49	3,826.09	61.86	51.28	119.83
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	74.88	424.49	5.96	418.53	3,829.44	61.88	51.29	119.85

Table 1-23

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	23.22	113.77	0.28	113.49	279.51	16.72	17.60	35.41
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	23.77	119.66	0.28	119.38	283.99	16.85	17.69	35.96
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.78	119.71	0.28	119.43	284.08	16.85	17.70	35.96
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	28.55	145.46	0.32	145.14	463.20	21.52	21.98	43.28
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	29.25	145.58	0.32	145.27	474.00	21.77	22.19	43.73
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	29.26	145.64	0.32	145.32	474.27	21.78	22.20	43.74
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	40.01	211.33	1.47	209.86	755.78	27.49	31.17	57.75
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	44.50	220.51	1.56	218.95	828.61	28.79	34.20	64.68
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	44.50	220.59	1.56	219.02	828.76	28.79	34.20	64.69
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	49.64	252.85	1.77	251.08	1,293.03	35.96	37.83	73.66
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	53.18	287.09	1.71	285.38	1,668.97	40.85	40.73	81.65
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	55.58	269.68	1.77	267.90	1,459.54	38.20	43.51	81.88
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	55.58	269.75	1.77	267.97	1,459.90	38.21	43.51	81.88
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	59.92	308.25	1.70	306.55	1,916.03	43.77	47.26	89.52
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	59.93	308.27	1.70	306.58	1,917.05	43.78	47.27	89.66
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	70.18	374.33	8.39	365.93	2,091.47	45.73	54.83	98.40
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	83.70	433.46	8.64	424.82	2,543.46	50.43	65.92	115.45
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	84.91	425.19	8.80	416.39	2,650.22	51.48	68.93	116.84
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	88.67	457.18	9.60	447.58	3,879.97	62.29	69.96	127.75
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	94.56	509.32	9.37	499.95	4,868.36	69.77	73.00	139.11
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	108.05	500.29	9.70	490.59	5,008.38	70.77	84.45	158.11
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	109.85	519.72	9.87	509.85	5,280.45	72.67	85.15	161.44
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	117.30	568.59	9.31	559.28	6,607.76	81.29	90.40	171.84
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	119.67	588.44	9.48	578.97	6,970.44	83.49	91.73	177.55

Table 1-29

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	16.77	90.67	2.18	88.49	203.05	14.25	10.86	26.17
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	16.97	90.80	2.23	88.57	206.39	14.37	11.01	26.24
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	16.98	90.84	2.24	88.60	206.45	14.37	11.01	26.25
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	18.01	139.52	1.36	138.16	329.60	18.16	12.58	26.37
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	19.20	103.40	2.15	101.25	223.61	14.95	13.66	28.86
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	19.68	138.87	1.41	137.46	357.44	18.91	13.40	28.39
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	19.69	138.95	1.41	137.54	357.83	18.92	13.41	28.40
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	20.49	97.39	2.32	95.07	325.32	18.04	13.09	31.73
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	20.59	107.91	2.22	105.69	254.27	15.95	14.34	31.56
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	20.60	108.02	2.22	105.81	254.87	15.96	14.35	31.58
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	20.73	97.52	2.32	95.20	330.52	18.18	13.39	31.76
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	20.75	97.56	2.33	95.23	330.85	18.19	13.40	31.78
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	23.43	112.26	2.15	110.11	374.35	19.35	15.72	35.52
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	25.31	118.93	2.23	116.70	428.40	20.70	16.77	39.04
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	25.33	119.05	2.23	116.82	429.36	20.72	16.78	39.06
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	30.61	173.60	6.72	166.88	477.64	21.85	21.27	41.89
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	34.98	169.29	7.36	161.93	572.16	23.92	24.24	49.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	35.00	169.41	7.36	162.04	572.90	23.94	24.25	49.20
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	39.76	163.76	8.32	155.43	641.56	25.33	29.96	54.87
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	43.21	178.64	8.57	170.07	787.46	28.06	32.89	60.10
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	43.24	178.81	8.57	170.24	789.18	28.09	32.91	60.13
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	48.90	175.00	10.64	164.37	1,011.63	31.81	35.71	71.12
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	53.92	182.11	11.85	170.26	1,278.68	35.76	38.38	79.54
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	53.95	182.26	11.86	170.40	1,281.18	35.79	38.40	79.62

Table 1-30

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	18.02	91.48	2.21	89.27	213.34	14.61	11.88	27.66
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	18.24	94.00	2.28	91.72	216.94	14.73	12.02	28.07
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	18.25	94.04	2.29	91.75	217.00	14.73	12.02	28.08
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	20.53	147.73	1.42	146.31	374.22	19.34	14.43	30.55
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	21.05	112.28	2.15	110.13	249.49	15.80	14.82	31.90
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	22.01	103.82	2.45	101.37	347.16	18.63	14.32	33.75
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	22.29	103.96	2.45	101.50	352.76	18.78	14.73	33.78
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22.31	103.99	2.46	101.54	353.10	18.79	14.74	33.80
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	22.53	146.75	1.46	145.29	413.10	20.32	15.23	33.19
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	22.54	146.83	1.46	145.37	413.50	20.33	15.24	33.20
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.69	117.14	2.24	114.90	284.54	16.87	16.47	34.39
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	22.70	117.26	2.24	115.02	285.14	16.89	16.47	34.42
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	25.76	123.16	2.24	120.92	421.50	20.53	17.63	38.86
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	27.93	130.69	2.35	128.34	484.79	22.02	19.04	43.19
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	27.95	130.81	2.35	128.46	485.78	22.04	19.04	43.21
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	33.24	184.78	6.89	177.89	527.53	22.97	23.07	45.62
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	38.67	179.38	7.56	171.81	651.43	25.52	26.86	54.73
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	38.69	179.50	7.57	171.93	652.20	25.54	26.88	54.75
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	41.45	170.58	8.65	161.93	668.80	25.86	30.98	57.77
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	45.64	187.29	9.35	177.94	826.94	28.76	34.47	64.58
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	45.66	187.46	9.36	178.11	828.65	28.79	34.48	64.61
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	51.17	177.07	11.00	166.07	1,061.09	32.57	37.62	73.67
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	57.10	192.52	12.70	179.82	1,359.48	36.87	41.44	84.44
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	57.14	192.68	12.70	179.98	1,362.01	36.91	41.47	84.49

Table 1-33

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.89	118.33	0.31	118.02	284.75	16.87	17.14	35.16
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	23.39	124.38	0.31	124.07	289.75	17.02	17.47	35.35
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.40	124.41	0.31	124.10	289.81	17.02	17.47	35.35
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	24.68	156.77	1.54	155.23	397.60	19.94	17.63	37.54
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.93	150.19	0.39	149.81	393.27	19.83	19.90	40.42
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	28.34	150.63	0.35	150.27	483.97	22.00	21.04	43.64
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	29.01	150.70	0.35	150.35	494.60	22.24	21.97	44.23
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	29.01	150.73	0.35	150.37	494.78	22.24	21.98	44.23
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	30.06	157.49	0.39	157.10	449.02	21.19	22.44	45.39
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	30.07	157.57	0.39	157.19	449.25	21.20	22.44	45.40
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	30.58	186.98	1.72	185.25	706.90	26.59	20.64	46.64
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	31.13	179.25	1.57	177.68	549.45	23.44	21.23	47.52
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	31.15	179.39	1.57	177.81	550.13	23.45	21.24	47.55
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	31.25	206.09	1.58	204.51	1,012.59	31.82	20.61	49.80
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	33.71	180.00	0.46	179.54	669.63	25.88	25.17	51.29
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	35.70	195.95	0.43	195.52	855.12	29.24	26.60	55.88
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	37.77	191.99	0.46	191.53	778.96	27.91	28.09	57.42
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	37.78	192.07	0.46	191.61	779.41	27.92	28.10	57.42
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	39.40	215.33	1.74	213.59	1,012.75	31.82	26.88	60.95
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	39.43	215.46	1.74	213.72	1,013.97	31.84	26.90	60.98
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	40.25	212.54	0.43	212.11	996.70	31.57	30.36	61.12
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	40.25	212.56	0.43	212.13	997.15	31.58	30.37	61.12
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	41.17	234.36	1.60	232.76	1,370.72	37.02	27.46	64.61
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	41.19	234.40	1.60	232.80	1,372.35	37.05	27.47	64.64

Table 1-38

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	21.29	116.05	1.10	114.95	270.32	16.44	15.04	33.00
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	21.68	121.44	1.14	120.29	275.59	16.60	15.56	33.01
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	21.69	121.45	1.14	120.31	275.65	16.60	15.57	33.01
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.02	136.07	1.30	134.77	307.48	17.54	16.37	34.34
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	25.36	142.52	1.34	141.18	360.83	19.00	18.24	37.65
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	25.37	142.58	1.34	141.24	361.11	19.00	18.25	37.65
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	26.37	140.58	1.33	139.25	473.97	21.77	17.73	41.51
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	26.87	140.66	1.33	139.33	485.42	22.03	18.12	42.27
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	26.88	140.67	1.33	139.34	485.67	22.04	18.13	42.28
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	27.28	174.11	1.36	172.75	700.40	26.47	17.47	43.07
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	28.52	156.41	1.47	154.94	547.68	23.40	19.07	44.12
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	30.00	186.13	4.09	182.04	641.87	25.34	19.54	43.16
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	30.66	174.20	1.40	172.80	799.16	28.27	20.37	47.40
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	30.66	174.27	1.40	172.87	799.56	28.28	20.37	47.41
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	31.69	167.40	1.53	165.87	651.69	25.53	21.76	48.68
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	31.70	167.46	1.53	165.93	652.17	25.54	21.77	48.70
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	31.85	153.35	6.43	146.92	463.34	21.53	23.37	46.13
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	37.18	172.93	8.30	164.63	619.78	24.90	27.35	55.31
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	37.20	173.05	8.30	164.75	620.68	24.91	27.36	55.33
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	37.41	183.51	4.59	178.93	855.25	29.24	25.16	55.96
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	37.42	183.63	4.59	179.05	855.97	29.26	25.16	55.98
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	39.17	166.26	7.26	159.00	776.48	27.87	27.98	57.70
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	46.57	190.75	7.36	183.39	1,081.13	32.88	31.89	70.78
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	46.59	190.85	7.37	183.49	1,082.53	32.90	31.90	70.81

Table 1-39

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	16.95	91.68	0.27	91.41	176.30	13.28	12.65	26.25
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	17.35	96.21	0.27	95.95	180.31	13.43	12.76	26.92
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.38	96.56	0.27	96.30	181.30	13.46	12.76	27.02
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	20.89	113.95	0.31	113.64	296.72	17.23	15.82	32.15
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	21.41	114.22	0.32	113.90	304.32	17.44	16.07	32.87
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	21.45	114.57	0.32	114.26	306.42	17.50	16.10	32.96
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	27.30	154.73	0.84	153.89	420.64	20.51	20.00	41.17
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	30.42	162.54	0.85	161.69	484.28	22.01	22.29	45.72
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	30.45	162.79	0.85	161.94	485.29	22.03	22.31	45.89
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	33.95	184.46	0.95	183.51	718.61	26.81	25.55	51.60
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	34.23	237.72	3.42	234.30	884.40	29.74	22.52	52.80
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	36.04	202.93	0.91	202.02	924.77	30.41	26.16	56.39
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	38.14	197.36	0.96	196.40	843.22	29.04	28.87	58.50
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	38.18	197.59	0.96	196.63	845.40	29.08	28.90	58.69
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	40.75	221.00	0.92	220.08	1,083.68	32.92	30.07	61.86
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	40.78	221.09	0.92	220.17	1,086.59	32.96	30.11	61.98
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	43.65	291.83	3.65	288.19	1,636.36	40.45	29.10	69.02
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	44.31	271.13	3.46	267.67	1,153.52	33.96	29.78	68.92
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	44.34	271.27	3.47	267.80	1,154.39	33.98	29.81	68.93
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	47.68	327.96	3.39	324.57	2,270.94	47.65	30.77	79.80
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	58.00	334.57	3.66	330.91	2,296.80	47.92	39.59	92.50
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	58.04	334.68	3.67	331.01	2,298.92	47.95	39.62	92.52
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	64.60	390.54	3.46	387.08	3,220.96	56.75	42.97	104.94
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	64.64	390.59	3.46	387.13	3,227.58	56.81	42.98	104.98

Table 1-41

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	23.34	119.32	0.78	118.53	279.82	16.73	17.44	35.31
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	23.87	125.31	0.79	124.52	285.30	16.89	17.66	35.45
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.89	125.60	0.79	124.81	285.77	16.90	17.67	35.45
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	30.07	162.15	0.86	161.29	592.23	24.34	22.21	46.80
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	30.72	162.25	0.86	161.39	612.15	24.74	23.06	47.37
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	30.75	162.34	0.86	161.48	615.49	24.81	23.06	47.37
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	35.53	194.66	1.85	192.80	615.90	24.82	26.31	52.37
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	39.33	203.86	1.84	202.03	689.65	26.26	29.71	57.65
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	39.35	204.14	1.84	202.30	690.75	26.28	29.71	57.65
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	41.29	284.56	5.28	279.28	1,190.73	34.51	27.79	64.46
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	44.23	235.54	2.10	233.44	1,084.04	32.92	33.62	67.91
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	47.26	263.87	2.02	261.85	1,404.84	37.48	35.81	72.56
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	49.37	250.35	2.09	248.26	1,247.87	35.33	37.84	73.91
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	49.41	250.61	2.09	248.52	1,250.28	35.36	37.86	74.03
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	52.37	318.15	5.27	312.87	1,495.94	38.68	36.78	81.53
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	52.40	318.25	5.27	312.98	1,496.71	38.69	36.78	81.56
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	52.94	351.18	6.06	345.12	2,290.03	47.85	34.53	85.15
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	53.17	283.97	2.05	281.91	1,635.36	40.44	40.85	79.71
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	53.20	284.06	2.05	282.01	1,638.91	40.48	40.86	79.71
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	58.27	394.62	5.83	388.79	3,144.10	56.07	37.18	97.80
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	69.13	394.34	5.93	388.41	3,143.45	56.07	47.12	108.87
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	69.16	394.43	5.93	388.49	3,145.60	56.09	47.12	108.88
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	77.80	456.58	5.92	450.66	4,454.08	66.74	51.26	127.34
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	77.84	456.62	5.92	450.70	4,461.72	66.80	51.28	127.35

Table 1-42

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	15.30	82.95	0.25	82.70	146.42	12.10	11.53	24.03
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	15.68	88.05	0.24	87.81	149.89	12.24	11.63	24.31
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	15.68	88.09	0.24	87.85	149.95	12.25	11.64	24.32
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	18.82	105.18	0.28	104.90	249.41	15.79	14.40	29.15
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	19.31	105.34	0.28	105.06	256.28	16.01	14.61	29.80
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	19.32	105.38	0.28	105.10	256.50	16.02	14.62	29.80
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	24.63	145.94	0.23	145.71	378.67	19.46	18.11	38.21
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	27.69	154.18	0.23	153.95	438.82	20.95	20.75	42.75
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	27.70	154.28	0.23	154.05	439.10	20.95	20.76	42.75
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	30.83	175.10	0.27	174.83	650.18	25.50	22.87	48.01
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	33.11	194.69	0.28	194.41	854.42	29.23	24.47	53.74
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	34.96	188.21	0.26	187.94	770.82	27.76	26.36	54.30
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	34.97	237.13	2.44	234.69	958.17	30.95	23.56	54.51
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	34.97	188.30	0.26	188.04	771.40	27.77	26.36	54.31
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	37.79	212.35	0.27	212.08	1,010.49	31.79	28.48	59.64
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	37.80	212.39	0.27	212.12	1,011.41	31.80	28.49	59.66
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	42.87	270.82	2.45	268.37	1,141.04	33.78	28.96	67.92
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	44.65	292.96	2.79	290.17	1,754.86	41.89	30.51	72.11
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	49.28	330.07	2.66	327.41	2,364.90	48.63	32.30	81.09
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	56.28	335.31	2.74	332.56	2,291.30	47.87	38.55	92.11
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	56.28	307.00	3.14	303.86	1,387.60	37.25	44.62	81.50
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	63.09	390.24	2.69	387.54	3,208.03	56.64	41.82	103.82
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	73.10	379.27	3.60	375.67	2,745.77	52.40	57.81	109.95
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	80.13	438.78	3.54	435.24	3,667.70	60.56	63.29	123.06

Table 1-43

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	17.53595559	93.586	0.25	93.336	187.5391728	13.69449425	13.01975	27.2436
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	17.95154448	98.8842	0.2438	98.6404	191.3461147	13.83279128	13.458425	27.676825
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.95513082	98.9317	0.2438	98.6879	191.4461413	13.83640637	13.4593	27.683125
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	22.50793811	124.4342	0.2642	124.17	400.488789	20.01221599	16.0813	36.2112
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	23.00173052	124.469	0.2718	124.1972	415.4546191	20.38270392	16.742825	36.5942
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	23.0073288	124.4867	0.2723	124.2144	416.2048846	20.40110008	16.751925	36.597825
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	28.83164156	163.6973	0.9337	162.7636	470.2646179	21.68558549	21.1245	42.9459
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	32.24270379	171.9762	0.9329	171.0433	536.5587217	23.16373721	23.908125	48.67075
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	32.24915408	172.0466	0.933	171.1136	536.7702756	23.16830325	23.9096	48.688275
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	35.89331731	197.041	1.0529	195.9881	807.5133573	28.4167795	26.5346	54.7664
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	36.71908211	257.8926	3.5529	254.3397	1030.250497	32.09751543	24.383725	57.85915
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	38.49032761	219.7808	1.0133	218.7675	1044.65	32.32104578	27.82685	60.831325
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	40.45054757	210.7469	1.0631	209.6838	941.1375433	30.67796511	30.1499	62.295675
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	40.45914546	210.8128	1.0632	209.7496	941.5605115	30.68485802	30.163825	62.33375
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	43.62517507	238.6744	1.0304	237.644	1223.421568	34.97744371	32.398025	66.712025
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	43.63154412	238.6961	1.0306	237.6655	1224.023835	34.986052	32.40385	66.713725
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	46.97095038	319.2274	4.0415	315.1859	1923.512361	43.85786544	30.2103	76.870375
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	47.37889204	292.2804	3.57	288.7104	1308.094122	36.16758385	32.20315	74.708075
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	47.38383813	292.3034	3.5703	288.7331	1308.270441	36.1700213	32.20505	74.71285
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	51.76289712	359.7588	3.8308	355.928	2641.795591	51.39840066	32.861425	88.501625
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	62.16891521	362.4044	4.0042	358.4002	2630.233611	51.28580321	43.0025	100.437175
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	62.17556167	362.4219	4.0045	358.4174	2630.675516	51.29011129	43.0062	100.4536
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	69.72075293	422.2988	3.8805	418.4183	3689.045444	60.73751266	46.5509	115.7576
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	69.72752766	422.3078	3.8808	418.427	3690.233316	60.74729061	46.55225	115.76105

Table 1-57

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	13.18	69.69	0.70	68.99	106.38	10.31	9.20	21.34
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	13.41	72.97	0.72	72.25	108.19	10.40	9.55	21.59
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	13.41	72.99	0.72	72.27	108.25	10.40	9.55	21.60
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.97	84.81	0.84	83.97	177.66	13.33	11.06	24.62
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	16.25	84.90	0.84	84.06	180.71	13.44	11.11	25.26
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	16.26	84.93	0.84	84.09	180.88	13.45	11.12	25.27
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	20.03	117.73	1.03	116.70	240.87	15.52	14.38	31.17
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.02	123.09	1.09	122.01	279.14	16.71	15.67	33.92
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	22.03	123.19	1.09	122.10	279.51	16.72	15.68	33.94
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	22.06	143.77	0.80	142.97	448.30	21.17	14.42	34.90
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	24.46	134.89	0.93	133.96	416.24	20.40	16.83	38.12
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	24.77	142.40	0.82	141.58	511.74	22.62	16.30	38.69
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	24.78	142.46	0.82	141.64	512.04	22.63	16.31	38.69
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	27.12	144.13	1.24	142.88	486.33	22.05	18.71	42.46
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	27.13	144.22	1.24	142.98	486.99	22.07	18.71	42.49
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	36.06	203.29	5.36	197.94	859.98	29.33	23.33	53.86
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	36.23	174.13	8.26	165.87	558.77	23.64	26.46	51.04
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	43.29	197.88	9.74	188.14	748.63	27.36	30.82	62.90
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	43.30	197.99	9.75	188.24	749.46	27.38	30.83	62.92
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	44.59	193.55	8.58	184.98	945.25	30.74	31.67	65.29
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	46.11	213.76	5.62	208.15	1,183.55	34.40	29.69	70.34
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	46.12	213.80	5.62	208.18	1,184.15	34.41	29.70	70.34
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	54.07	223.71	8.46	215.25	1,321.15	36.35	36.49	79.51
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	54.09	223.81	8.47	215.34	1,322.48	36.37	36.51	79.55

Table 1-61

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	18.59	104.12	0.48	103.64	207.12	14.39	13.58	28.63
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	18.96	109.95	0.47	109.48	212.07	14.56	13.65	28.97
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	18.97	109.96	0.47	109.49	212.12	14.56	13.65	28.98
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	22.05	133.29	0.85	132.45	290.91	17.06	15.92	33.57
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	22.90	129.91	0.54	129.37	364.79	19.10	16.34	35.52
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	23.39	129.96	0.54	129.42	375.07	19.37	16.73	35.62
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	23.39	129.98	0.54	129.44	375.23	19.37	16.73	35.62
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	24.45	140.54	0.83	139.71	342.31	18.50	17.17	37.46
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	24.46	140.58	0.83	139.75	342.43	18.50	17.17	37.46
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	27.17	156.45	0.95	155.50	513.88	22.67	18.97	41.68
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	27.52	150.06	3.30	146.76	371.05	19.26	20.10	39.94
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	28.36	177.44	0.90	176.54	764.31	27.65	19.21	44.26
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	30.39	167.95	0.93	167.01	612.37	24.75	21.55	47.14
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	30.39	167.98	0.93	167.05	612.59	24.75	21.56	47.15
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	31.25	193.39	2.20	191.20	796.14	28.22	20.72	46.01
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	31.98	180.46	0.87	179.59	876.87	29.61	21.77	50.64
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	31.98	180.47	0.87	179.60	877.13	29.62	21.77	50.65
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	33.69	172.07	3.17	168.90	640.99	25.32	23.69	49.47
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	33.76	171.62	3.33	168.29	518.84	22.78	24.23	48.65
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	33.77	171.69	3.33	168.36	519.23	22.79	24.24	48.66
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	40.39	204.22	2.27	201.95	1,091.92	33.04	27.74	61.34
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	40.40	204.24	2.27	201.97	1,092.39	33.05	27.75	61.35
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	42.11	198.99	3.17	195.82	931.48	30.52	29.22	62.98
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	42.13	199.06	3.17	195.89	932.11	30.53	29.23	63.03

Table 1-72

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	20.61	111.11	0.23	110.87	243.32	15.60	15.01	32.12
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	20.61	111.13	0.23	110.90	243.35	15.60	15.01	32.12
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.58	119.42	0.24	119.18	403.19	20.08	15.80	35.03
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	25.60	136.55	0.27	136.28	417.26	20.43	19.03	40.21
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	25.60	136.58	0.27	136.31	417.31	20.43	19.04	40.21
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	28.14	185.08	0.27	184.81	678.51	26.05	19.68	45.73
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	34.04	187.82	1.16	186.66	628.19	25.06	25.19	50.79
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	36.40	196.85	1.20	195.65	657.61	25.64	27.75	53.77
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	40.10	196.84	1.20	195.65	889.43	29.82	29.09	60.21
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	42.75	228.87	1.32	227.55	1,095.02	33.09	31.93	64.04
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	45.02	303.87	4.20	299.67	1,453.79	38.13	31.46	71.29
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	45.80	244.10	1.36	242.74	1,268.17	35.61	35.19	69.32
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	45.90	244.10	1.36	242.74	1,183.36	34.40	35.19	69.77
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	46.29	259.58	1.27	258.31	1,416.58	37.64	34.69	74.07
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	46.72	339.70	0.37	339.33	1,674.00	40.91	32.58	75.62
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	49.84	280.41	1.30	279.11	1,576.29	39.70	37.98	76.82
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	51.95	339.70	4.44	335.26	1,642.86	40.53	36.71	83.32
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	55.33	377.90	4.73	373.16	2,609.67	51.08	36.56	91.24
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	55.93	400.06	1.30	398.76	2,269.65	47.64	40.87	89.74
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	65.03	425.85	4.63	421.22	3,810.39	61.73	41.14	107.44
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	66.16	490.26	0.40	489.85	4,978.34	70.56	38.00	127.93
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	72.28	423.17	5.09	418.08	3,481.77	59.01	51.88	116.92
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	72.28	423.17	5.09	418.08	3,481.81	59.01	51.88	116.92
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	77.08	490.26	4.89	485.37	4,820.99	69.43	51.17	129.29

Table 1-73

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	14.70	85.77	0.48	85.28	149.37	12.22	10.52	22.80
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.99	90.52	0.47	90.05	153.23	12.38	10.99	23.19
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	15.00	90.72	0.47	90.25	153.81	12.40	11.00	23.20
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	18.08	104.22	0.56	103.66	264.10	16.25	12.86	28.83
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	18.44	104.40	0.56	103.84	272.38	16.50	12.93	29.18
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	18.46	104.62	0.56	104.06	273.38	16.53	12.94	29.23
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	20.40	132.32	0.39	131.93	291.15	17.06	13.91	31.92
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.77	140.35	0.36	139.99	347.07	18.63	15.59	36.01
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	22.79	140.51	0.37	140.14	347.66	18.65	15.64	36.07
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	25.47	155.49	0.44	155.05	528.12	22.98	17.43	40.81
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	26.60	179.66	0.46	179.20	822.87	28.69	16.96	42.27
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	28.69	168.00	0.41	167.59	641.45	25.33	19.47	45.88
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	28.72	168.14	0.41	167.73	642.76	25.35	19.48	45.91
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	30.26	182.20	0.45	181.75	943.77	30.72	20.32	48.00
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	30.27	182.25	0.45	181.81	945.40	30.75	20.33	48.04
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	31.14	187.89	4.16	183.73	619.00	24.88	20.41	47.04
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	39.45	227.38	3.66	223.72	1,138.77	33.75	25.29	60.81
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	39.87	220.86	4.27	216.59	834.66	28.89	26.41	59.79
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	41.07	256.41	3.10	253.31	1,562.17	39.52	25.87	66.06
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	42.30	257.16	2.89	254.27	1,048.29	32.38	28.21	65.41
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	51.95	270.33	3.80	266.53	1,650.38	40.62	33.89	78.94
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	55.11	314.76	3.41	311.34	2,225.65	47.18	35.95	87.41
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	55.46	317.62	3.03	314.59	2,104.53	45.88	37.48	88.37
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	61.41	370.63	2.84	367.79	2,928.55	54.12	41.65	99.17

Table 1-76

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.10	59.43	0.70	58.73	47.86	6.92	4.15	8.29
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.28	60.13	0.72	59.41	49.32	7.02	4.27	8.84
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.29	60.21	0.72	59.49	49.46	7.03	4.27	8.85
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.15	57.92	0.89	57.03	84.77	9.21	5.35	15.84
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.47	62.18	0.90	61.28	89.70	9.47	5.57	16.36
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.48	62.37	0.90	61.47	90.19	9.50	5.57	16.38
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	10.93	71.20	1.27	69.93	132.42	11.51	6.37	19.74
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.00	71.41	1.28	70.13	134.04	11.58	6.39	19.80
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.01	71.42	1.28	70.14	134.08	11.58	6.39	19.82
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	11.30	66.98	1.02	65.96	132.29	11.50	6.87	18.98
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.70	66.45	1.07	65.38	138.73	11.78	6.96	19.55
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	11.72	66.70	1.07	65.63	139.49	11.81	6.96	19.59
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	13.13	108.07	1.97	106.10	173.41	13.17	9.19	18.09
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.58	80.13	1.48	78.64	198.75	14.10	8.02	24.80
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	13.68	80.39	1.49	78.90	200.45	14.16	8.05	24.87
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.70	80.42	1.49	78.93	200.69	14.17	8.07	24.89
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	15.92	109.69	3.12	106.57	179.21	13.39	10.54	22.83
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	17.51	111.72	4.11	107.61	191.49	13.84	12.20	23.80
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.44	115.12	3.44	111.68	292.72	17.11	12.40	31.11
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	24.00	114.30	3.82	110.49	470.84	21.70	14.77	37.13
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	27.67	138.01	5.28	132.73	468.32	21.64	17.90	41.81
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	31.00	155.17	5.63	149.54	565.40	23.78	20.56	47.90
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	33.64	136.70	6.40	130.30	721.18	26.85	21.70	52.36
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	38.34	159.80	6.99	152.81	904.09	30.07	24.71	58.66

Table 1-85

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	23.93	121.51	0.83	120.68	288.97	17.00	17.86	35.99
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	24.52	127.52	0.83	126.69	295.91	17.20	18.08	36.31
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	24.53	127.70	0.83	126.87	296.00	17.20	18.10	36.30
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	29.45	153.52	0.93	152.59	491.52	22.17	22.18	44.46
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	30.20	154.28	0.94	153.34	506.13	22.50	22.75	45.59
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	30.22	154.49	0.94	153.55	506.89	22.51	22.82	45.57
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	36.28	196.75	1.93	194.82	629.54	25.09	26.89	53.27
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	40.11	205.67	1.94	203.73	703.61	26.53	30.14	58.50
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	40.18	206.39	1.94	204.44	706.14	26.57	30.20	58.49
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	42.08	285.22	5.40	279.82	1,204.82	34.71	28.86	65.17
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	45.08	237.56	2.20	235.36	1,103.42	33.22	34.46	68.91
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	48.11	266.16	2.12	264.04	1,427.50	37.78	36.48	73.83
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	50.25	252.12	2.21	249.91	1,267.03	35.60	38.40	75.08
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	50.35	252.79	2.21	250.58	1,272.52	35.67	38.57	75.36
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	53.21	318.78	5.48	313.30	1,509.41	38.85	37.66	82.27
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	53.27	319.00	5.48	313.52	1,511.14	38.87	37.68	82.30
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	53.80	351.82	6.21	345.61	2,302.51	47.98	35.42	86.37
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	54.03	285.95	2.15	283.80	1,657.24	40.71	41.61	80.90
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	54.13	286.19	2.15	284.03	1,669.22	40.86	41.63	80.92
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	59.09	395.03	6.05	388.98	3,146.91	56.10	37.90	98.95
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	69.99	394.35	6.20	388.15	3,146.02	56.09	47.91	109.94
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	70.06	394.52	6.20	388.32	3,151.24	56.14	47.94	110.11
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	78.56	456.45	6.14	450.32	4,439.18	66.63	52.11	128.00
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	78.67	456.54	6.14	450.40	4,457.03	66.76	52.12	128.04

Table 1-92

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.42	40.10	0.31	39.78	32.64	5.71	3.49	9.07
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.53	45.45	0.28	45.17	29.96	5.47	4.20	8.27
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.79	34.73	0.28	34.45	29.23	5.41	3.91	9.44
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.90	40.17	0.31	39.86	34.43	5.87	3.84	9.66
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.90	40.18	0.31	39.88	34.42	5.87	3.84	9.65
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.01	46.03	0.28	45.74	32.63	5.71	4.58	8.83
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.01	46.08	0.28	45.80	32.69	5.72	4.59	8.83
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.22	38.10	0.28	37.83	32.39	5.69	4.23	10.30
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.22	38.18	0.28	37.90	32.49	5.70	4.23	10.30
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.02	42.27	0.32	41.96	47.78	6.91	4.79	11.38
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.08	44.25	0.34	43.91	53.98	7.35	4.54	11.73
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.19	44.34	0.34	44.00	54.41	7.38	4.72	11.76
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.20	44.36	0.34	44.02	54.51	7.38	4.73	11.76
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.58	42.50	0.31	42.19	52.14	7.22	5.20	11.93
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.58	42.61	0.31	42.30	52.33	7.23	5.20	11.94
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.61	68.69	0.83	67.86	63.49	7.97	5.26	10.55
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.30	71.45	0.86	70.59	71.34	8.45	6.13	11.76
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.31	71.57	0.86	70.71	71.55	8.46	6.13	11.78
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	10.69	59.34	1.18	58.16	94.56	9.72	6.67	17.80
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.40	68.64	1.19	67.45	107.15	10.35	7.04	18.89
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.41	68.83	1.19	67.64	107.64	10.38	7.05	18.91
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	12.97	72.82	1.34	71.48	150.35	12.26	8.14	20.50
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.00	72.46	1.37	71.09	170.55	13.06	8.69	21.79
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.02	72.71	1.37	71.34	171.32	13.09	8.69	21.84

Table 1-98

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	55.21	198.47	11.53	186.94	1,512.96	38.90	38.70	81.99
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	49.28	176.83	11.12	165.71	1,195.53	34.58	33.51	74.16
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	39.34	152.85	6.68	146.17	943.70	30.72	26.81	59.61
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.06	70.61	1.94	68.67	165.39	12.86	8.45	22.81
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.44	68.77	1.87	66.90	154.08	12.41	8.19	21.57
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.09	70.83	1.94	68.89	166.33	12.90	8.47	22.86
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.16	90.22	2.84	87.38	259.30	16.10	10.31	30.02
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.31	90.62	2.85	87.77	263.16	16.22	10.48	30.61
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.29	90.42	2.85	87.57	262.39	16.20	10.47	30.57
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	27.19	142.24	7.71	134.52	352.26	18.77	19.14	37.12
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	24.70	144.90	6.65	138.25	331.57	18.21	16.54	35.01
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	22.17	138.68	4.58	134.11	332.08	18.22	14.93	30.98
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	7.56	61.25	0.99	60.26	54.81	7.40	5.32	10.50
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.23	61.09	0.96	60.14	52.77	7.26	5.07	10.04
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.57	61.31	0.99	60.31	54.94	7.41	5.32	10.52
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	44.61	194.07	9.20	184.87	960.95	31.00	31.10	64.34
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	40.40	174.27	8.34	165.94	783.59	27.99	27.86	57.19
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	31.93	152.34	5.52	146.82	588.15	24.25	21.70	46.56
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.47	64.59	1.80	62.79	106.94	10.34	7.06	18.96
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.01	61.29	1.76	59.53	99.58	9.98	6.71	18.24
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.48	64.73	1.80	62.93	107.49	10.37	7.06	19.00
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	13.83	77.76	2.56	75.20	174.16	13.20	8.36	24.06
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	13.95	78.04	2.60	75.45	176.68	13.29	8.41	24.35
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	13.94	77.92	2.59	75.33	176.32	13.28	8.40	24.33

Table 1-101

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	15.57	86.76	0.59	86.17	155.79	12.48	11.26	24.56
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	15.86	90.83	0.59	90.24	159.34	12.62	11.43	24.88
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	15.88	91.08	0.59	90.49	160.29	12.66	11.44	24.91
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	19.12	105.56	0.81	104.75	264.65	16.27	13.36	29.68
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	19.49	105.84	0.82	105.02	271.43	16.48	13.59	30.58
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	19.52	106.12	0.82	105.30	273.02	16.52	13.59	30.63
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	19.85	118.59	0.98	117.61	232.88	15.26	14.11	29.76
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	21.79	124.58	0.97	123.61	272.60	16.51	15.76	32.68
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	21.84	124.96	0.97	123.98	274.08	16.56	15.77	32.71
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	23.44	154.54	1.10	153.44	530.83	23.04	15.21	36.43
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	24.36	137.89	1.12	136.77	409.72	20.24	17.06	37.04
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	26.26	154.41	1.08	153.32	601.93	24.53	17.15	40.11
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	26.29	154.74	1.08	153.65	603.81	24.57	17.17	40.17
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	26.96	147.16	1.09	146.07	484.66	22.02	18.66	41.21
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	27.02	147.53	1.09	146.44	487.67	22.08	18.68	41.39
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	29.38	154.74	4.45	150.29	409.65	20.24	21.58	42.15
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	31.32	187.11	3.29	183.82	769.22	27.73	20.57	48.11
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	33.27	179.55	2.67	176.87	553.52	23.53	23.02	49.16
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	35.83	174.13	5.39	168.74	705.92	26.57	24.38	52.36
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	35.91	175.60	5.95	169.66	574.86	23.98	25.82	52.59
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	39.86	194.68	3.66	191.02	1,019.19	31.92	26.49	60.49
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	41.66	225.31	2.35	222.95	1,268.67	35.62	27.96	64.00
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	41.84	212.91	2.76	210.15	1,020.49	31.95	28.58	63.47
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	44.87	200.68	5.37	195.31	1,028.76	32.07	30.05	66.43

Table 1-105

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	12.54	68.10	0.21	67.90	100.73	10.04	9.38	20.17
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	12.86	72.61	0.20	72.41	103.14	10.16	9.67	20.51
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	12.86	72.64	0.20	72.44	103.18	10.16	9.67	20.52
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.40	87.97	0.22	87.75	175.10	13.23	11.52	24.61
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	15.80	88.10	0.21	87.89	180.20	13.42	11.65	25.23
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	15.81	88.13	0.21	87.92	180.39	13.43	11.65	25.23
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	21.41	130.11	0.18	129.93	308.00	17.55	15.76	33.96
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	24.22	137.85	0.17	137.68	358.98	18.95	18.52	38.63
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	24.23	137.93	0.17	137.75	359.12	18.95	18.52	38.63
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	26.84	157.61	0.20	157.40	535.44	23.14	20.06	42.52
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	29.23	177.54	0.20	177.34	739.68	27.20	21.97	49.12
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	30.62	170.14	0.20	169.94	638.71	25.27	23.17	48.39
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	30.63	170.21	0.20	170.01	639.03	25.28	23.17	48.40
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	33.65	241.27	1.88	239.39	950.92	30.84	23.39	52.54
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	33.70	194.74	0.20	194.54	874.43	29.57	24.91	54.36
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	33.70	194.77	0.20	194.56	875.34	29.59	24.91	54.37
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	41.52	275.77	1.97	273.80	1,153.29	33.96	28.49	64.69
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	43.32	299.70	2.11	297.59	1,772.98	42.11	28.35	70.54
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	48.43	338.17	2.06	336.12	2,439.10	49.39	31.91	80.44
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	53.82	305.02	2.55	302.48	1,359.45	36.87	42.35	76.85
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	54.95	343.33	2.26	341.07	2,343.46	48.41	38.70	89.98
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	62.39	399.97	2.17	397.80	3,321.65	57.63	42.37	103.76
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	70.42	378.95	2.93	376.01	2,713.96	52.10	55.43	104.96
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	77.72	438.72	2.82	435.90	3,636.66	60.30	60.61	119.17

Table 1-107

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.28	102.57	0.23	102.35	224.34	14.98	14.40	30.31
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.74	108.21	0.22	107.99	228.90	15.13	14.85	30.43
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	19.74	108.28	0.22	108.05	229.02	15.13	14.87	30.42
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	23.80	130.59	0.26	130.33	378.91	19.47	17.83	37.43
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	24.41	130.74	0.26	130.48	388.17	19.70	18.29	37.65
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	24.42	130.82	0.26	130.55	388.51	19.71	18.30	37.65
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	30.78	177.05	0.41	176.64	546.22	23.37	23.00	46.71
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	34.35	185.75	0.41	185.34	618.51	24.87	26.14	52.24
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	34.36	185.85	0.41	185.44	618.82	24.88	26.15	52.31
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	38.59	213.38	0.55	212.83	939.63	30.65	29.20	59.40
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	40.88	272.12	3.31	268.82	1,235.86	35.15	27.98	63.30
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	41.42	238.83	0.45	238.38	1,208.88	34.77	30.46	66.59
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	43.43	227.90	0.55	227.35	1,088.19	32.99	33.00	67.72
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	43.44	227.99	0.55	227.44	1,088.86	33.00	33.00	67.73
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	46.96	258.87	0.54	258.34	1,410.28	37.55	35.61	72.38
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	46.97	258.90	0.54	258.37	1,411.31	37.57	35.62	72.39
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	49.61	308.15	3.42	304.72	1,435.85	37.89	34.24	78.23
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	52.42	337.15	3.78	333.37	2,279.30	47.74	34.48	82.63
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	57.86	379.93	3.58	376.35	3,043.95	55.17	37.43	93.53
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	64.25	345.09	4.42	340.67	1,703.95	41.28	51.60	92.00
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	65.25	382.42	3.87	378.56	2,896.20	53.82	45.71	105.25
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	73.14	444.98	3.62	441.36	4,051.13	63.65	49.21	121.48
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	83.58	427.28	5.00	422.28	3,403.03	58.34	66.18	124.91
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	91.61	493.71	4.80	488.90	4,570.82	67.61	72.85	139.27

Table 1-111

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.21	43.04	0.36	42.68	24.43	4.94	2.83	6.14
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.39	43.46	0.35	43.11	25.31	5.03	3.01	6.42
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.40	43.53	0.35	43.18	25.40	5.04	3.02	6.42
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.58	44.09	0.42	43.67	46.66	6.83	2.99	10.38
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.84	47.98	0.42	47.56	49.62	7.04	3.22	10.50
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.85	48.13	0.42	47.71	49.93	7.07	3.22	10.53
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.85	52.13	0.45	51.67	71.87	8.48	3.84	12.84
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.17	55.13	0.76	54.36	85.42	9.24	3.45	14.58
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.19	51.61	0.45	51.16	75.33	8.68	4.04	13.14
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.20	51.84	0.45	51.39	75.85	8.71	4.04	13.17
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.22	55.35	0.77	54.59	86.75	9.31	3.47	14.75
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.24	55.38	0.77	54.61	86.82	9.32	3.47	14.78
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.67	64.73	0.80	63.93	124.69	11.17	4.91	17.82
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.75	65.09	0.80	64.29	126.07	11.23	4.92	17.88
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.77	65.12	0.80	64.31	126.38	11.24	4.93	17.89
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	15.59	135.94	1.41	134.53	265.97	16.31	11.61	22.51
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	17.99	139.83	1.48	138.35	313.33	17.70	12.66	25.52
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	17.99	139.96	1.48	138.48	313.84	17.72	12.66	25.53
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	18.50	93.79	2.27	91.51	227.19	15.07	12.29	28.06
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	20.51	112.22	2.29	109.92	279.12	16.71	14.12	31.59
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	20.53	112.42	2.30	110.12	279.90	16.73	14.12	31.61
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22.56	102.99	2.38	100.61	386.27	19.65	14.76	34.07
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	25.40	112.49	2.42	110.07	476.22	21.82	16.61	38.52
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	25.42	112.62	2.42	110.20	477.40	21.85	16.62	38.54

Table 1-113

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	9.90	64.12	1.59	62.53	60.10	7.75	6.92	13.56
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	10.15	65.59	1.64	63.95	62.55	7.91	7.16	14.05
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	10.16	65.67	1.65	64.03	62.75	7.92	7.17	14.07
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	18.03	89.01	3.48	85.53	219.03	14.80	11.24	30.16
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	18.51	94.95	3.55	91.40	231.95	15.23	11.52	30.65
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	18.54	95.18	3.55	91.62	233.09	15.27	11.54	30.72
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22.41	104.12	3.79	100.32	344.29	18.56	13.91	35.10
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	23.13	103.21	3.96	99.25	361.86	19.02	14.22	36.20
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	23.17	103.58	3.96	99.61	363.94	19.08	14.24	36.28
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	23.75	107.52	5.09	102.43	364.33	19.09	14.50	39.34
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	23.91	107.77	5.16	102.61	369.18	19.21	14.60	39.67
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.93	107.93	5.17	102.76	369.77	19.23	14.62	39.70
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	29.68	127.66	5.84	121.82	550.92	23.47	18.38	47.95
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	29.92	127.99	5.86	122.13	555.64	23.57	18.42	48.16
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	29.96	128.18	5.87	122.31	556.84	23.60	18.45	48.19
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	35.23	151.78	10.24	141.54	395.21	19.88	25.28	48.08
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	36.38	156.98	10.85	146.13	425.39	20.63	26.06	49.45
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	36.41	157.12	10.85	146.27	426.32	20.65	26.08	49.50
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	62.07	237.63	13.22	224.41	1,458.03	38.18	44.72	87.55
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	63.51	269.79	13.59	256.21	1,646.15	40.57	44.47	90.16
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	63.58	270.30	13.60	256.70	1,651.24	40.64	44.51	90.27
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	77.21	257.08	18.74	238.33	2,298.33	47.94	55.90	109.72
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	80.05	274.96	19.69	255.28	2,652.41	51.50	57.47	115.95
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	80.13	275.43	19.70	255.72	2,660.84	51.58	57.53	116.09

Table 1-114

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	14.31	82.27	1.52	80.76	151.37	12.30	9.01	23.02
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.47	82.34	1.56	80.78	153.42	12.39	9.17	23.81
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	14.47	112.97	1.27	111.70	188.30	13.72	10.68	20.76
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.47	82.36	1.56	80.79	153.49	12.39	9.17	23.81
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	15.41	114.74	1.33	113.41	201.76	14.20	10.99	22.04
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	15.41	114.78	1.33	113.45	201.90	14.21	10.99	22.05
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.75	85.48	1.80	83.68	245.63	15.67	11.00	28.21
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.96	85.54	1.80	83.73	247.69	15.74	11.02	28.29
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.97	85.57	1.81	83.77	247.91	15.75	11.03	28.31
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	18.45	102.89	1.90	101.00	247.48	15.73	11.86	29.80
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.45	112.78	1.96	110.82	272.72	16.51	12.57	31.25
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.45	112.87	1.97	110.90	273.05	16.52	12.58	31.27
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22.84	109.74	2.10	107.63	415.52	20.38	14.34	35.60
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	24.17	113.83	2.23	111.60	452.40	21.27	15.26	38.00
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	24.18	113.93	2.23	111.70	452.99	21.28	15.26	38.02
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	26.94	145.68	6.02	139.65	334.89	18.30	19.15	37.22
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	28.93	151.76	6.28	145.49	379.92	19.49	19.98	39.98
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	28.93	151.82	6.28	145.54	380.24	19.50	19.98	40.00
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	43.30	183.90	8.25	175.64	881.34	29.69	30.86	63.62
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	45.26	213.81	9.27	204.54	1,018.76	31.92	30.90	66.08
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	45.28	214.00	9.27	204.73	1,020.08	31.94	30.91	66.11
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	53.59	206.70	9.66	197.04	1,438.55	37.93	37.71	80.28
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	56.89	215.94	11.16	204.78	1,678.29	40.97	39.25	84.26
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	56.91	216.10	11.17	204.93	1,680.23	40.99	39.27	84.29

Table 1-131

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	14.40	84.76	0.99	83.78	167.59	12.95	9.19	23.43
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.61	84.85	1.03	83.82	170.40	13.05	9.28	23.97
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.62	85.00	1.03	83.97	170.75	13.07	9.28	23.99
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	16.62	96.41	0.89	95.52	192.51	13.87	11.58	26.10
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	16.68	141.38	0.90	140.48	338.87	18.41	11.43	25.15
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.66	89.59	1.25	88.35	276.17	16.62	11.47	28.48
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.92	89.69	1.25	88.44	280.99	16.76	11.53	28.51
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.93	89.78	1.25	88.53	281.68	16.78	11.53	28.54
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	18.08	100.99	0.94	100.05	223.91	14.96	12.74	28.06
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	18.09	101.13	0.94	100.19	224.48	14.98	12.74	28.08
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	18.45	140.77	0.92	139.85	373.71	19.33	12.27	27.21
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	18.45	140.84	0.92	139.92	374.09	19.34	12.28	27.23
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	20.36	106.83	1.08	105.75	332.24	18.23	13.68	31.90
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	22.29	113.86	1.14	112.72	388.03	19.70	14.95	35.21
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	22.31	114.00	1.14	112.86	389.14	19.73	14.96	35.27
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	25.18	175.48	3.34	172.13	498.80	22.33	16.12	36.74
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	27.71	141.27	3.52	137.75	417.62	20.44	19.52	42.08
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	28.80	138.41	5.48	132.93	419.63	20.48	20.49	42.61
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	30.09	176.29	1.87	174.42	739.08	27.19	19.83	46.22
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	31.08	172.81	4.45	168.36	617.92	24.86	20.50	45.73
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	34.49	155.14	6.88	148.26	591.38	24.32	25.01	51.41
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	34.71	159.37	3.32	156.05	741.16	27.22	22.36	54.00
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	35.16	143.86	6.55	137.31	684.39	26.16	23.88	52.70
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	43.20	164.24	7.77	156.47	1,009.04	31.77	29.64	66.56

Table 1-132

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.22	46.55	0.48	46.07	49.50	7.04	4.53	12.07
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.31	46.62	0.48	46.14	50.29	7.09	4.57	12.26
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.31	46.65	0.48	46.18	50.33	7.09	4.57	12.26
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.77	50.61	0.54	50.06	79.43	8.91	5.48	14.28
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.88	50.68	0.54	50.13	80.80	8.99	5.61	14.30
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.88	50.73	0.54	50.19	80.92	9.00	5.62	14.31
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	10.64	65.25	0.53	64.71	90.13	9.49	7.29	16.92
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	10.86	120.53	0.65	119.88	221.56	14.88	7.39	16.05
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.46	68.61	0.52	68.09	103.63	10.18	7.95	18.13
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.46	68.69	0.52	68.17	103.89	10.19	7.95	18.15
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	11.86	119.70	0.61	119.08	234.87	15.33	8.04	17.79
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	11.87	119.75	0.61	119.13	235.07	15.33	8.04	17.80
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	12.93	72.81	0.64	72.17	156.87	12.52	8.59	19.66
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.02	77.58	0.62	76.96	180.32	13.43	9.49	21.81
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.03	77.67	0.62	77.05	180.76	13.44	9.50	21.82
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	20.58	170.67	2.11	168.56	468.75	21.65	13.24	30.34
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	21.33	110.68	3.96	106.72	250.70	15.83	15.45	30.87
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	25.08	126.49	4.00	122.49	343.77	18.54	17.77	37.57
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	25.09	126.58	4.00	122.58	344.30	18.56	17.77	37.58
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	25.72	166.84	2.29	164.55	591.39	24.32	16.61	38.42
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	25.73	166.92	2.29	164.63	591.81	24.33	16.62	38.43
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	26.13	119.44	3.81	115.64	428.15	20.69	17.79	39.13
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	31.31	139.02	3.79	135.23	606.37	24.62	20.81	48.32
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	31.32	139.11	3.80	135.31	607.20	24.64	20.81	48.35

Table 1-133

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.63	68.95	0.43	68.52	96.62	9.83	8.35	18.03
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.84	73.13	0.42	72.70	98.93	9.95	8.53	18.47
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.84	73.15	0.42	72.73	98.99	9.95	8.53	18.48
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.25	84.36	0.50	83.86	176.72	13.29	10.10	22.53
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.52	84.38	0.50	83.88	182.17	13.50	10.41	22.69
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.53	84.41	0.50	83.91	182.32	13.50	10.41	22.70
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	16.53	111.29	0.28	111.00	205.77	14.34	11.30	26.14
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	18.50	118.62	0.28	118.35	249.42	15.79	12.33	29.69
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	18.50	118.63	0.28	118.36	249.44	15.79	12.33	29.70
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	20.69	131.24	0.36	130.88	383.65	19.59	14.07	32.94
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	21.98	174.06	0.38	173.68	687.68	26.22	14.00	34.55
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	23.41	142.64	0.33	142.31	471.07	21.70	15.81	37.63
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	23.41	142.65	0.33	142.32	471.11	21.71	15.81	37.63
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	25.09	172.55	0.36	172.19	780.26	27.93	16.73	40.37
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	25.09	172.58	0.36	172.22	780.41	27.94	16.73	40.37
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	27.85	179.72	2.95	176.77	557.03	23.60	18.48	42.41
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	35.47	219.23	2.69	216.53	1,036.90	32.20	22.47	56.44
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	36.11	211.70	3.02	208.68	757.03	27.51	23.22	55.18
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	37.80	246.37	2.33	244.04	1,482.06	38.50	23.84	61.84
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	38.20	243.35	2.03	241.32	940.90	30.67	25.44	59.10
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	47.31	260.55	2.79	257.76	1,509.62	38.85	30.62	73.48
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	50.32	301.80	2.18	299.62	1,892.32	43.50	34.06	81.07
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	51.24	304.64	2.55	302.09	2,099.87	45.82	33.83	81.53
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	56.41	353.09	2.10	350.99	2,675.44	51.72	39.10	92.02

Table 1-137

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.71	31.15	0.23	30.92	25.33	5.03	3.90	9.71
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.81	32.58	0.23	32.36	25.74	5.07	4.05	9.72
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.81	32.60	0.23	32.38	25.76	5.08	4.06	9.72
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.86	38.42	0.27	38.15	41.08	6.41	4.79	10.84
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.99	38.49	0.27	38.22	41.59	6.45	4.96	11.06
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.00	38.51	0.27	38.25	41.66	6.45	4.96	11.06
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.65	49.78	0.26	49.52	47.85	6.92	6.23	13.79
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.48	52.37	0.26	52.11	55.56	7.45	6.92	14.96
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.48	52.41	0.26	52.15	55.66	7.46	6.92	14.97
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	9.84	68.99	0.25	68.73	90.01	9.49	7.05	15.47
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.42	58.19	0.31	57.89	80.51	8.97	7.43	15.89
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	10.95	69.99	0.26	69.73	102.35	10.12	7.78	17.04
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	10.95	70.05	0.26	69.79	102.45	10.12	7.78	17.04
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.50	62.09	0.30	61.78	93.12	9.65	8.26	17.55
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	11.51	62.13	0.30	61.82	93.30	9.66	8.26	17.56
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.92	88.17	0.56	87.61	143.61	11.98	10.56	23.46
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	15.77	139.42	0.69	138.72	320.21	17.89	10.75	23.95
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	17.41	99.79	0.56	99.23	190.12	13.79	12.59	26.05
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	17.42	99.86	0.56	99.29	190.42	13.80	12.59	26.08
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	18.10	99.90	0.70	99.20	250.31	15.82	12.71	27.68
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	19.30	141.13	0.71	140.42	396.31	19.91	12.57	29.10
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	19.30	141.26	0.71	140.55	396.79	19.92	12.57	29.10
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	21.52	114.40	0.71	113.69	335.46	18.32	14.77	33.49
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	21.53	114.47	0.71	113.76	335.94	18.33	14.78	33.51

Table 1-139

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	31.23	153.53	3.37	150.17	471.41	21.71	22.37	46.42
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	31.74	159.70	3.46	156.24	479.42	21.90	22.60	46.50
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	31.74	159.74	3.46	156.27	479.54	21.90	22.61	46.51
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	37.70	200.15	4.54	195.61	653.32	25.56	26.50	55.30
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	38.47	183.23	3.63	179.60	812.83	28.51	26.26	57.94
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	39.13	183.30	3.63	179.67	829.46	28.80	26.61	59.48
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	39.14	183.33	3.63	179.70	829.82	28.81	26.61	59.50
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	41.27	208.57	4.63	203.93	745.50	27.30	28.76	60.05
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	41.28	208.62	4.64	203.99	745.84	27.31	28.76	60.06
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	43.78	198.07	11.90	186.17	712.59	26.69	31.25	62.07
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	45.32	239.89	3.85	236.04	1,356.45	36.83	30.82	69.30
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	46.85	231.36	4.65	226.72	1,165.85	34.14	31.64	69.83
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	50.02	253.17	8.38	244.79	1,424.87	37.75	33.20	73.80
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	50.69	258.08	3.96	254.12	1,566.26	39.58	34.91	76.85
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	50.70	258.10	3.96	254.14	1,566.56	39.58	34.91	76.86
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	51.75	246.11	4.77	241.33	1,363.12	36.92	34.96	77.01
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	51.76	246.16	4.77	241.38	1,363.74	36.93	34.97	77.02
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	53.66	230.35	14.01	216.34	969.44	31.14	38.42	76.88
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	53.90	256.42	11.06	245.36	1,108.85	33.30	38.77	78.38
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	55.05	224.65	10.93	213.72	1,256.07	35.44	37.72	80.19
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	64.88	296.30	10.12	286.17	2,059.19	45.38	45.34	94.55
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	69.20	269.98	12.23	257.75	1,856.32	43.09	47.31	97.06
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	69.79	309.23	10.41	298.82	2,220.46	47.12	47.40	99.76
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	71.27	355.58	9.16	346.42	2,827.89	53.18	48.72	110.76

Table 1-140

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.75	58.51	0.27	58.24	76.45	8.74	8.83	18.66
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.99	61.59	0.28	61.31	77.84	8.82	8.99	18.69
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.99	61.61	0.28	61.34	77.88	8.82	8.99	18.70
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.21	74.08	0.31	73.77	123.47	11.11	10.95	22.52
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.51	74.15	0.31	73.84	125.97	11.22	10.96	22.90
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.52	74.18	0.31	73.87	126.10	11.23	10.97	22.91
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.26	92.61	0.37	92.24	155.09	12.45	13.17	26.09
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.14	97.19	0.36	96.82	179.75	13.41	14.38	28.65
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.14	97.23	0.36	96.87	179.89	13.41	14.39	28.65
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	20.93	110.07	0.41	109.66	253.41	15.92	15.95	32.68
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	20.95	109.87	0.39	109.48	278.87	16.70	15.35	33.15
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	23.31	117.14	0.40	116.74	297.01	17.23	17.71	35.39
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	23.32	117.19	0.40	116.79	297.26	17.24	17.71	35.41
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	23.52	119.44	0.38	119.06	329.16	18.14	17.41	36.62
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	23.52	119.46	0.38	119.08	329.28	18.15	17.41	36.62
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.73	138.79	1.71	137.08	311.82	17.66	17.14	35.36
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	27.03	163.25	1.86	161.39	610.15	24.70	17.96	41.57
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	28.80	162.19	1.96	160.23	533.49	23.10	20.13	42.57
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	28.87	155.87	1.76	154.12	422.89	20.56	20.47	42.30
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	28.88	155.95	1.76	154.19	423.31	20.57	20.48	42.31
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	34.48	181.09	1.85	179.24	826.91	28.76	23.22	52.91
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	34.48	181.12	1.85	179.26	827.42	28.76	23.22	52.92
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	35.73	183.73	1.98	181.75	744.51	27.29	24.62	54.32
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	35.74	183.80	1.98	181.83	745.18	27.30	24.62	54.35

Table 1-141

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.42	47.27	0.72	46.56	58.44	7.64	4.35	12.97
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.49	47.37	0.73	46.64	59.23	7.70	4.37	13.09
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.49	47.40	0.73	46.67	59.28	7.70	4.37	13.11
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.90	89.01	0.73	88.27	115.27	10.74	5.44	11.40
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.41	88.16	0.75	87.42	118.03	10.86	5.91	12.21
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.41	88.23	0.75	87.48	118.21	10.87	5.91	12.22
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	9.03	55.06	0.83	54.22	88.78	9.42	5.38	14.73
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	9.10	55.17	0.84	54.33	89.92	9.48	5.37	14.76
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	9.11	55.24	0.84	54.40	90.09	9.49	5.37	14.77
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.31	56.25	0.75	55.50	80.24	8.96	5.87	15.01
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.80	58.23	0.77	57.46	86.77	9.31	6.10	15.85
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.81	58.34	0.77	57.57	87.12	9.33	6.11	15.88
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	11.26	62.60	0.87	61.73	127.67	11.30	7.17	17.69
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.90	64.63	0.90	63.73	138.52	11.77	7.52	18.58
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	11.91	64.81	0.90	63.91	139.09	11.79	7.52	18.60
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	18.24	140.85	4.08	136.77	296.27	17.21	12.86	25.08
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	19.87	136.52	4.42	132.09	318.46	17.85	13.41	27.97
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	19.89	136.65	4.43	132.22	319.06	17.86	13.42	28.00
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.15	123.12	4.33	118.80	395.83	19.90	17.92	36.98
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	27.55	131.30	4.74	126.56	451.44	21.25	18.75	40.65
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	27.58	131.51	4.74	126.77	453.03	21.28	18.77	40.70
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	31.63	127.12	5.38	121.74	609.91	24.70	20.95	48.24
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	33.69	136.64	5.76	130.88	712.52	26.69	22.83	52.06
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	33.72	136.85	5.76	131.08	714.88	26.74	22.85	52.14

Table 1-142

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.60	19.14	0.18	18.96	9.14	3.02	2.60	5.59
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.67	20.40	0.18	20.22	9.32	3.05	2.65	5.78
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.67	20.43	0.18	20.26	9.34	3.06	2.65	5.78
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.27	24.38	0.19	24.19	15.38	3.92	3.10	6.76
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.35	24.42	0.19	24.23	15.70	3.96	3.22	6.94
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.36	24.46	0.19	24.27	15.74	3.97	3.22	6.95
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.69	32.91	0.21	32.70	19.56	4.42	4.35	8.94
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.34	35.27	0.21	35.06	24.05	4.90	4.81	9.91
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.34	35.29	0.21	35.08	24.07	4.91	4.82	9.91
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.80	38.65	0.23	38.43	34.42	5.87	5.16	10.56
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.92	64.39	0.20	64.19	67.89	8.24	5.02	11.08
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.63	42.49	0.22	42.27	42.14	6.49	5.63	11.90
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.64	42.51	0.22	42.29	42.20	6.50	5.63	11.90
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	7.84	64.65	0.19	64.46	75.82	8.71	5.51	12.26
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.84	64.71	0.19	64.52	75.91	8.71	5.51	12.26
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.15	68.31	0.27	68.04	80.36	8.96	8.15	17.34
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	13.21	100.88	0.29	100.59	194.65	13.95	9.06	22.04
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.55	79.71	0.33	79.38	136.95	11.70	9.86	21.48
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	14.02	79.96	0.26	79.70	119.90	10.95	10.37	21.85
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.02	80.00	0.26	79.74	120.01	10.96	10.37	21.86
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	17.36	102.31	0.33	101.99	263.52	16.23	12.84	27.65
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	17.36	102.40	0.33	102.07	263.77	16.24	12.84	27.66
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.41	94.18	0.31	93.87	207.23	14.40	13.14	27.07
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.41	94.22	0.31	93.91	207.41	14.40	13.15	27.09

Table 1-143

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	14.35	77.91	0.66	77.25	137.16	11.71	10.23	22.86
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.58	81.71	0.67	81.04	140.09	11.84	10.56	22.93
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.59	81.75	0.67	81.07	140.18	11.84	10.56	22.93
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.50	92.52	0.79	91.74	229.53	15.15	12.29	27.47
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.79	92.68	0.79	91.89	234.78	15.32	12.44	27.73
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.80	92.72	0.79	91.93	235.11	15.33	12.45	27.74
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.97	105.83	0.56	105.27	194.47	13.95	13.65	28.18
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.69	111.44	0.58	110.86	228.57	15.12	14.94	30.23
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.70	111.58	0.58	111.00	229.09	15.14	14.94	30.24
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	20.30	150.62	0.65	149.97	430.75	20.75	13.77	31.51
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22.06	119.64	0.70	118.94	337.89	18.38	15.98	33.29
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	22.65	149.99	0.65	149.34	484.76	22.02	15.16	34.71
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	22.66	150.13	0.65	149.47	485.35	22.03	15.17	34.73
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	24.34	128.09	0.70	127.39	400.38	20.01	17.38	37.92
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	24.36	128.22	0.70	127.53	401.33	20.03	17.40	37.96
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	29.15	146.19	4.12	142.07	386.16	19.65	21.58	41.62
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	29.40	187.57	2.26	185.31	650.37	25.50	19.73	42.71
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	31.54	165.59	2.08	163.52	491.07	22.16	22.74	46.02
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	35.40	166.15	6.48	159.67	545.97	23.37	25.99	51.95
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	35.59	158.74	5.30	153.44	647.15	25.44	24.93	51.95
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	36.94	184.65	3.34	181.31	843.84	29.05	24.96	54.56
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	37.95	194.90	1.37	193.53	1,062.14	32.59	26.07	58.33
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	39.59	191.08	1.98	189.10	884.03	29.73	27.13	60.39
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	44.17	183.39	5.58	177.80	950.74	30.83	30.68	66.08

Table 1-149

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.25	28.89	0.18	28.71	21.08	4.59	4.79	9.56
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.40	30.99	0.18	30.81	21.56	4.64	4.96	9.61
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.40	31.03	0.18	30.85	21.58	4.65	4.98	9.62
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.51	38.00	0.20	37.79	34.10	5.84	5.75	11.26
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.69	38.02	0.19	37.83	35.13	5.93	5.88	11.36
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.70	38.07	0.19	37.88	35.17	5.93	5.88	11.36
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	12.95	63.97	0.18	63.79	125.61	11.21	9.26	22.32
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	13.73	71.89	0.31	71.57	104.94	10.24	10.38	20.90
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	15.52	76.38	0.24	76.15	125.90	11.22	11.60	24.16
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.82	94.15	0.19	93.96	205.19	14.32	11.05	27.33
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	16.72	86.19	0.34	85.86	171.92	13.11	12.52	25.46
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	17.19	105.96	0.17	105.79	250.18	15.82	12.65	28.42
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	17.94	95.81	0.30	95.51	249.02	15.78	13.14	29.36
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	19.00	94.16	0.25	93.91	209.71	14.48	14.28	29.63
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	20.52	105.96	0.24	105.73	297.77	17.26	15.36	33.08
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	38.44	213.30	1.55	211.74	757.18	27.52	29.24	55.44
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	47.62	262.04	1.73	260.32	1,299.35	36.05	36.37	69.02
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	48.14	236.17	1.68	234.49	920.82	30.34	37.82	69.18
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	48.14	236.18	1.68	234.50	920.84	30.35	37.82	69.18
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	50.49	287.55	1.64	285.92	1,652.49	40.65	38.82	77.10
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	60.70	291.34	1.91	289.43	1,677.22	40.95	48.40	88.71
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	60.70	291.35	1.91	289.44	1,677.27	40.95	48.40	88.71
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	65.33	332.11	1.82	330.29	2,198.02	46.88	52.00	97.77
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	65.34	332.11	1.82	330.29	2,198.24	46.89	52.00	97.77

Table 2-6

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.51	19.76	0.36	19.41	9.36	3.06	1.45	4.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.61	151.12	0.33	150.79	418.68	20.46	1.36	3.49
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.14	111.56	0.46	111.10	65.89	8.12	1.67	5.68
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.59	146.74	0.38	146.36	383.33	19.58	1.93	4.79
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.60	148.12	0.38	147.74	389.87	19.75	1.93	4.80
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.76	34.79	0.27	34.52	27.75	5.27	2.14	6.21
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.77	34.80	0.27	34.53	27.80	5.27	2.14	6.22
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.83	150.39	0.39	150.01	387.11	19.68	2.17	5.07
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.87	32.39	0.28	32.11	25.84	5.08	2.23	6.28
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.50	123.74	0.58	123.16	256.59	16.02	2.48	6.21
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.50	124.32	0.58	123.74	258.21	16.07	2.48	6.21
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.53	126.26	0.58	125.68	259.22	16.10	2.53	6.32
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.60	99.95	0.33	99.63	78.11	8.84	2.50	8.58
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.61	100.01	0.33	99.69	78.25	8.85	2.51	8.59
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.71	94.71	0.36	94.35	71.60	8.46	2.63	8.10
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.78	170.29	0.87	169.42	410.78	20.27	2.54	6.66
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.85	154.47	1.07	153.40	424.80	20.61	2.81	6.28
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.90	32.51	0.50	32.01	22.94	4.79	2.85	7.84
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.26	34.46	0.79	33.67	29.13	5.40	3.36	8.80
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.38	52.28	0.45	51.83	55.68	7.46	3.02	9.63
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.38	52.29	0.45	51.84	55.71	7.46	3.03	9.63
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.39	52.30	0.46	51.84	55.13	7.42	3.03	9.65
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.06	103.93	0.74	103.19	78.24	8.85	3.43	10.17
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.57	77.50	0.54	76.97	100.54	10.03	3.48	12.02
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.58	77.54	0.54	77.01	100.60	10.03	3.48	12.03
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.59	73.68	0.54	73.14	97.91	9.90	3.49	12.04
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.67	113.38	0.96	112.42	98.36	9.92	4.04	11.07

Table 2-8

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.69	131.09	0.73	130.36	270.97	16.46	3.27	8.20
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.69	131.17	0.73	130.43	271.14	16.47	3.28	8.20
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.75	103.98	0.79	103.19	160.09	12.65	3.35	8.64
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.75	104.03	0.79	103.24	160.17	12.66	3.35	8.64
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.76	105.02	0.79	104.23	159.48	12.63	3.43	8.57
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.88	133.55	0.72	132.83	265.96	16.31	3.39	8.45
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.33	64.04	0.67	63.37	86.29	9.29	4.15	13.03
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.37	68.97	0.71	68.27	93.80	9.68	4.19	13.34
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.37	68.98	0.71	68.27	93.81	9.69	4.20	13.34
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.13	71.39	0.77	70.62	102.43	10.12	4.65	14.50
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.16	71.39	0.80	70.59	103.51	10.17	4.62	14.50
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.16	71.39	0.80	70.59	103.52	10.17	4.62	14.50
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	9.00	75.95	0.83	75.12	149.28	12.22	4.86	16.19
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	9.09	79.65	0.87	78.78	161.50	12.71	4.93	17.30
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	9.09	79.65	0.87	78.78	161.53	12.71	4.93	17.30
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.02	67.89	0.97	66.92	162.84	12.76	5.56	17.72
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.05	67.89	0.97	66.91	165.18	12.85	5.59	17.71
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.05	67.89	0.97	66.92	165.19	12.85	5.59	17.71
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	12.41	161.51	2.73	158.78	420.13	20.50	7.90	17.47
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	12.41	161.67	2.73	158.94	420.57	20.51	7.90	17.47
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	13.16	170.11	2.76	167.34	396.43	19.91	8.50	18.68
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	17.82	109.84	2.51	107.33	288.39	16.98	11.65	27.55
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	17.83	109.85	2.52	107.33	288.47	16.98	11.65	27.55
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	18.09	94.28	2.54	91.74	251.84	15.87	12.18	27.50
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	22.28	114.30	2.71	111.59	484.18	22.00	14.55	37.81
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	22.28	114.31	2.71	111.60	484.34	22.01	14.55	37.81
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22.30	115.22	2.99	112.23	413.91	20.34	14.71	35.61

Table 2-13

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.55	149.31	1.34	147.97	1,220.33	34.93	30.40	69.17
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.55	149.34	1.34	148.00	1,051.09	32.42	29.41	65.51
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	8.68	150.45	1.25	149.20	1,220.06	34.93	30.40	69.16
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	9.07	136.83	1.45	135.38	333.67	18.27	8.29	26.91
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	9.08	136.57	1.45	135.12	308.93	17.58	8.24	26.54
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	9.08	136.59	1.45	135.14	333.65	18.27	8.29	26.91
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.82	92.04	1.71	90.33	378.40	19.45	9.35	28.88
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.96	101.78	1.76	100.02	382.28	19.55	9.35	28.71
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.96	101.78	1.76	100.02	382.29	19.55	9.35	28.71
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	13.44	110.75	2.03	108.72	451.30	21.24	14.37	29.26
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	13.52	110.75	2.10	108.65	413.84	20.34	14.95	30.94
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	13.52	110.75	2.10	108.65	451.16	21.24	14.37	29.26
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.78	95.13	1.96	93.18	341.91	18.49	5.08	12.14
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	15.04	96.42	2.08	94.33	330.07	18.17	5.27	12.57
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.04	96.42	2.08	94.33	341.85	18.49	5.08	12.14
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	16.84	98.70	2.35	96.35	273.54	16.54	5.61	13.09
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	16.95	98.69	2.35	96.34	278.60	16.69	5.58	13.19
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	16.95	98.70	2.35	96.34	278.64	16.69	5.58	13.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	21.34	171.90	6.08	165.83	734.79	27.11	22.61	49.41
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	21.35	171.96	6.08	165.89	637.01	25.24	23.03	49.71
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	22.03	170.83	5.55	165.28	734.66	27.10	22.61	49.40
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	33.45	189.02	5.13	183.88	188.60	13.73	6.72	19.93
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	33.46	189.02	5.13	183.89	172.19	13.12	6.93	19.40
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	33.63	156.68	5.41	151.27	188.59	13.73	6.72	19.93
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	42.22	193.66	7.99	185.67	223.76	14.96	7.78	22.14
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	42.75	192.09	7.39	184.71	226.57	15.05	7.78	22.29
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	42.75	192.10	7.39	184.71	226.58	15.05	7.78	22.29

Table 2-18

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	4.54	39.31	0.48	38.84	33.61	5.80	2.40	8.37
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.62	193.28	0.71	192.57	571.19	23.90	2.40	6.75
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.59	173.30	0.51	172.79	482.31	21.96	3.07	8.00
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.59	173.55	0.51	173.03	483.09	21.98	3.07	8.00
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.65	179.16	0.46	178.70	468.08	21.64	3.04	8.28
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.13	124.22	0.69	123.53	123.06	11.09	3.42	11.75
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.21	59.23	0.33	58.89	75.92	8.71	3.33	11.04
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.38	65.63	0.38	65.24	85.52	9.25	3.39	11.47
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.38	65.63	0.38	65.24	85.55	9.25	3.39	11.47
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.97	145.99	0.76	145.22	308.73	17.57	3.91	10.57
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.98	143.52	0.76	142.76	313.62	17.71	3.90	10.56
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.98	143.90	0.76	143.13	314.44	17.73	3.90	10.57
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.87	200.85	1.49	199.36	514.39	22.68	4.15	12.54
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.98	104.90	0.46	104.44	163.84	12.80	3.98	15.21
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.27	110.61	0.54	110.07	182.96	13.53	4.08	16.47
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.27	110.62	0.54	110.08	183.02	13.53	4.08	16.47
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.32	61.50	0.52	60.98	75.40	8.68	4.93	14.22
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.87	196.93	1.44	195.49	573.30	23.94	5.22	12.83
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.16	89.51	0.58	88.92	148.48	12.19	5.09	16.29
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.24	89.50	0.64	88.86	150.61	12.27	5.09	16.63
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.24	89.50	0.64	88.87	150.65	12.27	5.09	16.64
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.68	66.69	1.00	65.69	100.87	10.04	5.81	17.05
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.92	111.49	1.62	109.87	170.39	13.05	5.96	19.02
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.71	82.24	0.86	81.38	257.25	16.04	6.27	22.14
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	11.81	86.62	0.86	85.76	262.14	16.19	6.18	22.24
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	11.81	86.63	0.86	85.76	262.23	16.19	6.18	22.25
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.15	127.62	1.51	126.11	238.59	15.45	8.58	23.14

Table 2-20

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.09	20.08	0.15	19.93	9.34	3.06	1.12	3.90
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.31	184.64	0.12	184.51	542.64	23.29	1.15	3.20
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.74	117.11	0.34	116.77	72.23	8.50	1.44	5.58
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.21	166.44	0.25	166.19	459.20	21.43	1.65	4.64
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.21	166.69	0.25	166.44	459.98	21.45	1.65	4.64
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.30	36.10	0.18	35.92	29.40	5.42	1.77	5.99
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.30	36.10	0.18	35.92	29.41	5.42	1.77	5.99
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.32	33.19	0.18	33.00	27.16	5.21	1.80	5.92
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.34	174.31	0.25	174.06	459.16	21.43	1.72	4.89
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.10	31.79	0.17	31.62	21.74	4.66	2.22	7.19
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.13	104.19	0.21	103.98	85.91	9.27	2.06	8.17
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.13	104.20	0.21	103.98	85.93	9.27	2.06	8.17
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.13	99.52	0.24	99.28	78.78	8.88	2.04	8.15
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.16	202.61	0.57	202.05	521.08	22.83	2.02	6.19
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.29	137.76	0.46	137.30	296.90	17.23	2.29	6.42
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.29	138.01	0.46	137.55	297.46	17.25	2.29	6.42
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.30	141.83	0.46	141.37	299.61	17.31	2.33	6.52
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.48	186.70	0.73	185.97	542.45	23.29	2.40	6.23
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	4.60	34.12	0.49	33.63	28.23	5.31	2.69	7.95
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.09	54.21	0.38	53.83	58.23	7.63	2.78	9.54
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.10	54.21	0.37	53.83	58.94	7.68	2.78	9.80
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.10	54.21	0.37	53.83	58.95	7.68	2.78	9.80
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.24	109.06	0.51	108.55	81.79	9.04	2.86	9.09
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.02	118.83	0.77	118.06	103.75	10.19	3.51	10.83
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.30	77.33	0.43	76.90	107.46	10.37	3.30	12.27
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.31	80.79	0.43	80.36	110.13	10.49	3.30	12.27
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.31	80.79	0.43	80.36	110.16	10.50	3.30	12.27

Table 2-21

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.32	151.49	0.32	151.17	410.67	20.27	1.79	4.52
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.32	151.71	0.32	151.38	411.31	20.28	1.79	4.52
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.39	31.85	0.25	31.61	23.74	4.87	1.89	5.59
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.39	31.85	0.25	31.61	23.75	4.87	1.89	5.60
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.50	29.70	0.25	29.45	22.28	4.72	1.97	5.63
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.54	156.86	0.35	156.51	411.62	20.29	1.95	4.80
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.14	101.02	0.30	100.72	73.37	8.57	2.24	7.51
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.14	101.03	0.30	100.73	73.39	8.57	2.24	7.51
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.19	161.14	0.72	160.43	458.41	21.41	2.38	5.52
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.20	161.42	0.72	160.71	459.77	21.44	2.38	5.53
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.24	128.14	0.53	127.61	270.72	16.45	2.31	5.91
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.24	128.37	0.53	127.84	271.20	16.47	2.31	5.91
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.25	96.32	0.33	95.99	67.81	8.23	2.43	7.35
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.26	130.97	0.53	130.45	273.63	16.54	2.35	5.94
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	4.39	30.10	0.61	29.49	22.60	4.75	2.71	7.28
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	4.39	30.10	0.61	29.49	22.61	4.75	2.71	7.28
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.64	28.42	0.76	27.65	20.46	4.52	2.93	7.44
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.68	180.30	0.68	179.62	444.70	21.09	2.59	6.31
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.93	48.50	0.43	48.07	48.17	6.94	2.74	9.05
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	4.93	48.50	0.43	48.07	48.18	6.94	2.74	9.05
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	4.94	48.51	0.44	48.07	47.66	6.90	2.80	8.98
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	5.59	114.51	0.78	113.73	88.98	9.43	3.29	9.69
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	5.59	114.52	0.78	113.74	89.00	9.43	3.29	9.69
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.84	105.64	0.90	104.75	75.39	8.68	3.50	9.61
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.01	78.20	0.51	77.70	90.55	9.52	3.28	10.64
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.01	78.21	0.51	77.70	90.56	9.52	3.28	10.64
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.03	74.79	0.51	74.28	88.15	9.39	3.28	10.65

Table 2-23

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.23	3.12	0.01	3.11	0.25	0.50	0.13	0.46
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.26	56.06	0.01	56.05	13.60	3.69	0.14	0.54
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.30	79.50	0.01	79.50	112.79	10.62	0.12	0.49
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.38	5.49	0.02	5.47	0.65	0.81	0.21	0.72
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.42	5.07	0.02	5.05	0.63	0.79	0.24	0.74
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.47	56.16	0.03	56.13	14.28	3.78	0.25	0.94
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.50	54.25	0.02	54.22	13.11	3.62	0.28	0.88
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.50	79.78	0.03	79.75	112.97	10.63	0.23	0.74
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.56	92.40	0.01	92.39	119.19	10.92	0.25	0.75
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.74	8.55	0.04	8.51	1.39	1.18	0.41	1.34
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.74	8.55	0.04	8.51	1.39	1.18	0.41	1.34
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.80	52.73	0.05	52.68	12.94	3.60	0.44	1.43
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.80	52.73	0.05	52.68	12.94	3.60	0.44	1.43
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.82	7.88	0.04	7.84	1.49	1.22	0.48	1.44
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.83	88.55	0.04	88.51	131.96	11.49	0.39	1.19
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.83	88.61	0.04	88.57	132.05	11.49	0.39	1.19
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.90	52.94	0.05	52.90	13.08	3.62	0.52	1.57
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.94	92.05	0.05	92.00	132.41	11.51	0.45	1.32
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.23	15.23	0.10	15.12	3.53	1.88	0.65	2.32
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.23	15.23	0.10	15.12	3.53	1.88	0.65	2.32
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.25	15.23	0.10	15.12	3.50	1.87	0.68	2.32
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.26	78.58	0.11	78.47	97.34	9.87	0.63	1.86
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.26	78.66	0.11	78.55	97.43	9.87	0.63	1.86
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.28	80.66	0.11	80.55	98.61	9.93	0.63	1.86
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.36	41.39	0.12	41.27	11.15	3.34	0.73	2.43
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.36	41.39	0.12	41.27	11.15	3.34	0.73	2.43
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.38	41.62	0.12	41.49	11.21	3.35	0.75	2.43

Table 2-29

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.55	101.50	1.35	100.15	153.31	12.38	4.61	11.02
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.55	101.51	1.35	100.16	153.33	12.38	4.61	11.02
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	7.57	102.42	1.35	101.07	153.17	12.38	4.67	11.02
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.73	126.48	1.39	125.08	253.14	15.91	4.71	11.21
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	7.73	126.50	1.39	125.11	253.19	15.91	4.71	11.22
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.98	128.56	1.34	127.22	250.51	15.83	4.97	11.30
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.14	81.49	2.05	79.44	149.10	12.21	6.63	18.58
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.20	86.82	1.97	84.85	161.55	12.71	6.44	18.82
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.20	86.83	1.97	84.85	161.56	12.71	6.44	18.82
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.99	87.76	2.16	85.60	168.49	12.98	6.97	19.92
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	12.03	87.76	2.22	85.54	170.27	13.05	6.97	20.15
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	12.03	87.76	2.22	85.54	170.27	13.05	6.97	20.15
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.59	75.34	2.12	73.22	241.80	15.55	7.73	23.40
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	13.75	79.49	2.11	77.38	259.79	16.12	7.76	24.14
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.75	79.49	2.11	77.38	259.81	16.12	7.76	24.14
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.70	85.45	2.31	83.14	260.04	16.13	8.42	25.73
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.75	85.45	2.31	83.13	263.16	16.22	8.43	25.73
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.75	85.45	2.31	83.14	263.17	16.22	8.43	25.73
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	20.26	157.43	5.96	151.46	405.81	20.14	14.06	27.34
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	20.26	157.48	5.97	151.51	405.94	20.15	14.07	27.35
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	21.53	165.46	5.76	159.71	394.86	19.87	14.66	29.06
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	31.88	156.66	5.75	150.91	620.85	24.92	21.64	47.26
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	31.88	156.66	5.75	150.91	620.95	24.92	21.64	47.26
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	32.43	138.69	6.22	132.46	547.39	23.40	23.85	45.66
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	39.79	164.08	7.75	156.33	978.07	31.27	28.32	61.59
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	39.79	164.09	7.75	156.33	978.26	31.28	28.32	61.59
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	39.91	165.25	8.01	157.23	852.57	29.20	28.38	60.50

Table 2-30

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.59	103.29	1.41	101.88	156.08	12.49	4.71	11.16
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.59	103.31	1.41	101.90	156.11	12.49	4.71	11.16
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	7.61	104.62	1.41	103.21	155.93	12.49	4.73	11.16
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.67	129.33	1.43	127.90	258.62	16.08	4.60	11.29
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	7.67	129.35	1.43	127.93	258.67	16.08	4.60	11.29
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.88	132.09	1.38	130.70	254.50	15.95	4.80	11.16
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	10.93	80.81	1.97	78.84	147.37	12.14	6.53	18.34
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.01	86.49	1.91	84.58	159.02	12.61	6.46	18.59
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.01	86.49	1.91	84.58	159.03	12.61	6.46	18.59
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.91	87.51	2.18	85.33	166.30	12.90	6.89	20.05
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.95	87.51	2.27	85.25	168.05	12.96	6.89	20.19
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.96	87.51	2.27	85.25	168.06	12.96	6.89	20.19
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.37	75.68	2.19	73.49	241.11	15.53	7.60	22.84
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	13.54	79.37	2.08	77.29	259.18	16.10	7.55	23.93
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.54	79.37	2.08	77.29	259.20	16.10	7.55	23.93
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.61	85.89	2.44	83.45	259.75	16.12	8.39	25.32
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.66	85.89	2.44	83.45	262.71	16.21	8.31	25.32
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.66	85.89	2.44	83.45	262.72	16.21	8.31	25.32
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	20.41	162.63	5.96	156.66	417.95	20.44	14.27	27.36
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	20.41	162.68	5.97	156.72	418.08	20.45	14.27	27.36
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	21.53	172.70	5.76	166.94	404.85	20.12	14.73	30.08
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	31.54	156.10	5.48	150.62	610.60	24.71	21.45	46.42
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	31.55	156.11	5.48	150.63	610.70	24.71	21.45	46.43
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	32.00	137.55	6.07	131.48	542.26	23.29	23.72	45.93
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	39.54	163.24	7.75	155.50	972.80	31.19	28.15	61.24
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	39.54	163.25	7.75	155.51	973.00	31.19	28.15	61.25
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	39.59	164.56	7.76	156.80	846.79	29.10	28.18	59.73

Table 2-33

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.731036821	94.8837	0.1564	94.7273	144.8833371	12.03674944	0.876425	2.589175
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.7311293	94.9105	0.1564	94.7541	144.9241588	12.03844503	0.876525	2.5892
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.731144106	25.2724	0.1566	25.1158	10.55487923	3.248827362	0.922775	3.503775
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.731235846	25.2726	0.1566	25.116	10.55541751	3.248910204	0.9228	3.503875
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.79910407	23.1921	0.1612	23.0309	9.570618326	3.093641596	0.953775	3.505425
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.844434109	97.5036	0.1517	97.3519	143.0868309	11.96189077	0.941975	2.68945
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.980227094	88.1973	0.2016	87.9957	121.3186245	11.01447341	1.016275	2.970275
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.980328253	88.2433	0.2016	88.0417	121.3741609	11.01699418	1.0164	2.97035
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.993885463	90.1903	0.198	89.9923	121.8467867	11.0384232	1.020325	2.97045
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.074695363	54.8413	0.1889	54.6524	26.65534028	5.162881006	1.068425	3.9373
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.074794381	54.8417	0.1889	54.6528	26.65634276	5.16297809	1.068525	3.93745
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.09669946	30.3347	0.2069	30.1278	14.77883439	3.844324959	1.08395	4.1894
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.096789689	30.3348	0.2069	30.1279	14.77925488	3.844379648	1.0841	4.189425
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.104054417	30.335	0.2121	30.1229	14.58252197	3.818706846	1.06825	4.100775
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.135656013	55.0732	0.1914	54.8818	25.4635031	5.046137443	1.1254	3.932425
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.509616985	48.2828	0.247	48.0358	29.84006494	5.462606058	1.275025	4.789175
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.509728301	48.2832	0.247	48.0362	29.84119438	5.462709436	1.275525	4.78925
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.518171362	48.5106	0.247	48.2636	29.63887438	5.444159658	1.281325	4.789475
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.991554753	154.2289	0.4487	153.7802	409.5890976	20.23830768	2.166675	5.6079
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.991939824	154.3403	0.4487	153.8916	409.8852008	20.24562177	2.166775	5.60815
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	4.366876813	40.8631	0.3717	40.4914	38.60382328	6.213197509	2.45975	7.4752
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	4.36731103	40.8637	0.3717	40.492	38.60864858	6.213585807	2.459825	7.4758
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.481302265	164.5594	0.4529	164.1065	391.621781	19.7894361	2.4031	6.10015
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.641144369	34.5249	0.3467	34.1782	34.72927876	5.893155247	2.6312	7.8869
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	5.389327193	101.0697	0.467	100.6027	96.02243451	9.799103761	2.83955	10.321325
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	5.389832802	101.0711	0.467	100.6041	96.03133026	9.799557656	2.8397	10.32195
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.669204538	93.8365	0.4535	93.383	83.16783497	9.119640068	3.131825	9.741725

Table 2-39

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.51	19.76	0.36	19.41	9.36	3.06	1.45	4.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.61	151.12	0.33	150.79	418.68	20.46	1.36	3.49
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.14	111.56	0.46	111.10	65.89	8.12	1.67	5.68
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.59	146.74	0.38	146.36	383.33	19.58	1.93	4.79
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.60	148.12	0.38	147.74	389.87	19.75	1.93	4.80
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.76	34.79	0.27	34.52	27.75	5.27	2.14	6.21
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.77	34.80	0.27	34.53	27.80	5.27	2.14	6.22
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.83	150.39	0.39	150.01	387.11	19.68	2.17	5.07
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.87	32.39	0.28	32.11	25.84	5.08	2.23	6.28
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.50	123.74	0.58	123.16	256.59	16.02	2.48	6.21
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.50	124.32	0.58	123.74	258.21	16.07	2.48	6.21
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.53	126.26	0.58	125.68	259.22	16.10	2.53	6.32
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.60	99.95	0.33	99.63	78.11	8.84	2.50	8.58
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.61	100.01	0.33	99.69	78.25	8.85	2.51	8.59
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.71	94.71	0.36	94.35	71.60	8.46	2.63	8.10
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.78	170.29	0.87	169.42	410.78	20.27	2.54	6.66
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.85	154.47	1.07	153.40	424.80	20.61	2.81	6.28
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.90	32.51	0.50	32.01	22.94	4.79	2.85	7.84
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.26	34.46	0.79	33.67	29.13	5.40	3.36	8.80
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.38	52.28	0.45	51.83	55.68	7.46	3.02	9.63
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.38	52.29	0.45	51.84	55.71	7.46	3.03	9.63
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.39	52.30	0.46	51.84	55.13	7.42	3.03	9.65
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.06	103.93	0.74	103.19	78.24	8.85	3.43	10.17
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.57	77.50	0.54	76.97	100.54	10.03	3.48	12.02
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.58	77.54	0.54	77.01	100.60	10.03	3.48	12.03
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.59	73.68	0.54	73.14	97.91	9.90	3.49	12.04
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.67	113.38	0.96	112.42	98.36	9.92	4.04	11.07

Table 2-41

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.51	19.76	0.36	19.41	9.36	3.06	1.45	4.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.61	151.12	0.33	150.79	418.68	20.46	1.36	3.49
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.14	111.56	0.46	111.10	65.89	8.12	1.67	5.68
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.59	146.74	0.38	146.36	383.33	19.58	1.93	4.79
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.60	148.12	0.38	147.74	389.87	19.75	1.93	4.80
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.76	34.79	0.27	34.52	27.75	5.27	2.14	6.21
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.77	34.80	0.27	34.53	27.80	5.27	2.14	6.22
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.83	150.39	0.39	150.01	387.11	19.68	2.17	5.07
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.87	32.39	0.28	32.11	25.84	5.08	2.23	6.28
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.50	123.74	0.58	123.16	256.59	16.02	2.48	6.21
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.50	124.32	0.58	123.74	258.21	16.07	2.48	6.21
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.53	126.26	0.58	125.68	259.22	16.10	2.53	6.32
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.60	99.95	0.33	99.63	78.11	8.84	2.50	8.58
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.61	100.01	0.33	99.69	78.25	8.85	2.51	8.59
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.71	94.71	0.36	94.35	71.60	8.46	2.63	8.10
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.78	170.29	0.87	169.42	410.78	20.27	2.54	6.66
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.85	154.47	1.07	153.40	424.80	20.61	2.81	6.28
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.90	32.51	0.50	32.01	22.94	4.79	2.85	7.84
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.26	34.46	0.79	33.67	29.13	5.40	3.36	8.80
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.38	52.28	0.45	51.83	55.68	7.46	3.02	9.63
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.38	52.29	0.45	51.84	55.71	7.46	3.03	9.63
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.39	52.30	0.46	51.84	55.13	7.42	3.03	9.65
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.06	103.93	0.74	103.19	78.24	8.85	3.43	10.17
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.57	77.50	0.54	76.97	100.54	10.03	3.48	12.02
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.58	77.54	0.54	77.01	100.60	10.03	3.48	12.03
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.59	73.68	0.54	73.14	97.91	9.90	3.49	12.04
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.67	113.38	0.96	112.42	98.36	9.92	4.04	11.07

Table 2-42

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.67	8.77	0.03	8.73	1.50	1.22	0.36	1.15
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.83	85.68	0.05	85.63	131.23	11.46	0.39	1.07
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.85	65.21	0.04	65.17	20.33	4.51	0.42	1.66
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.48	19.61	0.12	19.49	6.60	2.57	0.82	2.66
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.48	19.61	0.12	19.49	6.60	2.57	0.82	2.66
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.55	17.90	0.12	17.78	5.98	2.44	0.86	2.67
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.56	97.10	0.12	96.98	153.17	12.38	0.78	2.19
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.56	97.12	0.12	97.00	153.26	12.38	0.78	2.19
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.56	13.64	0.08	13.56	4.37	2.09	0.87	2.80
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.68	14.68	0.10	14.58	5.06	2.25	0.98	2.92
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.68	97.71	0.12	97.59	152.38	12.34	0.87	2.29
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.76	60.80	0.14	60.66	24.00	4.90	0.95	3.12
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.76	60.80	0.14	60.66	24.01	4.90	0.95	3.12
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.84	61.11	0.15	60.96	23.27	4.82	1.04	3.12
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.87	164.15	0.13	164.01	393.26	19.83	0.89	2.44
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.88	150.24	0.15	150.09	411.91	20.30	0.96	2.44
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.90	99.47	0.13	99.33	47.09	6.86	1.04	3.24
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.07	109.25	0.12	109.13	57.19	7.56	1.12	3.68
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.12	84.82	0.22	84.60	113.04	10.63	1.13	3.17
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.12	84.86	0.22	84.64	113.14	10.64	1.13	3.17
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.13	86.10	0.21	85.89	113.23	10.64	1.13	3.18
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.26	31.83	0.22	31.61	15.64	3.96	1.18	4.22
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.26	31.83	0.22	31.61	15.64	3.96	1.18	4.22
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.27	31.83	0.22	31.61	15.44	3.93	1.19	4.19
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.71	47.54	0.26	47.28	30.51	5.52	1.42	4.94
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.71	47.54	0.26	47.28	30.51	5.52	1.42	4.94
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.72	47.84	0.26	47.58	30.30	5.50	1.43	4.93

Table 2-43

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.33	19.41	0.10	19.31	6.53	2.56	0.71	2.54
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.33	19.41	0.10	19.31	6.53	2.56	0.71	2.54
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.39	17.65	0.11	17.55	5.92	2.43	0.74	2.56
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.41	98.58	0.11	98.47	160.59	12.67	0.69	2.04
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.41	98.61	0.11	98.50	160.65	12.67	0.69	2.04
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.49	14.48	0.10	14.38	4.81	2.19	0.84	2.69
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.49	14.48	0.10	14.38	4.81	2.19	0.84	2.69
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.51	101.85	0.10	101.75	158.67	12.60	0.74	2.22
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.60	60.55	0.13	60.42	24.01	4.90	0.85	2.97
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.60	60.55	0.13	60.42	24.01	4.90	0.85	2.97
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.62	14.24	0.09	14.15	4.93	2.22	0.93	2.83
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.65	60.77	0.13	60.64	23.19	4.82	0.90	2.92
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.71	159.31	0.14	159.17	438.00	20.93	0.84	2.27
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.71	159.42	0.14	159.27	438.47	20.94	0.84	2.27
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.87	108.90	0.13	108.77	56.94	7.55	0.97	3.57
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.87	108.90	0.13	108.78	56.95	7.55	0.97	3.57
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.96	178.32	0.13	178.20	422.70	20.56	0.96	2.55
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.01	99.65	0.12	99.53	48.03	6.93	1.09	3.49
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.02	86.84	0.21	86.63	116.88	10.81	1.04	3.01
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.02	86.90	0.21	86.69	116.95	10.81	1.04	3.01
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.03	88.67	0.20	88.46	117.15	10.82	1.05	3.01
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.16	31.63	0.21	31.42	15.65	3.96	1.11	4.24
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.16	31.63	0.21	31.42	15.65	3.96	1.11	4.24
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.16	31.63	0.22	31.41	15.44	3.93	1.11	4.21
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.58	47.40	0.25	47.15	30.79	5.55	1.33	4.83
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.59	47.40	0.25	47.15	30.79	5.55	1.33	4.83
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.59	47.63	0.25	47.38	30.57	5.53	1.34	4.83

Table 2-57

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.04	69.96	0.63	69.33	67.88	8.24	2.37	6.24
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.04	69.97	0.63	69.34	67.88	8.24	2.37	6.24
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.05	71.26	0.63	70.63	68.29	8.26	2.37	6.24
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.09	120.40	0.77	119.64	219.47	14.81	2.89	7.57
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.09	120.42	0.77	119.66	219.51	14.82	2.89	7.57
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.26	124.05	0.75	123.30	218.97	14.80	2.91	7.70
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.04	47.91	0.68	47.23	54.25	7.37	3.42	11.20
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.05	47.91	0.71	47.20	54.73	7.40	3.40	11.29
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.05	47.91	0.71	47.20	54.73	7.40	3.40	11.29
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.88	58.31	0.73	57.58	81.81	9.04	3.81	12.51
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.88	61.83	0.77	61.06	86.58	9.30	3.87	12.93
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.88	61.83	0.77	61.06	86.58	9.30	3.87	12.93
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.35	51.78	0.83	50.95	82.59	9.09	4.17	13.29
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.36	51.78	0.83	50.95	83.34	9.13	4.17	13.29
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.36	51.78	0.83	50.95	83.34	9.13	4.17	13.29
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.37	66.00	0.87	65.12	133.05	11.53	4.47	15.30
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.41	68.30	0.92	67.39	140.75	11.86	4.53	15.50
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.41	68.30	0.92	67.39	140.76	11.86	4.53	15.50
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	12.15	166.69	2.77	163.92	434.40	20.84	7.74	17.03
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	12.15	166.73	2.77	163.96	434.51	20.84	7.74	17.03
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	12.94	178.80	2.75	176.05	425.42	20.63	8.29	18.21
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	17.48	98.17	2.62	95.55	270.31	16.44	11.82	26.99
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	17.48	98.17	2.62	95.55	270.33	16.44	11.82	26.99
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.84	88.68	2.59	86.09	244.34	15.63	12.09	26.72
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	21.72	108.38	2.82	105.55	442.66	21.04	14.50	36.42
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	21.72	108.38	2.82	105.55	442.70	21.04	14.50	36.42
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	21.98	105.54	3.09	102.45	389.60	19.74	14.68	35.09

Table 2-61

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.11	132.61	0.38	132.23	292.96	17.12	1.68	4.40
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.11	132.62	0.38	132.24	293.00	17.12	1.68	4.40
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.31	34.12	0.33	33.80	23.43	4.84	1.80	5.87
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.31	34.12	0.33	33.80	23.43	4.84	1.80	5.87
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.32	136.94	0.41	136.53	291.94	17.09	1.79	4.60
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.43	31.78	0.34	31.45	22.08	4.70	1.94	5.87
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.46	121.22	0.47	120.75	236.24	15.37	1.91	4.90
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.46	121.24	0.47	120.77	236.28	15.37	1.91	4.90
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.48	124.48	0.47	124.01	239.07	15.46	1.91	4.90
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.90	40.16	0.41	39.75	31.27	5.59	2.09	7.38
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.90	40.16	0.41	39.75	31.27	5.59	2.09	7.38
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.91	40.16	0.42	39.74	30.96	5.56	2.09	7.27
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.95	81.31	0.38	80.93	57.82	7.60	2.14	6.87
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.95	81.31	0.38	80.93	57.83	7.60	2.14	6.87
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.07	78.40	0.41	77.99	54.32	7.37	2.21	6.69
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.65	71.26	0.48	70.78	62.53	7.91	2.39	8.10
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.65	71.26	0.48	70.78	62.53	7.91	2.39	8.10
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.67	68.78	0.48	68.30	61.01	7.81	2.40	7.87
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.39	146.54	1.41	145.12	357.07	18.90	3.60	8.82
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.39	146.56	1.41	145.15	357.14	18.90	3.60	8.82
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.04	157.73	1.34	156.39	347.49	18.64	4.05	9.83
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.20	60.02	1.30	58.72	92.02	9.59	4.90	13.25
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.20	60.02	1.30	58.72	92.03	9.59	4.90	13.25
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.55	52.30	1.36	50.94	82.88	9.10	5.16	13.32
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.05	95.66	1.44	94.22	168.16	12.97	5.58	17.75
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.05	95.66	1.44	94.22	168.16	12.97	5.58	17.75
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.37	89.04	1.75	87.30	147.10	12.13	5.94	17.83

Table 2-72

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.84	11.52	0.04	11.49	2.31	1.52	0.43	1.56
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.84	8.39	0.04	8.35	1.72	1.31	0.45	1.54
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.85	11.49	0.05	11.44	2.39	1.55	0.46	1.49
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.88	11.49	0.05	11.44	2.46	1.57	0.47	1.57
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.89	59.58	0.05	59.52	31.36	5.60	0.48	1.63
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.91	9.81	0.04	9.77	2.21	1.49	0.50	1.53
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.92	10.55	0.04	10.50	2.24	1.50	0.53	1.57
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.97	97.20	0.05	97.15	160.21	12.66	0.45	1.36
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.00	97.19	0.05	97.14	160.01	12.65	0.46	1.46
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.00	109.90	0.05	109.85	53.26	7.30	0.51	1.88
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.00	109.90	0.05	109.85	53.26	7.30	0.51	1.88
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.00	59.58	0.05	59.52	17.56	4.19	0.54	1.83
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.04	59.80	0.05	59.75	17.43	4.18	0.58	1.81
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.05	101.03	0.05	100.98	159.84	12.64	0.49	1.42
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.08	160.80	0.06	160.74	455.26	21.34	0.48	1.50
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.14	101.37	0.06	101.31	46.14	6.79	0.61	2.07
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.19	185.02	0.07	184.95	455.29	21.34	0.55	1.49
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.25	160.82	0.06	160.76	454.23	21.31	0.48	1.99
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.33	19.98	0.11	19.87	5.33	2.31	0.75	2.32
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.34	88.19	0.08	88.11	118.80	10.90	0.63	1.95
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.45	19.98	0.11	19.87	6.09	2.47	0.76	2.68
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.45	19.98	0.11	19.87	6.09	2.47	0.76	2.68
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.46	85.95	0.13	85.83	117.21	10.83	0.71	2.20
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.46	85.96	0.13	85.84	117.22	10.83	0.71	2.20
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.51	46.95	0.13	46.83	14.71	3.84	0.81	2.81
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.65	46.72	0.13	46.59	16.68	4.08	0.86	2.92
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.65	46.72	0.13	46.59	16.68	4.08	0.86	2.92

Table 2-73

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.45	19.56	0.35	19.21	9.07	3.01	1.40	4.08
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.55	149.09	0.33	148.76	404.00	20.10	1.34	3.39
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.06	108.28	0.42	107.86	62.43	7.90	1.62	5.61
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.58	144.65	0.37	144.27	371.43	19.27	1.95	4.78
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.58	144.68	0.37	144.31	371.70	19.28	1.95	4.78
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.77	35.45	0.27	35.18	27.85	5.28	2.14	6.26
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.77	35.45	0.27	35.18	27.85	5.28	2.14	6.26
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.81	148.78	0.39	148.39	371.37	19.27	2.16	5.07
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.88	32.93	0.28	32.65	25.85	5.08	2.20	6.26
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.48	122.94	0.57	122.37	247.56	15.73	2.45	6.21
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.48	123.14	0.57	122.57	247.93	15.75	2.45	6.21
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.51	125.21	0.57	124.64	249.42	15.79	2.51	6.28
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.60	97.19	0.33	96.85	76.03	8.72	2.51	8.51
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.60	97.19	0.33	96.86	76.04	8.72	2.51	8.51
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.63	165.90	0.80	165.10	389.79	19.74	2.49	6.40
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.70	150.78	1.02	149.76	402.94	20.07	2.73	6.07
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.71	91.98	0.37	91.61	69.56	8.34	2.66	8.09
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.77	32.05	0.50	31.55	21.96	4.69	2.80	7.63
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.12	34.03	0.78	33.25	28.03	5.29	3.24	8.51
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.40	53.04	0.46	52.58	55.96	7.48	3.06	9.83
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.40	53.04	0.46	52.59	55.96	7.48	3.06	9.83
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.40	53.04	0.47	52.58	55.33	7.44	3.06	9.83
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.88	100.55	0.73	99.82	73.89	8.60	3.31	9.87
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.47	109.94	0.93	109.01	93.54	9.67	3.90	10.98
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.58	75.36	0.54	74.82	99.70	9.98	3.49	11.84
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.58	75.36	0.54	74.82	99.71	9.99	3.49	11.84
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.60	71.56	0.54	71.02	97.07	9.85	3.47	11.84

Table 2-76

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.01	59.22	0.72	58.50	47.62	6.90	3.12	7.09
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.01	59.22	0.72	58.51	47.63	6.90	3.12	7.09
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.06	58.54	0.70	57.85	46.36	6.81	3.18	7.24
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.85	57.33	0.85	56.49	46.03	6.78	3.79	8.60
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.86	58.16	0.85	57.32	46.87	6.85	3.75	8.60
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.86	58.17	0.85	57.33	46.88	6.85	3.75	8.60
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.31	57.56	0.88	56.68	80.83	8.99	4.87	15.12
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.44	61.62	0.90	60.72	85.64	9.25	4.88	15.41
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.44	61.62	0.90	60.72	85.65	9.25	4.88	15.41
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	9.68	105.41	1.96	103.45	161.42	12.70	6.14	13.58
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.25	65.00	1.01	63.99	125.14	11.19	6.28	17.96
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.46	64.38	1.07	63.32	130.93	11.44	6.21	18.04
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.46	64.38	1.07	63.32	130.94	11.44	6.21	18.04
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	10.76	71.09	1.26	69.84	131.48	11.47	6.14	19.53
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	10.82	71.09	1.27	69.82	132.45	11.51	6.22	19.53
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	10.82	71.09	1.27	69.82	132.45	11.51	6.22	19.53
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.36	79.93	1.48	78.44	196.72	14.03	7.94	24.56
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.44	79.92	1.48	78.44	197.48	14.05	7.98	24.57
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	13.44	79.92	1.48	78.44	197.49	14.05	7.98	24.57
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	14.27	108.59	3.10	105.49	175.47	13.25	8.93	20.62
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	15.19	110.34	4.10	106.24	182.53	13.51	10.39	21.04
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	16.69	113.26	2.87	110.39	270.48	16.45	10.14	27.87
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	20.66	108.72	3.54	105.18	428.79	20.71	11.93	34.86
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.29	137.15	3.84	133.31	457.84	21.40	16.90	40.59
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	29.20	154.10	5.22	148.88	546.86	23.39	18.73	45.67
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	32.01	136.01	6.12	129.88	700.74	26.47	20.08	51.25
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	36.14	156.65	6.33	150.32	868.46	29.47	23.32	56.65

Table 2-85

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.48	20.44	0.12	20.33	7.11	2.67	0.82	2.75
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.49	20.45	0.12	20.33	7.12	2.67	0.82	2.75
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.56	18.60	0.12	18.48	6.40	2.53	0.83	2.75
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.57	97.65	0.13	97.52	157.49	12.55	0.78	2.29
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.57	98.00	0.13	97.87	158.85	12.60	0.78	2.30
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.68	99.41	0.12	99.29	156.68	12.52	0.86	2.35
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.69	15.28	0.12	15.17	5.35	2.31	0.97	2.99
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.69	15.29	0.12	15.17	5.37	2.32	0.97	3.00
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.79	61.66	0.14	61.52	25.32	5.03	0.96	3.25
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.79	61.68	0.14	61.54	25.35	5.03	0.96	3.25
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.85	61.94	0.15	61.79	24.47	4.95	1.02	3.19
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.86	15.68	0.10	15.58	5.67	2.38	1.10	3.06
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.90	152.57	0.15	152.42	417.47	20.43	0.96	2.50
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.90	154.09	0.15	153.93	424.47	20.60	0.96	2.50
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.10	110.18	0.14	110.05	58.75	7.66	1.10	3.79
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.10	110.25	0.14	110.11	58.82	7.67	1.10	3.80
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.16	85.57	0.23	85.34	115.63	10.75	1.15	3.19
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.16	85.79	0.23	85.56	116.02	10.77	1.15	3.19
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.17	87.03	0.22	86.81	115.81	10.76	1.16	3.19
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.20	168.62	0.14	168.49	400.26	20.01	1.09	2.80
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.27	100.45	0.14	100.31	49.55	7.04	1.29	3.95
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.31	33.04	0.22	32.81	16.78	4.10	1.19	4.37
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.31	33.04	0.22	32.82	16.78	4.10	1.19	4.37
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.32	33.04	0.23	32.81	16.56	4.07	1.20	4.34
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.78	48.22	0.26	47.96	32.67	5.72	1.45	5.18
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.78	48.23	0.26	47.97	32.67	5.72	1.45	5.18
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.79	48.49	0.26	48.23	32.44	5.70	1.46	5.13

Table 2-92

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.25	41.87	0.28	41.59	23.47	4.84	1.30	3.55
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.25	41.88	0.28	41.60	23.47	4.84	1.30	3.55
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.29	41.73	0.28	41.45	22.85	4.78	1.31	3.69
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.41	42.07	0.30	41.77	23.66	4.86	1.40	3.84
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.41	42.07	0.30	41.77	23.66	4.86	1.40	3.84
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.42	41.89	0.30	41.59	23.35	4.83	1.40	3.84
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.08	33.02	0.28	32.74	21.62	4.65	1.53	6.43
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.10	36.15	0.27	35.87	23.22	4.82	1.50	6.43
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.10	36.15	0.27	35.87	23.22	4.82	1.50	6.43
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.19	38.66	0.31	38.34	25.54	5.05	1.59	6.30
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.41	38.66	0.31	38.35	27.75	5.27	1.63	6.97
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.41	38.66	0.31	38.35	27.75	5.27	1.63	6.97
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.78	35.76	0.31	35.45	34.41	5.87	1.96	7.53
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.84	35.32	0.31	35.01	35.89	5.99	2.01	7.70
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.84	35.32	0.31	35.01	35.89	5.99	2.01	7.70
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.20	38.80	0.34	38.46	42.28	6.50	2.21	8.41
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.22	38.80	0.34	38.46	42.41	6.51	2.23	8.41
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.22	38.80	0.34	38.46	42.41	6.51	2.23	8.41
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.58	69.19	0.86	68.33	65.12	8.07	3.46	8.08
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.58	69.20	0.86	68.35	65.13	8.07	3.46	8.08
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.82	66.91	0.83	66.08	59.80	7.73	3.63	8.37
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.19	67.38	1.19	66.19	96.99	9.85	5.25	16.34
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.19	67.38	1.19	66.19	97.00	9.85	5.25	16.34
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.21	58.42	1.17	57.25	87.67	9.36	5.37	15.94
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	11.20	69.58	1.33	68.25	137.74	11.74	6.91	18.83
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	11.34	68.09	1.36	66.73	151.05	12.29	6.84	19.50
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.34	68.09	1.36	66.73	151.06	12.29	6.84	19.50

Table 2-98

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.52	59.98	0.99	58.99	50.30	7.09	3.45	7.98
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.52	59.98	0.99	59.00	50.30	7.09	3.45	7.98
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.60	59.91	0.95	58.95	49.25	7.02	3.53	8.08
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.78	58.90	1.22	57.68	50.08	7.08	4.52	10.06
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.78	59.25	1.22	58.02	50.75	7.12	4.52	10.06
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.78	59.26	1.22	58.03	50.76	7.12	4.52	10.06
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.64	60.43	1.75	58.69	92.84	9.64	5.79	16.86
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.81	63.71	1.79	61.92	99.03	9.95	5.75	17.22
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.81	63.71	1.79	61.92	99.04	9.95	5.75	17.22
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	11.81	65.96	1.86	64.10	141.34	11.89	7.28	19.97
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	12.09	67.44	1.93	65.51	149.90	12.24	7.21	20.66
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	12.09	67.44	1.93	65.51	149.92	12.24	7.21	20.66
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	13.49	77.62	2.54	75.08	171.73	13.10	8.10	23.72
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	13.56	77.61	2.58	75.03	173.23	13.16	8.10	24.13
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	13.56	77.62	2.58	75.04	173.24	13.16	8.10	24.13
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	15.40	134.34	3.88	130.47	285.94	16.91	10.19	21.56
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	16.70	89.71	2.83	86.88	254.10	15.94	10.10	29.78
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	16.79	89.70	2.83	86.87	256.12	16.00	10.10	29.93
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	16.79	89.71	2.83	86.87	256.14	16.00	10.10	29.93
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	21.66	143.21	5.82	137.39	318.99	17.86	13.92	30.88
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	22.34	139.70	6.65	133.05	320.27	17.90	15.38	30.79
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	26.63	148.93	4.28	144.65	521.69	22.84	17.49	40.85
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	32.83	142.75	4.73	138.02	818.87	28.62	21.18	54.03
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	37.89	172.58	6.66	165.92	758.78	27.55	25.90	55.18
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	40.91	191.92	8.31	183.60	909.15	30.15	27.69	60.14
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	46.33	169.13	10.49	158.64	1,146.12	33.85	31.02	69.44
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	50.67	192.84	10.31	182.53	1,413.19	37.59	35.11	78.21

Table 2-101

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.64	126.16	0.57	125.59	258.68	16.08	2.60	6.45
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.64	126.25	0.57	125.68	258.91	16.09	2.60	6.45
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.69	100.24	0.63	99.61	152.45	12.35	2.66	6.70
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.69	100.42	0.63	99.79	152.71	12.36	2.66	6.71
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.71	101.40	0.63	100.78	152.61	12.35	2.68	6.71
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.86	128.48	0.60	127.87	256.20	16.01	2.70	6.72
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.59	55.20	0.47	54.73	59.95	7.74	3.18	10.19
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.59	55.20	0.47	54.73	59.97	7.74	3.18	10.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.61	149.98	0.90	149.09	389.11	19.73	3.12	7.61
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.64	51.56	0.48	51.08	55.19	7.43	3.16	10.23
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.19	58.43	0.56	57.87	67.73	8.23	3.44	11.52
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.20	58.43	0.55	57.87	68.41	8.27	3.44	11.65
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.20	58.43	0.55	57.88	68.42	8.27	3.44	11.65
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.79	55.50	1.02	54.48	72.31	8.50	4.02	11.38
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.85	77.25	0.55	76.70	107.69	10.38	3.63	12.62
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.85	77.25	0.55	76.70	107.72	10.38	3.63	12.62
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.88	73.47	0.58	72.89	99.83	9.99	3.68	12.17
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.59	55.79	0.63	55.16	108.20	10.40	4.10	13.51
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.59	56.97	0.63	56.34	109.99	10.49	4.20	13.51
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.60	56.97	0.63	56.34	110.01	10.49	4.20	13.51
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.40	101.35	1.21	100.13	145.25	12.05	4.67	15.02
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	9.13	161.23	1.66	159.57	381.31	19.53	5.07	13.00
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	9.34	153.13	2.11	151.02	393.84	19.85	5.67	13.15
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.81	74.09	1.21	72.89	140.64	11.86	6.94	19.52
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	12.88	85.22	1.76	83.46	179.64	13.40	7.95	20.59
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.36	97.42	1.93	95.49	237.36	15.41	8.36	24.13
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.97	104.80	2.02	102.78	307.69	17.54	9.72	27.22

Table 2-105

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.39	5.09	0.02	5.07	0.56	0.75	0.22	0.70
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.47	62.65	0.02	62.63	17.36	4.17	0.26	0.88
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.51	83.94	0.03	83.91	128.40	11.33	0.22	0.71
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.97	8.71	0.05	8.67	2.17	1.47	0.54	1.65
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.97	11.12	0.05	11.07	2.37	1.54	0.54	1.71
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.02	12.23	0.07	12.16	2.67	1.63	0.58	1.76
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.02	12.23	0.07	12.16	2.67	1.63	0.58	1.76
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.11	11.29	0.08	11.21	2.60	1.61	0.65	1.88
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.13	95.08	0.08	95.00	149.27	12.22	0.53	1.61
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.13	95.10	0.08	95.03	149.37	12.22	0.53	1.61
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.15	98.81	0.08	98.74	43.75	6.61	0.65	1.99
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.16	58.59	0.09	58.50	17.30	4.16	0.63	2.08
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.16	58.59	0.09	58.51	17.30	4.16	0.63	2.08
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.17	107.51	0.06	107.45	51.14	7.15	0.61	2.20
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.18	150.47	0.07	150.40	417.84	20.44	0.55	1.60
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.24	168.79	0.07	168.72	410.57	20.26	0.57	1.63
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.25	96.28	0.08	96.20	150.05	12.25	0.63	1.71
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.25	58.89	0.09	58.80	17.27	4.16	0.72	2.08
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.60	21.03	0.15	20.88	6.69	2.59	0.87	3.04
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.60	83.58	0.16	83.42	110.28	10.50	0.80	2.35
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.60	21.03	0.15	20.88	6.69	2.59	0.87	3.04
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.60	83.61	0.16	83.44	110.36	10.51	0.81	2.35
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.61	84.80	0.17	84.64	111.33	10.55	0.81	2.34
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.61	21.03	0.16	20.87	6.61	2.57	0.89	3.04
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.82	45.88	0.18	45.71	17.04	4.13	0.98	3.21
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.82	45.88	0.18	45.71	17.04	4.13	0.98	3.21
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.85	46.17	0.18	45.99	17.04	4.13	0.98	3.21

Table 2-107

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.55	8.32	0.02	8.30	1.36	1.17	0.28	1.02
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.72	64.71	0.04	64.67	19.90	4.46	0.36	1.60
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.72	90.73	0.04	90.69	143.32	11.97	0.32	0.99
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.28	18.40	0.10	18.30	6.09	2.47	0.69	2.42
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.28	18.40	0.10	18.30	6.09	2.47	0.69	2.42
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.32	12.93	0.04	12.89	3.81	1.95	0.74	2.53
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.34	16.81	0.10	16.71	5.57	2.36	0.71	2.46
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.37	98.41	0.10	98.31	161.02	12.69	0.67	2.02
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.37	98.47	0.10	98.37	161.13	12.69	0.67	2.02
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.45	13.96	0.11	13.86	4.59	2.14	0.81	2.65
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.47	101.85	0.10	101.76	159.63	12.63	0.73	2.12
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.53	60.25	0.12	60.13	23.15	4.81	0.83	2.82
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.53	60.26	0.12	60.13	23.15	4.81	0.83	2.82
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.59	60.48	0.13	60.35	22.44	4.74	0.87	2.82
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.62	180.60	0.12	180.48	434.96	20.86	0.73	2.22
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.64	100.19	0.09	100.10	47.14	6.87	0.86	2.88
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.67	160.15	0.14	160.00	444.86	21.09	0.81	2.20
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.82	109.15	0.13	109.01	56.71	7.53	0.94	3.47
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.96	86.74	0.20	86.54	117.20	10.83	1.01	2.97
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.96	86.82	0.20	86.62	117.30	10.83	1.01	2.97
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.98	88.69	0.20	88.49	117.77	10.85	1.01	2.97
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.09	30.20	0.21	29.99	14.69	3.83	1.08	4.18
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.09	30.20	0.21	29.99	14.69	3.83	1.08	4.18
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.10	30.20	0.21	29.99	14.50	3.81	1.07	4.13
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.49	47.18	0.25	46.94	29.17	5.40	1.28	4.74
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.49	47.19	0.25	46.94	29.18	5.40	1.28	4.74
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.50	47.41	0.25	47.17	28.98	5.38	1.28	4.74

Table 2-111

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.02	42.15	0.35	41.80	23.84	4.88	1.81	4.80
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.02	42.15	0.35	41.80	23.84	4.88	1.81	4.80
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.04	41.80	0.35	41.45	23.15	4.81	1.78	4.92
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.81	39.87	0.44	39.43	22.35	4.73	2.39	6.27
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.82	40.35	0.44	39.92	22.76	4.77	2.41	6.27
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.82	40.36	0.44	39.92	22.76	4.77	2.41	6.27
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.57	43.38	0.42	42.96	43.60	6.60	2.27	9.65
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	4.65	47.33	0.42	46.91	46.59	6.83	2.26	9.72
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	4.65	47.33	0.42	46.91	46.59	6.83	2.26	9.72
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.63	49.83	0.45	49.38	66.71	8.17	3.01	11.70
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	5.78	49.26	0.45	48.81	69.93	8.36	3.05	11.93
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	5.78	49.26	0.45	48.81	69.94	8.36	3.05	11.93
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.13	55.02	0.76	54.26	84.82	9.21	3.43	14.51
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.18	55.02	0.76	54.26	85.49	9.25	3.44	14.67
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.18	55.02	0.76	54.26	85.49	9.25	3.44	14.67
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.62	64.56	0.80	63.76	123.81	11.13	4.89	17.78
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.69	64.55	0.80	63.75	124.24	11.15	4.89	17.77
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.69	64.55	0.80	63.75	124.25	11.15	4.89	17.77
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.89	130.53	1.47	129.06	255.43	15.98	5.67	12.68
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.89	130.57	1.47	129.10	255.50	15.98	5.67	12.68
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	9.32	128.60	1.40	127.20	232.25	15.24	5.99	13.05
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	13.32	107.54	2.28	105.26	213.74	14.62	7.94	22.26
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	13.32	107.54	2.28	105.26	213.76	14.62	7.94	22.26
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	13.43	90.00	2.25	87.75	185.37	13.62	8.26	22.10
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	16.39	93.88	2.35	91.53	314.49	17.73	9.78	27.90
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	16.55	95.59	2.40	93.19	358.26	18.93	9.07	27.82
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	16.55	95.59	2.40	93.20	358.29	18.93	9.07	27.82

Table 2-113

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	8.79	63.14	1.58	61.56	57.13	7.56	5.95	12.29
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.81	64.59	1.64	62.95	59.14	7.69	5.97	12.19
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.81	64.60	1.64	62.96	59.15	7.69	5.97	12.19
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	10.60	61.02	2.04	58.98	60.28	7.76	7.39	15.23
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	10.64	62.67	2.04	60.63	61.70	7.85	7.41	15.29
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	10.64	62.68	2.04	60.64	61.71	7.86	7.41	15.29
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.11	88.27	3.46	84.81	211.98	14.56	10.62	28.85
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	17.45	94.30	3.54	90.76	224.76	14.99	10.72	28.95
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	17.45	94.31	3.54	90.77	224.80	14.99	10.72	28.96
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	21.30	102.15	3.76	98.39	331.92	18.22	13.07	33.86
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	21.85	101.23	3.95	97.28	348.67	18.67	13.38	35.14
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	21.85	101.24	3.95	97.29	348.74	18.67	13.38	35.14
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	23.68	107.36	5.04	102.32	362.72	19.05	14.39	39.28
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.81	107.36	5.13	102.22	366.01	19.13	14.54	39.50
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	23.81	107.36	5.13	102.23	366.04	19.13	14.54	39.50
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	29.60	127.41	5.83	121.58	548.54	23.42	18.35	47.89
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	29.80	127.39	5.83	121.56	550.92	23.47	18.35	47.95
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	29.80	127.40	5.83	121.57	550.98	23.47	18.35	47.95
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	32.26	154.38	10.83	143.55	392.41	19.81	22.51	43.02
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	32.26	154.44	10.83	143.60	392.57	19.81	22.51	43.02
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	32.85	149.98	10.11	139.87	377.46	19.43	23.19	44.54
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	60.19	236.30	12.00	224.31	1,426.23	37.77	42.93	84.52
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	60.39	267.83	11.80	256.03	1,591.67	39.90	41.81	86.64
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	60.39	267.85	11.80	256.05	1,592.19	39.90	41.81	86.67
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	74.91	254.18	18.15	236.03	2,244.61	47.38	53.24	108.36
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	76.24	268.09	18.01	250.08	2,553.66	50.53	53.54	112.17
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	76.25	268.17	18.01	250.16	2,554.68	50.54	53.54	112.18

Table 2-114

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.75	70.81	1.01	69.80	68.22	8.26	4.31	9.20
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.76	72.11	1.01	71.10	70.22	8.38	4.31	9.21
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.76	72.11	1.01	71.10	70.23	8.38	4.31	9.21
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.79	108.32	1.32	107.01	166.10	12.89	5.57	12.72
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.79	108.33	1.32	107.01	166.11	12.89	5.57	12.72
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	8.85	107.20	1.26	105.94	159.94	12.65	5.66	12.61
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.48	80.61	1.51	79.11	134.21	11.58	6.90	20.19
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.55	80.61	1.56	79.05	135.59	11.64	6.91	20.44
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.55	80.61	1.56	79.05	135.60	11.64	6.91	20.45
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	13.91	100.10	1.88	98.22	210.03	14.49	8.50	24.57
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.17	109.49	1.95	107.54	227.42	15.08	8.63	25.04
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	14.17	109.49	1.95	107.54	227.43	15.08	8.63	25.04
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.34	79.12	1.80	77.32	214.12	14.63	8.53	24.13
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.44	79.12	1.80	77.32	215.39	14.68	8.64	24.13
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.44	79.12	1.80	77.32	215.40	14.68	8.64	24.13
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.33	100.38	2.09	98.29	349.20	18.69	10.03	29.49
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.75	102.92	2.22	100.70	370.69	19.25	10.23	30.03
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.75	102.93	2.22	100.70	370.70	19.25	10.23	30.03
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	22.45	147.00	6.23	140.77	330.04	18.17	15.32	30.97
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	22.45	147.02	6.23	140.79	330.09	18.17	15.32	30.97
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	22.88	142.20	5.85	136.35	306.34	17.50	15.73	31.87
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	40.08	181.97	7.44	174.52	835.76	28.91	27.76	58.23
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	40.26	210.73	7.38	203.35	944.67	30.74	26.76	60.19
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	40.26	210.73	7.38	203.36	944.76	30.74	26.76	60.19
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	49.67	201.34	8.76	192.58	1,362.43	36.91	34.15	77.05
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	50.76	205.66	9.18	196.48	1,545.63	39.31	33.69	79.21
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	50.76	205.68	9.18	196.50	1,545.78	39.32	33.69	79.21

Table 2-131

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.41	129.02	0.90	128.12	258.08	16.06	3.75	9.42
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.41	129.04	0.90	128.14	258.12	16.07	3.75	9.42
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.42	102.43	0.94	101.49	153.57	12.39	3.83	9.60
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.42	102.46	0.94	101.52	153.61	12.39	3.83	9.60
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.42	102.96	0.94	102.02	151.89	12.32	3.84	9.60
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.56	130.78	0.88	129.90	251.00	15.84	3.97	9.54
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.39	155.19	1.79	153.41	389.77	19.74	5.01	11.61
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.58	74.10	0.87	73.23	110.52	10.51	4.93	15.02
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.69	80.43	0.92	79.51	121.44	11.02	5.01	15.36
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.70	80.43	0.92	79.51	121.45	11.02	5.01	15.36
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.50	81.64	0.98	80.67	129.81	11.39	5.44	16.90
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.55	81.64	1.02	80.62	131.28	11.46	5.35	17.27
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.55	81.64	1.02	80.62	131.28	11.46	5.35	17.27
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.57	74.82	1.06	73.76	188.14	13.72	5.83	18.68
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.78	78.79	1.12	77.67	205.49	14.33	5.76	19.94
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.78	78.79	1.12	77.67	205.51	14.34	5.76	19.94
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.21	86.34	1.46	84.88	156.86	12.52	6.61	18.45
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.76	75.47	1.24	74.23	206.18	14.36	6.77	20.96
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	11.82	75.46	1.24	74.22	209.03	14.46	6.71	20.96
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	11.82	75.47	1.24	74.22	209.04	14.46	6.71	20.96
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	13.62	166.01	3.10	162.91	386.74	19.67	7.81	20.19
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.05	103.35	1.86	101.49	283.46	16.84	7.94	24.27
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	14.62	159.98	3.43	156.55	404.73	20.12	9.50	20.61
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	19.32	110.96	1.96	109.00	306.11	17.50	12.05	30.13
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	21.75	131.75	3.29	128.46	388.89	19.72	14.29	33.66
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	23.76	113.45	4.00	109.44	488.65	22.11	14.36	38.94
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	27.32	135.17	3.79	131.38	650.81	25.51	18.04	45.59

Table 2-132

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.64	65.87	0.49	65.38	60.92	7.81	2.16	5.37
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.64	65.88	0.49	65.39	60.93	7.81	2.16	5.37
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.65	66.20	0.49	65.71	60.56	7.78	2.17	5.37
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.69	113.06	0.61	112.45	198.12	14.08	2.64	6.69
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.69	113.08	0.61	112.46	198.14	14.08	2.64	6.69
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.87	114.67	0.65	114.02	195.00	13.96	2.73	6.87
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.08	45.36	0.48	44.88	41.75	6.46	2.81	9.61
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.10	45.36	0.48	44.88	42.16	6.49	2.83	9.76
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.10	45.36	0.48	44.88	42.16	6.49	2.83	9.76
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.91	59.14	0.52	58.62	65.66	8.10	3.25	10.92
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.91	59.14	0.52	58.62	65.66	8.10	3.25	10.92
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.93	55.04	0.53	54.51	60.42	7.77	3.27	10.94
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.21	45.66	0.54	45.11	64.47	8.03	3.53	11.25
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.23	45.66	0.54	45.11	65.30	8.08	3.53	11.25
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.23	45.66	0.54	45.11	65.30	8.08	3.53	11.25
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.22	62.97	0.64	62.34	103.03	10.15	3.82	12.32
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.24	66.20	0.62	65.59	110.95	10.53	3.90	13.02
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.24	66.20	0.62	65.59	110.96	10.53	3.90	13.02
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	9.04	152.17	2.02	150.15	382.82	19.57	5.47	12.72
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	9.04	152.20	2.02	150.18	382.89	19.57	5.47	12.72
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	9.71	159.94	2.07	157.86	362.08	19.03	5.96	13.75
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	12.39	85.70	1.67	84.03	172.01	13.12	7.49	20.00
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	12.39	85.70	1.67	84.03	172.02	13.12	7.49	20.00
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	12.68	73.07	1.87	71.20	149.65	12.23	8.04	19.37
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	15.40	103.31	2.03	101.27	299.36	17.30	9.17	26.84
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.40	103.31	2.03	101.28	299.38	17.30	9.17	26.84
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	15.53	95.61	2.30	93.32	254.61	15.96	9.40	26.05

Table 2-133

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.82	15.42	0.22	15.20	5.81	2.41	1.02	3.20
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.99	150.08	0.24	149.84	409.86	20.24	1.01	2.63
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.25	107.48	0.22	107.26	56.60	7.52	1.16	4.13
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.01	144.87	0.32	144.54	374.68	19.36	1.62	4.11
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.01	144.88	0.32	144.55	374.71	19.36	1.62	4.11
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.04	29.02	0.24	28.78	18.94	4.35	1.73	4.95
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.04	29.02	0.24	28.78	18.94	4.35	1.73	4.95
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.16	27.02	0.25	26.78	17.80	4.22	1.84	5.08
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.24	149.80	0.35	149.45	375.64	19.38	1.78	4.34
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.55	25.11	0.41	24.70	13.97	3.74	2.07	5.86
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.61	151.28	0.58	150.70	408.42	20.21	1.99	4.74
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.62	168.52	0.50	168.02	399.63	19.99	1.91	4.97
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.68	96.44	0.29	96.15	62.77	7.92	2.10	6.47
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.68	96.44	0.29	96.15	62.77	7.92	2.10	6.47
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.76	26.65	0.52	26.13	17.40	4.17	2.20	6.21
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.80	91.71	0.32	91.39	57.84	7.61	2.18	6.58
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.87	123.13	0.52	122.61	249.22	15.79	2.15	5.34
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.87	123.14	0.52	122.62	249.23	15.79	2.15	5.34
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.89	125.78	0.52	125.26	251.69	15.86	2.19	5.34
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.36	99.79	0.46	99.33	61.22	7.82	2.48	7.35
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.43	44.70	0.41	44.29	39.42	6.28	2.36	8.23
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	4.43	44.70	0.41	44.29	39.42	6.28	2.36	8.23
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	4.44	44.70	0.42	44.28	38.99	6.24	2.37	8.22
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.73	108.77	0.72	108.06	75.62	8.70	2.68	8.39
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.35	74.58	0.49	74.09	75.51	8.69	2.86	9.20
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	5.35	74.58	0.49	74.09	75.51	8.69	2.86	9.20
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	5.37	71.16	0.49	70.67	73.29	8.56	2.85	9.20

Table 2-137

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.83	40.42	0.22	40.20	22.30	4.72	1.03	2.88
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.83	40.42	0.22	40.20	22.30	4.72	1.03	2.88
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.84	40.43	0.21	40.22	22.15	4.71	1.03	2.88
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.13	58.99	0.25	58.74	49.85	7.06	1.18	3.37
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.13	59.00	0.25	58.74	49.85	7.06	1.18	3.37
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.22	59.24	0.24	59.00	49.00	7.00	1.21	3.52
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.38	28.86	0.23	28.63	15.08	3.88	1.08	5.16
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.38	28.86	0.23	28.64	15.22	3.90	1.08	5.15
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.38	28.86	0.23	28.64	15.22	3.90	1.08	5.15
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.57	33.90	0.26	33.65	18.54	4.31	1.23	5.21
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.57	33.91	0.26	33.65	18.54	4.31	1.23	5.21
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.61	31.29	0.26	31.02	17.23	4.15	1.28	5.23
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.87	29.77	0.27	29.51	23.15	4.81	1.44	5.87
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.87	29.77	0.27	29.51	23.23	4.82	1.43	5.87
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.87	29.77	0.27	29.51	23.23	4.82	1.43	5.87
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.09	31.82	0.30	31.52	29.97	5.47	1.58	5.99
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.09	31.82	0.30	31.52	29.97	5.47	1.58	5.99
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.11	32.20	0.31	31.90	28.85	5.37	1.65	5.68
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.25	125.58	0.69	124.89	251.19	15.85	3.01	7.38
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.25	125.61	0.69	124.92	251.26	15.85	3.01	7.38
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.78	127.24	0.68	126.57	235.65	15.35	3.36	7.97
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.72	63.50	0.54	62.95	78.88	8.88	3.76	11.88
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.72	63.50	0.54	62.95	78.89	8.88	3.76	11.88
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.05	55.02	0.55	54.47	71.11	8.43	4.04	12.54
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.25	78.16	0.69	77.47	137.31	11.72	4.46	15.05
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.25	78.16	0.69	77.47	137.31	11.72	4.46	15.05
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.54	73.40	0.68	72.72	124.17	11.14	4.81	14.59

Table 2-139

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.84	151.54	1.22	150.32	388.58	19.71	3.98	9.38
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.84	151.56	1.22	150.34	388.62	19.71	3.98	9.38
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.08	155.86	1.14	154.72	384.58	19.61	4.14	9.65
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.05	159.28	1.98	157.30	421.39	20.53	4.94	10.77
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	8.12	129.53	1.48	128.06	263.95	16.25	4.88	11.96
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	8.12	129.55	1.48	128.07	263.99	16.25	4.88	11.96
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.14	131.57	1.48	130.09	264.44	16.26	4.90	11.89
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.68	63.38	1.34	62.04	95.81	9.79	5.38	14.23
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.69	68.58	1.31	67.27	105.20	10.26	5.24	14.38
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.69	68.58	1.31	67.27	105.21	10.26	5.24	14.38
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.38	56.38	1.34	55.03	74.16	8.61	6.04	14.89
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.74	97.35	1.63	95.72	181.02	13.45	5.97	18.88
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.83	102.87	1.53	101.34	198.34	14.08	6.00	19.53
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.83	102.87	1.53	101.34	198.35	14.08	6.00	19.53
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.88	92.70	1.90	90.81	179.70	13.41	6.84	19.59
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.92	92.70	1.87	90.84	181.89	13.49	6.84	19.99
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.92	92.70	1.87	90.84	181.89	13.49	6.84	19.99
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	12.09	115.66	1.77	113.89	175.64	13.25	7.78	20.42
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	12.85	178.13	2.94	175.19	414.51	20.36	7.61	18.93
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	13.28	162.92	3.14	159.78	426.39	20.65	8.80	18.11
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.68	82.22	2.29	79.94	289.61	17.02	8.16	25.96
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.73	82.22	2.20	80.02	294.47	17.16	8.16	25.96
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.73	82.22	2.20	80.02	294.48	17.16	8.16	25.96
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	15.23	81.18	1.58	79.60	138.91	11.79	10.19	23.27
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	16.51	85.89	2.14	83.75	174.98	13.23	10.99	25.76
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	19.53	109.43	3.02	106.41	256.79	16.02	12.01	29.51
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	21.49	120.06	2.70	117.36	336.33	18.34	14.60	33.78

Table 2-140

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.90	40.84	0.23	40.61	22.80	4.78	1.06	3.03
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.90	40.84	0.23	40.61	22.80	4.78	1.06	3.03
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.90	40.99	0.22	40.76	22.57	4.75	1.06	3.03
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.20	59.73	0.27	59.46	51.10	7.15	1.21	3.59
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.20	59.74	0.27	59.47	51.10	7.15	1.21	3.59
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.29	60.20	0.26	59.94	49.96	7.07	1.25	3.67
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.46	29.93	0.24	29.69	15.89	3.99	1.13	5.12
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.46	29.93	0.24	29.69	16.08	4.01	1.13	5.12
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.46	29.93	0.24	29.69	16.08	4.01	1.13	5.12
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.64	35.31	0.27	35.04	19.78	4.45	1.28	5.49
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.64	35.31	0.27	35.05	19.78	4.45	1.28	5.49
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.67	32.57	0.27	32.30	17.85	4.22	1.33	5.49
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.98	30.16	0.27	29.89	24.46	4.95	1.48	6.17
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.98	30.16	0.27	29.89	24.67	4.97	1.47	6.19
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.98	30.16	0.27	29.89	24.67	4.97	1.47	6.19
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.20	32.34	0.31	32.04	31.98	5.65	1.63	6.30
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.20	32.34	0.31	32.04	31.98	5.65	1.63	6.30
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.20	31.26	0.31	30.94	29.80	5.46	1.64	5.87
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.44	127.13	0.67	126.46	258.69	16.08	3.10	7.66
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.44	127.17	0.67	126.50	258.76	16.09	3.10	7.66
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.98	129.72	0.71	129.01	242.99	15.59	3.51	8.32
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.91	66.06	0.60	65.46	84.14	9.17	3.85	12.45
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.91	66.06	0.60	65.46	84.14	9.17	3.85	12.45
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.16	56.10	0.57	55.53	72.90	8.54	4.12	12.44
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.52	78.40	0.73	77.68	145.59	12.07	4.56	16.06
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.52	78.40	0.73	77.68	145.60	12.07	4.56	16.07
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.69	72.66	0.73	71.93	125.31	11.19	4.87	15.34

Table 2-141

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.93	58.30	0.61	57.69	47.80	6.91	2.32	5.87
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.93	58.30	0.61	57.70	47.81	6.91	2.32	5.87
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.94	58.76	0.61	58.16	47.93	6.92	2.36	5.87
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.72	85.47	0.74	84.73	108.50	10.42	2.77	6.87
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.72	85.48	0.74	84.74	108.52	10.42	2.77	6.87
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.90	86.62	0.73	85.89	108.29	10.41	2.82	6.91
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.18	46.66	0.71	45.95	54.70	7.40	3.62	11.39
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.20	46.66	0.72	45.94	55.14	7.43	3.62	11.63
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.20	46.66	0.72	45.94	55.14	7.43	3.62	11.63
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.84	56.02	0.76	55.26	73.37	8.57	3.80	12.72
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.84	56.03	0.76	55.26	73.38	8.57	3.80	12.72
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.85	53.45	0.75	52.70	69.43	8.33	3.88	12.75
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.55	52.61	0.83	51.78	80.89	8.99	4.48	13.45
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.56	52.61	0.83	51.78	81.59	9.03	4.47	13.45
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.56	52.61	0.83	51.78	81.59	9.03	4.47	13.45
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.31	57.32	0.86	56.46	106.29	10.31	4.74	15.11
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.33	58.51	0.90	57.61	111.78	10.57	4.83	15.14
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.34	58.51	0.90	57.61	111.79	10.57	4.83	15.14
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	13.35	132.45	3.33	129.12	281.83	16.79	8.72	19.20
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	13.35	132.49	3.33	129.16	281.91	16.79	8.72	19.20
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	14.37	138.09	3.48	134.61	278.00	16.67	9.26	20.26
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	22.51	123.33	3.57	119.76	400.49	20.01	14.65	34.45
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.51	123.33	3.57	119.76	400.55	20.01	14.65	34.45
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.03	112.33	3.63	108.70	366.67	19.15	14.99	34.23
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	27.44	122.29	3.72	118.57	612.56	24.75	17.65	45.40
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	27.44	122.29	3.72	118.57	612.65	24.75	17.65	45.40
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	27.83	118.81	4.35	114.46	553.78	23.53	17.84	45.02

Table 2-142

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.28	39.25	0.16	39.09	21.56	4.64	0.74	1.99
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.28	39.25	0.16	39.09	21.56	4.64	0.74	1.99
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.29	39.58	0.17	39.41	21.59	4.65	0.74	1.99
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.43	16.99	0.18	16.81	4.97	2.23	0.70	2.72
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.43	16.99	0.18	16.81	4.97	2.23	0.70	2.72
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.44	16.99	0.18	16.81	4.91	2.22	0.71	2.68
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.47	57.25	0.19	57.06	48.40	6.96	0.81	2.22
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.47	57.25	0.19	57.07	48.40	6.96	0.81	2.22
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.54	19.17	0.21	18.97	5.64	2.37	0.80	2.89
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.54	19.17	0.21	18.97	5.64	2.37	0.80	2.89
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.60	57.97	0.19	57.77	48.13	6.94	0.91	2.30
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.64	17.89	0.21	17.68	5.25	2.29	0.91	3.00
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.64	18.32	0.19	18.13	7.94	2.82	0.83	3.11
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.64	18.32	0.19	18.13	7.94	2.82	0.83	3.11
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.65	18.32	0.19	18.13	7.90	2.81	0.85	3.11
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.76	27.71	0.22	27.49	10.48	3.24	0.93	3.34
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.76	27.71	0.22	27.49	10.48	3.24	0.93	3.34
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.87	27.92	0.22	27.70	10.14	3.18	1.02	3.39
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.42	84.71	0.30	84.41	111.42	10.56	1.31	3.67
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.42	84.72	0.30	84.42	111.44	10.56	1.31	3.67
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.70	34.75	0.25	34.51	23.75	4.87	1.40	5.53
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.70	34.75	0.25	34.51	23.75	4.87	1.40	5.53
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.80	86.97	0.27	86.70	110.45	10.51	1.54	4.11
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.97	30.28	0.25	30.03	20.83	4.56	1.53	5.75
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.31	46.55	0.30	46.25	40.74	6.38	1.63	6.21
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.31	46.55	0.30	46.25	40.74	6.38	1.63	6.21
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.57	45.59	0.32	45.27	36.46	6.04	1.89	6.21

Table 2-142

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.05	126.88	0.64	126.25	254.58	15.96	2.83	7.27
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.05	126.92	0.64	126.28	254.66	15.96	2.83	7.27
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.15	100.71	0.70	100.01	150.45	12.27	2.97	7.54
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.15	100.73	0.70	100.03	150.49	12.27	2.97	7.54
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.17	102.14	0.70	101.44	150.56	12.27	3.02	7.54
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.25	129.75	0.64	129.11	251.22	15.85	2.93	7.30
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.31	151.94	1.18	150.76	383.90	19.59	3.55	8.55
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.32	60.24	0.56	59.68	72.56	8.52	3.48	11.41
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.32	60.25	0.56	59.68	72.56	8.52	3.48	11.42
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.34	56.12	0.55	55.58	67.15	8.19	3.62	11.60
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.04	63.20	0.65	62.55	80.85	8.99	3.84	12.73
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.06	63.20	0.67	62.54	81.68	9.04	3.81	12.73
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.06	63.20	0.67	62.54	81.68	9.04	3.81	12.73
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.72	72.75	0.68	72.07	117.41	10.84	4.09	13.69
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	7.73	76.23	0.68	75.55	126.44	11.24	4.02	14.52
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	7.73	76.23	0.68	75.55	126.44	11.24	4.02	14.52
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.91	62.06	1.26	60.80	90.34	9.50	4.72	13.06
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.61	61.04	0.78	60.26	128.21	11.32	4.85	15.23
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.63	61.04	0.78	60.26	130.10	11.41	4.85	15.23
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.63	61.04	0.78	60.26	130.10	11.41	4.85	15.23
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	9.79	99.94	1.39	98.55	172.42	13.13	5.31	17.57
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	10.47	165.28	2.05	163.23	380.83	19.51	5.88	15.31
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	10.93	155.60	2.41	153.19	390.68	19.77	6.76	15.28
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.00	83.53	1.45	82.08	181.64	13.48	8.58	22.61
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	15.47	96.38	2.17	94.21	228.80	15.13	10.08	23.56
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.04	96.83	2.69	94.14	298.71	17.28	9.99	28.21
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	19.17	104.23	2.33	101.90	384.84	19.62	12.35	32.30

Table 2-149

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.90	8.86	0.05	8.80	1.83	1.35	0.51	1.58
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.90	8.86	0.05	8.80	1.83	1.35	0.51	1.58
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.99	54.08	0.06	54.01	13.96	3.74	0.55	1.68
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.99	54.08	0.06	54.01	13.96	3.74	0.55	1.68
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.00	89.75	0.06	89.69	133.79	11.57	0.48	1.41
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.00	89.76	0.06	89.70	133.82	11.57	0.48	1.41
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.02	8.81	0.18	8.64	1.50	1.23	0.59	1.84
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.02	8.81	0.18	8.64	1.50	1.23	0.59	1.84
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.03	37.26	0.16	37.10	19.71	4.44	0.58	1.47
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.03	37.27	0.16	37.10	19.71	4.44	0.58	1.47
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.04	37.74	0.17	37.57	19.86	4.46	0.61	1.47
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.04	8.81	0.18	8.63	1.49	1.22	0.61	1.87
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.12	9.95	0.18	9.77	1.74	1.32	0.66	1.98
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.13	16.11	0.19	15.92	2.86	1.69	0.67	1.91
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.13	16.11	0.19	15.92	2.86	1.69	0.67	1.91
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.14	9.95	0.16	9.78	1.77	1.33	0.67	1.98
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.15	7.91	0.06	7.84	2.34	1.53	0.69	1.85
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.15	37.27	0.16	37.10	26.97	5.19	0.64	1.65
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.15	16.23	0.20	16.03	2.87	1.69	0.70	1.91
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.22	63.83	0.17	63.65	62.78	7.92	0.66	1.65
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.22	16.11	0.19	15.92	3.03	1.74	0.75	1.99
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.24	31.32	0.19	31.12	5.93	2.44	0.75	1.99
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.27	53.48	0.08	53.40	14.14	3.76	0.76	2.11
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.28	9.33	0.18	9.16	1.89	1.38	0.79	2.10
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.32	94.79	0.08	94.71	137.42	11.72	0.67	1.78
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.39	65.07	0.19	64.89	62.91	7.93	0.76	1.89
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.41	31.53	0.21	31.32	6.12	2.47	0.87	2.23

Table 3-6

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.08	58.38	0.05	58.33	92.67	9.63	5.82	16.94
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.36	63.24	0.05	63.19	95.11	9.75	6.01	17.02
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.36	63.25	0.05	63.20	95.13	9.75	6.01	17.02
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.37	79.65	0.05	79.60	157.39	12.55	7.31	21.01
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	11.74	79.69	0.05	79.64	162.39	12.74	7.31	21.27
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	11.74	79.71	0.05	79.66	162.44	12.75	7.31	21.27
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	12.17	96.19	0.05	96.14	201.78	14.20	7.79	22.81
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	12.62	96.16	0.05	96.12	207.85	14.42	7.78	23.04
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	12.62	96.17	0.05	96.12	207.90	14.42	7.78	23.05
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.28	121.72	0.19	121.53	287.82	16.97	11.13	29.93
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.98	129.94	0.19	129.75	338.88	18.41	13.05	33.96
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.98	130.05	0.19	129.85	339.16	18.42	13.05	33.96
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	21.92	150.23	0.21	150.02	504.26	22.46	13.62	38.18
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	23.32	177.33	0.21	177.12	633.82	25.18	14.95	41.10
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	25.72	163.31	0.46	162.85	610.33	24.70	16.52	43.87
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	25.73	163.42	0.46	162.95	610.94	24.72	16.53	43.88
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.79	178.28	2.25	176.03	610.10	24.70	17.25	42.56
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	27.54	194.36	0.21	194.15	787.98	28.07	17.70	47.69
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	27.55	194.41	0.21	194.20	788.48	28.08	17.70	47.70
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	34.19	225.56	2.53	223.03	1,133.52	33.67	21.51	56.29
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	35.52	211.10	2.36	208.74	786.19	28.04	23.45	56.43
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	36.23	267.56	2.48	265.07	1,440.61	37.96	23.25	60.70
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	41.73	259.42	2.86	256.56	1,078.08	32.83	28.70	67.26
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	46.56	269.22	2.78	266.45	1,585.11	39.81	31.24	74.11
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	50.89	323.52	2.56	320.97	2,163.58	46.51	35.84	84.47
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	54.89	326.90	3.40	323.50	2,192.88	46.83	38.31	90.94
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	59.81	385.08	3.18	381.90	2,970.05	54.50	40.63	102.27

Table 3-8

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.81	25.66	0.01	25.65	20.39	4.52	2.50	7.39
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.94	27.06	0.01	27.06	20.95	4.58	2.65	7.50
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.94	27.07	0.01	27.06	20.95	4.58	2.65	7.50
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.71	33.91	0.01	33.91	32.91	5.74	3.10	9.45
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.88	34.08	0.01	34.07	34.01	5.83	3.15	9.50
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.88	34.08	0.01	34.08	34.01	5.83	3.15	9.50
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.09	41.91	0.01	41.91	42.10	6.49	3.27	10.03
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.29	41.91	0.01	41.90	43.47	6.59	3.39	10.38
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.29	41.91	0.01	41.90	43.47	6.59	3.39	10.38
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.74	49.61	0.02	49.59	58.82	7.67	4.44	12.61
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.58	51.89	0.05	51.84	70.86	8.42	4.52	13.33
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.04	53.39	0.02	53.37	74.06	8.61	5.28	14.92
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.04	53.39	0.02	53.37	74.07	8.61	5.28	14.92
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.39	61.70	0.02	61.68	96.53	9.82	5.33	15.71
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	8.93	72.35	0.02	72.33	120.00	10.95	5.41	16.94
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	9.72	64.95	0.05	64.90	114.03	10.68	5.87	16.54
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.05	67.29	0.02	67.27	123.85	11.13	6.34	18.67
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.05	67.30	0.02	67.28	123.87	11.13	6.34	18.67
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	10.30	76.33	0.05	76.28	139.12	11.80	6.03	17.65
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	10.81	81.85	0.02	81.83	158.16	12.58	6.64	20.38
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	10.81	81.86	0.02	81.84	158.17	12.58	6.64	20.38
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.85	66.58	0.06	66.52	124.96	11.18	7.46	20.87
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.85	66.59	0.06	66.53	124.99	11.18	7.46	20.87
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	15.28	84.62	0.07	84.54	212.13	14.56	9.28	26.80
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.28	84.63	0.07	84.56	212.19	14.57	9.28	26.80
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	16.58	106.22	0.07	106.15	278.47	16.69	10.08	30.07
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	16.58	106.23	0.07	106.15	278.50	16.69	10.08	30.07

Table 3-13

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.98	30.88	0.03	30.85	28.72	5.36	3.02	8.91
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.15	37.65	0.03	37.61	44.68	6.68	3.70	10.59
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.58	38.34	0.02	38.33	45.33	6.73	4.47	11.96
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.63	45.47	0.03	45.43	55.40	7.44	3.90	11.54
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.77	41.14	0.02	41.12	46.39	6.81	4.48	12.19
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.77	41.14	0.02	41.12	46.39	6.81	4.48	12.19
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.85	40.61	0.04	40.57	54.22	7.36	5.09	13.71
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.85	40.61	0.04	40.57	54.23	7.36	5.09	13.71
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.17	50.85	0.02	50.83	73.77	8.59	5.41	15.28
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.42	51.51	0.02	51.49	75.91	8.71	5.50	15.43
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.42	51.51	0.02	51.49	75.91	8.71	5.50	15.43
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.73	56.85	0.04	56.82	77.26	8.79	5.67	15.32
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	8.87	62.73	0.02	62.71	95.23	9.76	5.61	16.58
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	9.15	62.73	0.02	62.71	97.89	9.89	5.64	16.65
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	9.15	62.73	0.02	62.71	97.89	9.89	5.64	16.65
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	9.79	51.54	0.05	51.49	88.16	9.39	6.18	17.73
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	9.79	51.54	0.05	51.50	88.16	9.39	6.18	17.73
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	10.12	60.51	0.04	60.47	94.07	9.70	6.66	17.95
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	10.12	60.52	0.04	60.48	94.07	9.70	6.66	17.95
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.83	70.40	0.04	70.36	127.01	11.27	7.04	19.14
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	10.88	65.60	0.04	65.56	117.17	10.82	6.82	19.88
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	10.88	65.60	0.04	65.56	117.18	10.82	6.82	19.88
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	11.74	82.57	0.04	82.53	159.49	12.63	7.11	21.14
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	12.64	75.78	0.04	75.74	156.94	12.53	8.11	22.66
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	12.64	75.78	0.04	75.74	156.95	12.53	8.11	22.66
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	13.82	91.77	0.04	91.73	202.08	14.22	8.81	25.12
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	13.82	91.77	0.04	91.73	202.08	14.22	8.81	25.12

Table 3-18

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.49	65.36	0.05	65.31	122.43	11.06	7.27	20.03
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.81	69.92	0.05	69.87	125.18	11.19	7.59	20.45
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.81	69.93	0.05	69.88	125.21	11.19	7.59	20.45
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.56	87.05	0.31	86.74	203.00	14.25	9.23	25.69
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.99	87.42	0.31	87.11	208.75	14.45	9.24	25.91
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.99	87.43	0.31	87.12	208.80	14.45	9.24	25.91
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	15.71	107.57	0.30	107.27	264.19	16.25	9.68	27.95
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	16.22	107.56	0.30	107.26	271.54	16.48	9.77	28.68
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	16.22	107.57	0.30	107.26	271.58	16.48	9.77	28.68
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	20.98	131.72	1.00	130.72	349.78	18.70	13.48	35.51
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	24.06	139.01	1.03	137.98	406.73	20.17	16.19	40.51
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	24.06	139.03	1.03	138.01	406.82	20.17	16.19	40.51
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.09	154.80	2.54	152.27	536.74	23.17	16.76	39.56
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	26.34	161.73	1.15	160.58	604.77	24.59	16.88	44.76
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	28.09	191.48	1.12	190.36	769.29	27.74	17.89	48.48
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	30.40	173.25	1.16	172.09	721.57	26.86	19.95	51.59
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	30.41	173.27	1.16	172.11	721.78	26.87	19.95	51.59
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	32.77	210.47	1.12	209.35	949.45	30.81	21.15	56.45
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	32.77	210.49	1.12	209.37	949.57	30.82	21.15	56.45
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	33.09	204.38	2.85	201.54	972.14	31.18	21.61	51.66
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	34.36	186.89	3.13	183.76	671.51	25.91	22.50	53.65
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	35.24	256.43	2.79	253.63	1,238.46	35.19	22.85	56.33
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	43.33	249.83	3.96	245.87	1,049.55	32.40	30.26	66.87
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	44.54	237.55	3.51	234.04	1,318.00	36.30	29.52	70.80
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	48.84	295.42	3.41	292.01	1,837.65	42.87	32.50	78.86
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	56.60	313.05	4.45	308.60	2,099.84	45.82	39.86	90.93
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	61.88	377.59	4.29	373.30	2,889.50	53.75	42.84	102.42

Table 3-20

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	36.73	186.40	3.24	183.16	719.91	26.83	25.97	57.73
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	37.48	194.91	3.24	191.67	728.74	27.00	27.16	58.74
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	37.48	194.96	3.24	191.72	728.86	27.00	27.16	58.75
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	45.68	242.87	3.68	239.19	1,248.76	35.34	31.84	72.76
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	46.68	242.79	3.68	239.10	1,271.61	35.66	33.20	75.06
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	46.68	242.84	3.68	239.15	1,271.86	35.66	33.20	75.07
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	48.75	289.63	3.59	286.04	1,640.29	40.50	32.83	79.81
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	49.38	275.09	6.58	268.51	1,279.78	35.77	35.16	72.87
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	49.95	289.60	3.59	286.01	1,675.25	40.93	35.12	82.69
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	49.95	289.62	3.59	286.03	1,675.40	40.93	35.13	82.69
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	51.58	304.47	9.80	294.67	1,559.31	39.49	36.86	76.65
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	54.45	286.79	6.75	280.04	1,380.75	37.16	39.39	80.96
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	54.45	286.83	6.75	280.08	1,381.00	37.16	39.39	80.96
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	62.04	337.99	7.44	330.55	2,318.94	48.16	43.98	98.15
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	63.10	342.90	11.48	331.42	1,823.39	42.70	45.85	91.40
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	65.68	395.58	7.20	388.38	2,987.51	54.66	46.12	106.27
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	66.07	383.99	13.09	370.90	3,063.56	55.35	45.56	96.89
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	68.93	357.39	7.63	349.76	2,590.73	50.90	48.50	108.18
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	68.93	357.44	7.63	349.81	2,591.24	50.90	48.51	108.18
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	70.39	443.61	12.80	430.81	3,992.90	63.19	48.30	110.56
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	70.77	399.49	12.50	386.99	2,412.60	49.12	52.27	102.59
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	73.81	419.44	7.34	412.09	3,472.13	58.92	51.67	121.20
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	73.81	419.46	7.34	412.12	3,472.40	58.93	51.67	121.20
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	82.95	433.97	13.32	420.65	3,931.41	62.70	59.28	125.05
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	91.16	514.66	13.05	501.62	5,647.84	75.15	61.13	145.14
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	93.62	498.96	14.47	484.49	5,217.40	72.23	68.20	148.27
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	102.88	579.12	14.33	564.79	7,358.82	85.78	68.29	165.80

Table 3-21

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	15.17	95.35	0.07	95.28	225.51	15.02	9.96	27.07
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	15.59	101.70	0.07	101.62	230.45	15.18	10.29	27.28
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	15.59	101.71	0.07	101.64	230.48	15.18	10.29	27.28
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	19.01	127.47	0.08	127.39	385.33	19.63	12.54	34.19
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	19.57	127.44	0.08	127.36	396.03	19.90	12.72	34.75
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	19.57	127.46	0.08	127.37	396.09	19.90	12.72	34.75
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	20.30	154.16	0.08	154.08	497.26	22.30	13.57	37.02
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	21.13	154.15	0.08	154.07	510.45	22.59	13.65	37.80
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	21.13	154.16	0.08	154.07	510.50	22.59	13.65	37.81
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.50	175.84	1.29	174.55	561.68	23.70	17.78	44.11
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	30.18	185.64	1.33	184.31	638.85	25.28	20.01	49.67
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	30.18	185.66	1.33	184.33	638.94	25.28	20.01	49.67
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	33.37	216.43	1.46	214.98	997.14	31.58	21.45	56.96
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	34.86	238.61	4.16	234.45	928.39	30.47	23.56	54.59
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	35.28	255.51	1.40	254.11	1,266.15	35.58	24.03	60.77
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	38.32	232.36	1.51	230.85	1,168.16	34.18	25.41	63.85
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	38.32	232.38	1.51	230.87	1,168.35	34.18	25.41	63.85
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	41.01	276.41	1.44	274.96	1,526.52	39.07	27.06	70.60
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	41.01	276.42	1.44	274.97	1,526.64	39.07	27.06	70.60
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	44.49	300.45	4.68	295.77	1,750.36	41.84	28.18	70.41
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	46.24	273.74	4.34	269.40	1,204.05	34.70	31.79	71.68
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	46.25	273.76	4.34	269.42	1,204.20	34.70	31.79	71.69
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	47.17	346.53	4.60	341.93	2,243.62	47.37	30.96	76.71
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	60.70	347.08	4.94	342.14	2,502.55	50.03	42.47	97.88
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	60.70	347.10	4.95	342.16	2,502.84	50.03	42.47	97.88
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	66.43	415.37	4.77	410.60	3,480.89	59.00	44.75	110.11
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	66.43	415.38	4.77	410.61	3,481.09	59.00	44.76	110.11

Table 3-23

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	20.91	104.72	0.09	104.63	272.49	16.51	15.97	33.94
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	21.46	110.46	0.09	110.38	276.66	16.63	16.32	34.13
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	21.46	110.46	0.09	110.38	276.67	16.63	16.32	34.13
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	25.89	135.96	0.10	135.86	445.91	21.12	19.91	41.45
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	26.60	137.00	0.10	136.90	455.72	21.35	20.09	41.77
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	26.60	137.01	0.10	136.91	455.73	21.35	20.09	41.77
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	27.31	159.91	0.10	159.81	544.68	23.34	19.91	43.59
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	28.14	159.91	0.10	159.81	556.96	23.60	20.98	44.37
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	28.14	159.91	0.10	159.81	556.98	23.60	20.98	44.37
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	38.60	206.04	1.36	204.68	754.68	27.47	29.56	57.44
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	43.24	215.13	1.46	213.67	824.83	28.72	33.53	62.74
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	43.24	215.14	1.46	213.68	824.86	28.72	33.53	62.74
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	47.88	247.72	1.66	246.06	1,288.07	35.89	36.87	71.89
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	49.86	285.27	1.61	283.66	1,568.93	39.61	38.06	75.00
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	53.97	264.47	1.67	262.80	1,450.67	38.09	42.20	79.49
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	53.97	264.48	1.67	262.81	1,450.72	38.09	42.20	79.49
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	56.75	306.45	1.60	304.85	1,816.69	42.62	43.77	84.68
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	56.75	306.46	1.60	304.85	1,816.74	42.62	43.77	84.68
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	69.43	371.20	8.34	362.86	2,080.23	45.61	53.96	98.05
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	83.03	430.07	8.61	421.47	2,524.09	50.24	65.47	115.13
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	84.46	423.36	8.78	414.58	2,644.29	51.42	68.69	116.64
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	87.58	454.65	9.55	445.10	3,862.18	62.15	68.89	127.02
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	91.60	507.94	9.33	498.61	4,748.78	68.91	70.52	134.51
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	107.02	497.67	9.66	488.01	4,967.32	70.48	83.63	157.78
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	109.08	518.26	9.85	508.41	5,271.95	72.61	83.93	161.36
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	114.53	567.31	9.27	558.04	6,476.17	80.47	88.64	170.93
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	116.97	587.76	9.46	578.30	6,863.10	82.84	89.59	174.88

Table 3-29

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.02	19.71	0.00	19.71	12.38	3.52	2.03	5.87
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.12	20.53	0.00	20.52	12.76	3.57	2.13	5.93
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.12	20.53	0.00	20.52	12.76	3.57	2.13	5.93
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.71	25.91	0.00	25.91	19.83	4.45	2.60	7.28
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.86	25.91	0.00	25.90	20.56	4.53	2.62	7.43
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.86	25.91	0.00	25.90	20.56	4.53	2.62	7.43
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.02	31.85	0.00	31.84	25.54	5.05	2.73	7.99
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.22	31.84	0.00	31.84	26.46	5.14	2.98	8.18
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.22	31.85	0.00	31.84	26.46	5.14	2.98	8.18
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.05	31.37	0.03	31.34	30.21	5.50	2.73	9.09
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.69	38.49	0.01	38.48	37.75	6.14	3.58	10.07
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.20	38.34	0.03	38.31	46.83	6.84	3.33	10.86
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	6.59	45.71	0.03	45.68	57.06	7.55	3.65	11.52
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.79	41.99	0.01	41.98	48.53	6.97	4.67	12.23
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.79	41.99	0.01	41.98	48.53	6.97	4.67	12.23
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.01	48.05	0.02	48.03	61.26	7.83	4.47	12.65
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.47	56.22	0.02	56.20	76.34	8.74	4.98	13.76
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.33	42.80	0.03	42.77	60.39	7.77	5.57	14.61
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.33	42.81	0.03	42.78	60.39	7.77	5.57	14.61
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.47	53.08	0.02	53.06	80.61	8.98	5.72	15.61
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.47	53.08	0.02	53.07	80.61	8.98	5.72	15.61
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	9.14	64.53	0.02	64.51	103.70	10.18	6.13	17.05
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	9.14	64.53	0.02	64.51	103.70	10.18	6.13	17.05
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.40	54.83	0.04	54.80	100.42	10.02	6.82	18.73
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.40	54.84	0.04	54.80	100.43	10.02	6.82	18.73
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	11.42	69.03	0.04	68.99	134.17	11.58	7.33	20.90
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	11.42	69.03	0.04	68.99	134.17	11.58	7.33	20.90

Table 3-30

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	4.12	24.55	0.00	24.54	19.26	4.39	2.80	7.58
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.25	25.88	0.00	25.87	19.83	4.45	2.88	7.79
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	4.25	25.88	0.00	25.87	19.83	4.45	2.88	7.79
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	5.10	32.44	0.01	32.44	30.75	5.55	3.46	9.42
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.26	32.44	0.01	32.43	31.87	5.65	3.52	9.66
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	5.26	32.44	0.01	32.43	31.87	5.65	3.52	9.66
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.51	39.14	0.01	39.13	39.39	6.28	3.83	10.40
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.71	39.13	0.01	39.13	40.81	6.39	3.91	10.50
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.71	39.13	0.01	39.13	40.81	6.39	3.91	10.50
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.86	39.69	0.04	39.64	46.43	6.81	4.01	11.56
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.45	47.93	0.02	47.91	56.91	7.54	4.76	13.00
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.38	48.49	0.06	48.43	72.44	8.51	4.78	13.78
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.82	51.67	0.02	51.65	71.51	8.46	6.02	15.39
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.82	51.67	0.02	51.65	71.51	8.46	6.02	15.39
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	8.97	56.75	0.06	56.69	88.22	9.39	5.31	14.83
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	9.25	59.41	0.03	59.39	92.22	9.60	6.16	16.33
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	9.87	68.23	0.03	68.20	114.55	10.70	6.49	17.81
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	10.75	52.40	0.06	52.34	87.20	9.34	7.34	18.02
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	10.75	52.40	0.06	52.34	87.21	9.34	7.34	18.02
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.96	64.89	0.03	64.87	118.37	10.88	7.45	19.54
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.96	64.90	0.03	64.87	118.38	10.88	7.45	19.54
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	11.81	77.51	0.03	77.48	151.47	12.31	7.94	21.37
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	11.81	77.51	0.03	77.48	151.47	12.31	7.94	21.37
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	13.46	66.11	0.08	66.03	143.72	11.99	8.80	23.34
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.46	66.12	0.08	66.03	143.74	11.99	8.80	23.34
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	14.82	82.89	0.08	82.80	191.05	13.82	9.59	25.81
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	14.82	82.89	0.08	82.81	191.06	13.82	9.60	25.82

Table 3-33

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	18.00	127.56	1.02	126.54	318.89	17.86	11.18	30.49
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.27	99.47	0.09	99.38	247.35	15.73	14.60	31.46
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	19.75	105.09	0.09	105.00	251.48	15.86	14.80	31.91
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.75	105.09	0.09	105.00	251.48	15.86	14.80	31.91
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22.45	159.43	1.15	158.28	544.23	23.33	13.13	38.17
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	23.52	181.94	1.13	180.81	663.63	25.76	13.67	40.97
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	23.89	134.37	0.19	134.18	362.73	19.05	18.08	36.95
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	23.96	130.92	0.10	130.82	410.41	20.26	18.15	39.20
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	24.60	130.91	0.10	130.81	419.79	20.49	18.24	40.40
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	24.60	130.91	0.10	130.81	419.79	20.49	18.24	40.40
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	24.82	148.74	1.06	147.68	444.69	21.09	16.15	40.53
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	24.82	148.75	1.06	147.70	444.73	21.09	16.15	40.53
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	25.33	154.90	0.10	154.80	507.00	22.52	18.90	40.94
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	26.07	154.90	0.10	154.80	518.90	22.78	19.50	42.02
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	26.07	154.90	0.10	154.80	518.91	22.78	19.50	42.02
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	27.15	141.32	0.21	141.11	412.25	20.30	20.41	41.41
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	27.15	141.32	0.21	141.11	412.26	20.30	20.41	41.41
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	30.14	164.26	0.23	164.03	606.40	24.63	21.94	46.80
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	31.46	186.70	1.20	185.51	796.13	28.22	20.12	52.45
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	31.46	186.71	1.20	185.52	796.20	28.22	20.12	52.45
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	31.56	190.35	0.22	190.12	736.79	27.14	23.54	49.08
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	33.67	223.18	1.15	222.03	1,027.47	32.05	21.85	57.58
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	33.67	223.18	1.15	222.03	1,027.51	32.05	21.85	57.58
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	34.25	175.94	0.24	175.70	705.61	26.56	25.56	52.95
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	34.25	175.94	0.24	175.70	705.64	26.56	25.56	52.95
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	36.19	206.98	0.23	206.75	879.24	29.65	26.99	56.87
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	36.19	206.98	0.23	206.75	879.26	29.65	26.99	56.87

Table 3-38

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	10.41	65.80	0.67	65.12	107.77	10.38	6.46	17.02
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.48	66.77	0.38	66.39	118.50	10.89	7.11	19.73
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.81	71.25	0.38	70.87	121.03	11.00	7.23	19.88
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.81	71.25	0.38	70.87	121.03	11.00	7.23	19.88
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	12.80	83.57	0.76	82.81	176.32	13.28	7.94	21.30
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	13.53	98.73	0.74	97.99	218.27	14.77	8.08	22.45
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.15	92.90	0.65	92.25	179.91	13.41	8.83	23.76
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.28	89.90	0.43	89.46	200.01	14.14	8.82	24.38
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.72	89.89	0.43	89.46	205.54	14.34	8.83	24.68
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.72	89.89	0.43	89.46	205.55	14.34	8.83	24.68
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	15.32	109.74	0.42	109.32	259.93	16.12	9.70	27.02
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	15.63	82.36	0.86	81.51	177.63	13.33	9.84	25.38
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	15.63	82.37	0.86	81.51	177.65	13.33	9.84	25.38
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	15.84	109.74	0.42	109.32	267.13	16.34	9.70	27.23
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	15.84	109.74	0.42	109.32	267.14	16.34	9.70	27.23
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	16.44	98.54	0.66	97.88	214.66	14.65	10.18	27.30
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	16.44	98.55	0.66	97.88	214.67	14.65	10.18	27.30
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.62	114.46	0.73	113.72	305.53	17.48	10.61	29.75
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	18.70	136.39	0.71	135.68	386.60	19.66	11.53	32.41
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	19.60	105.81	0.97	104.84	308.52	17.56	11.99	32.92
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	19.60	105.81	0.97	104.84	308.55	17.57	11.99	32.92
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	20.61	124.26	0.75	123.51	373.56	19.33	12.69	34.50
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	20.61	124.26	0.75	123.51	373.57	19.33	12.69	34.50
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	21.29	133.20	0.94	132.27	413.73	20.34	13.35	36.01
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	21.29	133.21	0.94	132.27	413.75	20.34	13.35	36.01
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	22.14	150.52	0.72	149.79	487.01	22.07	13.83	38.09
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	22.14	150.52	0.72	149.80	487.01	22.07	13.83	38.09

Table 3-39

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	12.35	66.44	0.02	66.41	127.30	11.28	8.93	21.58
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	12.69	71.05	0.02	71.02	129.92	11.40	8.97	21.89
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	12.69	71.05	0.02	71.03	129.94	11.40	8.97	21.89
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.24	88.38	0.03	88.35	205.77	14.34	11.04	26.89
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	15.68	88.93	0.03	88.91	211.17	14.53	11.19	26.89
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	15.68	88.95	0.03	88.92	211.22	14.53	11.19	26.89
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	16.16	105.78	0.03	105.75	253.48	15.92	11.52	28.02
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	16.67	105.77	0.03	105.74	260.18	16.13	11.76	28.47
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	16.67	105.78	0.03	105.75	260.22	16.13	11.76	28.47
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	24.45	138.82	0.68	138.14	383.81	19.59	17.60	37.97
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	27.67	146.53	0.71	145.82	440.61	20.99	20.15	42.18
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	27.67	146.55	0.71	145.84	440.67	20.99	20.15	42.19
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	30.33	169.55	0.77	168.78	644.92	25.40	21.09	47.80
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	30.74	227.08	2.86	224.22	841.26	29.00	19.96	50.82
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	31.80	197.10	0.74	196.36	789.41	28.10	23.00	50.23
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	34.55	182.11	0.79	181.31	758.71	27.54	25.24	53.76
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	34.56	182.13	0.79	181.33	758.85	27.55	25.24	53.76
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	36.60	215.33	0.76	214.57	953.08	30.87	26.32	57.92
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	36.60	215.34	0.76	214.58	953.18	30.87	26.32	57.93
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	39.12	283.11	3.20	279.91	1,544.43	39.30	24.23	65.74
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	41.11	259.98	2.92	257.07	1,091.89	33.04	27.56	66.70
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	41.11	260.01	2.92	257.09	1,092.04	33.05	27.56	66.70
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	41.40	322.71	3.14	319.57	1,946.92	44.12	26.05	71.18
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	53.59	325.54	3.29	322.25	2,164.05	46.52	36.85	89.63
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	53.59	325.56	3.29	322.27	2,164.33	46.52	36.85	89.65
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	58.26	385.77	3.16	382.61	2,925.20	54.09	38.60	101.27
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	58.27	385.78	3.16	382.62	2,925.43	54.09	38.61	101.28

Table 3-41

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.75	98.47	0.54	97.93	236.47	15.38	14.61	30.74
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	20.24	104.34	0.54	103.80	240.28	15.50	14.72	31.55
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	20.24	104.36	0.54	103.82	240.31	15.50	14.72	31.55
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	24.38	130.40	0.61	129.79	394.31	19.86	17.72	38.28
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	25.03	130.36	0.61	129.75	403.26	20.08	18.06	38.70
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	25.03	130.38	0.61	129.77	403.31	20.08	18.06	38.71
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	25.72	155.08	0.59	154.49	494.47	22.24	18.48	40.16
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	26.48	155.06	0.59	154.48	506.17	22.50	18.97	41.07
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	26.48	155.07	0.59	154.48	506.23	22.50	18.97	41.08
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	33.05	181.74	1.71	180.03	584.38	24.17	24.80	49.52
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	36.98	190.84	1.71	189.13	651.53	25.53	28.21	54.31
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	36.98	190.87	1.71	189.16	651.64	25.53	28.22	54.31
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	38.32	276.02	5.06	270.96	1,155.54	33.99	25.81	62.84
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	41.12	223.24	1.93	221.31	1,018.25	31.91	30.93	64.30
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	43.06	259.12	1.86	257.26	1,272.22	35.67	32.62	66.27
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	46.37	237.98	1.96	236.03	1,171.23	34.22	35.21	69.41
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	46.37	238.01	1.96	236.06	1,171.45	34.23	35.21	69.41
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	49.11	279.33	1.90	277.42	1,506.66	38.82	37.61	75.45
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	49.11	279.34	1.90	277.44	1,506.83	38.82	37.62	75.45
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	49.12	344.17	5.80	338.37	2,207.99	46.99	32.43	81.35
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	49.79	309.24	5.02	304.22	1,443.05	37.99	35.05	78.94
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	49.79	309.27	5.02	304.25	1,443.22	37.99	35.05	78.94
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	52.04	390.38	5.68	384.70	2,835.36	53.25	33.37	89.07
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	65.57	387.15	5.78	381.38	3,019.63	54.95	44.69	106.75
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	65.57	387.18	5.78	381.40	3,019.93	54.95	44.69	106.76
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	71.63	452.72	5.75	446.97	4,168.79	64.57	47.72	122.43
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	71.64	452.73	5.75	446.99	4,169.08	64.57	47.72	122.44

Table 3-42

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	11.40	63.77	0.02	63.75	115.61	10.75	8.24	19.98
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.74	68.49	0.02	68.47	118.15	10.87	8.32	20.32
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	11.74	68.49	0.02	68.47	118.15	10.87	8.32	20.32
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	14.09	85.23	0.02	85.21	189.21	13.76	10.24	25.10
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.54	86.39	0.02	86.37	194.50	13.95	10.36	25.10
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	14.54	86.39	0.02	86.37	194.50	13.95	10.36	25.10
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	14.88	101.51	0.02	101.48	233.03	15.27	10.56	26.05
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	15.40	101.50	0.02	101.48	239.49	15.48	10.85	26.73
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	15.40	101.50	0.02	101.48	239.50	15.48	10.85	26.73
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	21.90	134.00	0.10	133.90	357.44	18.91	16.32	36.35
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	25.09	142.00	0.11	141.89	412.02	20.30	18.73	40.27
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	25.09	142.01	0.11	141.90	412.04	20.30	18.73	40.27
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	27.54	164.99	0.12	164.87	604.58	24.59	19.59	44.66
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	28.95	190.27	0.12	190.16	738.24	27.17	20.82	46.44
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	31.74	176.62	0.12	176.50	716.15	26.76	23.57	50.70
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	31.74	176.63	0.12	176.50	716.19	26.76	23.57	50.70
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	32.26	229.23	2.28	226.95	939.23	30.65	20.89	52.76
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	33.72	207.99	0.12	207.87	896.57	29.94	24.67	54.00
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	33.72	207.99	0.12	207.88	896.60	29.94	24.67	54.00
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	40.26	262.57	2.28	260.29	1,101.67	33.19	26.78	66.23
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	41.11	286.45	2.58	283.87	1,709.02	41.34	26.15	70.46
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	43.30	326.13	2.52	323.61	2,128.93	46.14	28.14	74.82
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	52.67	328.64	2.62	326.02	2,200.00	46.90	35.65	89.08
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	55.20	302.37	3.10	299.27	1,361.85	36.90	43.19	81.17
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	57.18	386.62	2.54	384.08	2,951.33	54.33	37.80	99.63
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	71.42	375.55	3.56	371.99	2,701.49	51.98	56.39	108.70
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	76.83	436.82	3.49	433.33	3,583.78	59.86	58.22	120.31

Table 3-43

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	13.71	74.33	0.03	74.30	154.10	12.41	9.97	23.95
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.10	79.20	0.03	79.17	157.05	12.53	10.05	24.21
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.10	79.20	0.03	79.17	157.06	12.53	10.05	24.21
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.01	98.85	0.03	98.82	251.15	15.85	12.37	29.92
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.51	99.22	0.03	99.19	257.43	16.04	12.54	29.96
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.51	99.22	0.03	99.19	257.44	16.04	12.54	29.97
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	17.99	117.78	0.03	117.75	308.32	17.56	13.08	30.82
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	18.57	117.78	0.03	117.75	316.06	17.78	13.20	32.10
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	18.57	117.78	0.03	117.75	316.07	17.78	13.20	32.10
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.54	151.70	0.80	150.90	446.30	21.13	19.39	40.74
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	30.05	159.70	0.82	158.88	506.58	22.51	22.07	45.29
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	30.05	159.70	0.82	158.89	506.59	22.51	22.07	45.29
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	33.02	185.58	0.90	184.68	756.26	27.50	23.55	51.69
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	34.07	250.02	3.37	246.65	1,000.90	31.64	22.66	56.17
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	34.58	215.42	0.87	214.55	924.09	30.40	25.10	54.46
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	37.64	199.05	0.93	198.12	880.44	29.67	27.67	58.16
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	37.64	199.05	0.93	198.12	880.48	29.67	27.67	58.16
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	39.79	234.36	0.89	233.46	1,104.20	33.23	28.85	62.38
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	39.79	234.36	0.89	233.47	1,104.22	33.23	28.85	62.38
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	43.49	312.79	3.78	309.01	1,855.27	43.07	27.16	73.73
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	45.04	283.99	3.37	280.62	1,263.23	35.54	30.87	73.07
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	45.04	283.99	3.37	280.62	1,263.26	35.54	30.87	73.07
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	45.94	355.91	3.70	352.21	2,336.48	48.34	29.87	78.16
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	58.87	355.71	3.88	351.83	2,528.66	50.29	41.11	97.63
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	58.87	355.71	3.88	351.84	2,528.72	50.29	41.11	97.63
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	63.85	418.78	3.74	415.04	3,412.37	58.42	43.00	110.49
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	63.85	418.78	3.74	415.05	3,412.42	58.42	43.00	110.49

Table 3-57

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.09	32.54	0.01	32.54	34.13	5.84	3.32	10.23
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.26	34.17	0.01	34.16	34.92	5.91	3.49	10.25
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.26	34.17	0.01	34.16	34.92	5.91	3.49	10.25
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.30	43.21	0.01	43.20	54.83	7.40	4.06	12.66
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.52	43.21	0.01	43.20	56.37	7.51	4.18	12.82
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.52	43.21	0.01	43.20	56.37	7.51	4.18	12.82
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.82	54.21	0.01	54.20	70.31	8.38	4.35	13.66
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.07	54.21	0.01	54.20	72.30	8.50	4.46	13.79
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.07	54.21	0.01	54.20	72.30	8.50	4.46	13.79
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	10.45	69.46	0.04	69.42	116.98	10.82	6.69	18.70
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	12.30	74.07	0.04	74.03	142.66	11.94	7.65	22.00
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	12.30	74.08	0.04	74.03	142.66	11.94	7.65	22.00
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.06	86.23	0.05	86.18	192.59	13.88	7.84	23.96
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	14.03	104.23	0.05	104.18	241.06	15.53	8.18	25.61
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.98	88.24	1.13	87.11	201.97	14.21	9.39	24.73
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	15.57	93.90	0.05	93.85	238.70	15.45	9.26	27.61
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.57	93.90	0.05	93.85	238.71	15.45	9.26	27.61
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	16.74	116.32	0.05	116.27	307.40	17.53	10.21	29.72
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	16.74	116.32	0.05	116.27	307.41	17.53	10.21	29.73
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	18.55	113.50	1.28	112.22	335.12	18.31	11.71	30.97
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	19.64	136.27	1.26	135.01	416.10	20.40	12.19	32.94
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	21.99	109.34	1.17	108.17	314.59	17.74	13.66	35.90
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	21.99	109.34	1.17	108.18	314.61	17.74	13.66	35.90
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	27.68	141.73	1.32	140.41	550.65	23.47	16.77	46.51
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	27.68	141.74	1.32	140.42	550.69	23.47	16.77	46.52
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	29.97	180.20	1.29	178.91	739.21	27.19	18.35	50.55
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	29.97	180.20	1.29	178.91	739.23	27.19	18.35	50.55

Table 3-61

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	12.57	76.22	0.04	76.18	151.08	12.29	8.51	22.46
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	12.92	81.53	0.04	81.49	154.86	12.44	8.85	22.59
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	12.92	81.53	0.04	81.49	154.86	12.44	8.85	22.59
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	15.79	101.00	0.05	100.95	252.68	15.90	10.65	28.37
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	16.25	102.02	0.05	101.96	260.46	16.14	11.05	28.44
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	16.25	102.02	0.05	101.97	260.46	16.14	11.05	28.44
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	16.36	102.42	0.74	101.68	225.14	15.00	10.22	26.44
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	16.91	121.61	0.05	121.56	319.47	17.87	10.77	29.73
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	16.93	109.48	0.41	109.07	244.41	15.63	10.78	28.65
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	17.46	121.61	0.05	121.56	328.77	18.13	11.20	30.34
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	17.46	121.61	0.05	121.56	328.77	18.13	11.20	30.34
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.47	116.28	0.43	115.85	287.94	16.97	13.16	32.40
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.47	116.28	0.43	115.85	287.94	16.97	13.16	32.40
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	20.20	127.21	0.87	126.34	373.75	19.33	12.44	32.65
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	21.04	134.45	0.51	133.95	412.36	20.31	13.29	35.25
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	21.17	146.87	0.85	146.01	454.70	21.32	13.13	34.70
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	22.17	156.94	0.49	156.45	510.20	22.59	14.29	38.30
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	22.75	122.28	0.76	121.52	334.78	18.30	14.83	36.63
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.75	122.29	0.76	121.53	334.79	18.30	14.83	36.63
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	24.35	144.49	0.51	143.98	496.22	22.28	16.29	40.20
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	24.35	144.49	0.51	143.98	496.23	22.28	16.29	40.20
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	25.90	172.01	0.49	171.52	629.17	25.08	16.53	43.50
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	25.90	172.01	0.49	171.52	629.18	25.08	16.53	43.50
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	28.55	152.75	0.89	151.86	584.23	24.17	18.49	46.92
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	28.55	152.75	0.89	151.87	584.26	24.17	18.49	46.92
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	30.56	186.02	0.86	185.16	756.19	27.50	19.97	50.43
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	30.56	186.02	0.86	185.16	756.20	27.50	19.97	50.43

Table 3-72

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	17.84	98.74	0.05	98.69	228.63	15.12	13.10	29.91
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	17.84	98.74	0.05	98.69	228.63	15.12	13.10	29.91
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.94	118.25	0.05	118.20	394.06	19.85	14.23	32.85
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	22.39	123.93	0.06	123.87	383.11	19.57	16.32	37.48
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	22.39	123.93	0.06	123.87	383.11	19.57	16.32	37.48
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	23.63	146.88	0.06	146.82	470.31	21.69	17.37	39.49
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	23.63	146.88	0.06	146.82	470.32	21.69	17.37	39.49
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	25.06	182.67	0.06	182.60	654.32	25.58	17.11	41.55
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	26.38	226.24	0.06	226.18	781.93	27.96	17.69	44.82
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	32.47	180.58	1.06	179.52	619.32	24.89	23.93	49.20
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	34.86	189.42	1.10	188.33	647.28	25.44	26.55	52.49
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	38.63	189.42	1.10	188.33	876.42	29.60	28.02	58.75
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	40.76	221.97	1.20	220.76	1,072.75	32.75	29.58	62.32
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	42.69	257.04	1.16	255.87	1,315.37	36.27	30.82	66.38
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	43.35	299.25	4.13	295.12	1,441.01	37.96	30.41	70.49
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	43.82	237.03	1.24	235.79	1,240.76	35.22	33.73	67.41
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	43.95	237.03	1.24	235.78	1,158.68	34.04	33.26	67.41
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	44.92	334.86	0.08	334.78	1,656.23	40.70	30.85	74.65
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	46.37	277.87	1.20	276.68	1,460.71	38.22	34.51	71.99
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	50.40	334.86	4.40	330.46	1,625.64	40.32	35.35	82.48
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	52.23	398.13	1.20	396.94	2,202.53	46.93	37.17	84.65
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	52.98	374.14	4.66	369.48	2,573.47	50.73	35.00	88.94
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	59.44	423.68	4.56	419.12	3,542.78	59.52	38.32	101.38
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	60.04	488.26	0.08	488.18	4,615.74	67.94	35.06	117.58
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	70.20	419.28	5.03	414.25	3,424.45	58.52	49.96	114.69
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	70.20	419.28	5.03	414.25	3,424.45	58.52	49.96	114.69
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	71.76	488.26	4.83	483.43	4,504.43	67.12	48.70	121.50

Table 2-73

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.45	19.56	0.35	19.21	9.07	3.01	1.40	4.08
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.55	149.09	0.33	148.76	404.00	20.10	1.34	3.39
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.06	108.28	0.42	107.86	62.43	7.90	1.62	5.61
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.58	144.65	0.37	144.27	371.43	19.27	1.95	4.78
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	3.58	144.68	0.37	144.31	371.70	19.28	1.95	4.78
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.77	35.45	0.27	35.18	27.85	5.28	2.14	6.26
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.77	35.45	0.27	35.18	27.85	5.28	2.14	6.26
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.81	148.78	0.39	148.39	371.37	19.27	2.16	5.07
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.88	32.93	0.28	32.65	25.85	5.08	2.20	6.26
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.48	122.94	0.57	122.37	247.56	15.73	2.45	6.21
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.48	123.14	0.57	122.57	247.93	15.75	2.45	6.21
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.51	125.21	0.57	124.64	249.42	15.79	2.51	6.28
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.60	97.19	0.33	96.85	76.03	8.72	2.51	8.51
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.60	97.19	0.33	96.86	76.04	8.72	2.51	8.51
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.63	165.90	0.80	165.10	389.79	19.74	2.49	6.40
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.70	150.78	1.02	149.76	402.94	20.07	2.73	6.07
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.71	91.98	0.37	91.61	69.56	8.34	2.66	8.09
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.77	32.05	0.50	31.55	21.96	4.69	2.80	7.63
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.12	34.03	0.78	33.25	28.03	5.29	3.24	8.51
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.40	53.04	0.46	52.58	55.96	7.48	3.06	9.83
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.40	53.04	0.46	52.59	55.96	7.48	3.06	9.83
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.40	53.04	0.47	52.58	55.33	7.44	3.06	9.83
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.88	100.55	0.73	99.82	73.89	8.60	3.31	9.87
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.47	109.94	0.93	109.01	93.54	9.67	3.90	10.98
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.58	75.36	0.54	74.82	99.70	9.98	3.49	11.84
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.58	75.36	0.54	74.82	99.71	9.99	3.49	11.84
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.60	71.56	0.54	71.02	97.07	9.85	3.47	11.84

Table 2-76

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.01	59.22	0.72	58.50	47.62	6.90	3.12	7.09
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.01	59.22	0.72	58.51	47.63	6.90	3.12	7.09
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.06	58.54	0.70	57.85	46.36	6.81	3.18	7.24
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.85	57.33	0.85	56.49	46.03	6.78	3.79	8.60
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.86	58.16	0.85	57.32	46.87	6.85	3.75	8.60
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.86	58.17	0.85	57.33	46.88	6.85	3.75	8.60
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.31	57.56	0.88	56.68	80.83	8.99	4.87	15.12
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.44	61.62	0.90	60.72	85.64	9.25	4.88	15.41
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.44	61.62	0.90	60.72	85.65	9.25	4.88	15.41
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	9.68	105.41	1.96	103.45	161.42	12.70	6.14	13.58
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	10.25	65.00	1.01	63.99	125.14	11.19	6.28	17.96
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.46	64.38	1.07	63.32	130.93	11.44	6.21	18.04
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.46	64.38	1.07	63.32	130.94	11.44	6.21	18.04
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	10.76	71.09	1.26	69.84	131.48	11.47	6.14	19.53
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	10.82	71.09	1.27	69.82	132.45	11.51	6.22	19.53
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	10.82	71.09	1.27	69.82	132.45	11.51	6.22	19.53
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.36	79.93	1.48	78.44	196.72	14.03	7.94	24.56
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.44	79.92	1.48	78.44	197.48	14.05	7.98	24.57
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	13.44	79.92	1.48	78.44	197.49	14.05	7.98	24.57
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	14.27	108.59	3.10	105.49	175.47	13.25	8.93	20.62
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	15.19	110.34	4.10	106.24	182.53	13.51	10.39	21.04
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	16.69	113.26	2.87	110.39	270.48	16.45	10.14	27.87
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	20.66	108.72	3.54	105.18	428.79	20.71	11.93	34.86
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.29	137.15	3.84	133.31	457.84	21.40	16.90	40.59
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	29.20	154.10	5.22	148.88	546.86	23.39	18.73	45.67
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	32.01	136.01	6.12	129.88	700.74	26.47	20.08	51.25
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	36.14	156.65	6.33	150.32	868.46	29.47	23.32	56.65

Table 3-85

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	20.29	100.24	0.59	99.65	244.07	15.62	15.05	31.38
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	20.79	106.08	0.59	105.49	247.92	15.75	15.12	32.26
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	20.79	106.09	0.59	105.50	247.94	15.75	15.13	32.26
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	24.99	132.29	0.66	131.63	405.48	20.14	18.37	39.06
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	25.65	132.24	0.66	131.58	414.51	20.36	18.55	39.64
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	25.65	132.25	0.66	131.59	414.54	20.36	18.55	39.64
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	26.35	157.32	0.64	156.68	508.07	22.54	19.04	41.19
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	27.13	157.30	0.64	156.66	519.98	22.80	19.57	41.95
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	27.13	157.30	0.64	156.66	520.03	22.80	19.57	41.95
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	33.76	183.75	1.79	181.96	597.03	24.43	25.10	50.44
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	37.74	192.68	1.81	190.87	664.87	25.78	28.89	55.48
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	37.75	192.76	1.81	190.95	665.13	25.79	28.89	55.48
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	39.13	276.85	5.21	271.65	1,170.22	34.21	26.50	63.54
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	41.91	225.15	2.03	223.12	1,035.39	32.18	31.49	64.97
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	43.85	261.35	1.95	259.40	1,291.85	35.94	33.27	66.97
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	47.21	239.74	2.07	237.67	1,189.24	34.49	36.17	70.61
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	47.22	239.82	2.07	237.75	1,189.74	34.49	36.18	70.61
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	49.95	281.30	2.00	279.30	1,527.40	39.08	38.28	76.67
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	49.96	281.34	2.00	279.34	1,527.88	39.09	38.28	76.67
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	49.99	344.93	6.03	338.90	2,222.14	47.14	33.10	82.50
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	50.65	310.04	5.27	304.78	1,456.93	38.17	35.78	79.80
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	50.66	310.10	5.27	304.83	1,457.32	38.17	35.79	79.81
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	52.89	390.86	5.91	384.95	2,844.94	53.34	34.13	89.65
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	66.45	387.28	6.06	381.22	3,023.27	54.98	45.78	107.83
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	66.46	387.33	6.06	381.26	3,023.91	54.99	45.78	107.84
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	72.44	452.66	5.98	446.67	4,160.00	64.50	48.45	123.55
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	72.45	452.68	5.98	446.70	4,160.68	64.50	48.46	123.55

Table 3-92

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.78	6.47	0.00	6.47	1.24	1.11	0.48	1.72
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.96	7.96	0.00	7.95	1.89	1.38	0.63	2.16
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.04	9.32	0.00	9.32	2.31	1.52	0.76	2.30
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.23	8.86	0.00	8.86	2.47	1.57	0.89	2.55
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.23	8.86	0.00	8.86	2.47	1.57	0.89	2.55
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.34	9.53	0.00	9.53	2.56	1.60	1.11	2.76
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.48	9.55	0.00	9.55	2.82	1.68	1.20	3.02
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.48	9.55	0.00	9.55	2.82	1.68	1.20	3.02
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.53	11.27	0.00	11.27	3.87	1.97	1.12	3.15
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.53	11.28	0.00	11.27	3.87	1.97	1.12	3.15
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.68	13.54	0.00	13.54	4.91	2.22	1.16	3.55
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.68	13.54	0.00	13.54	4.91	2.22	1.16	3.55
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.69	11.21	0.00	11.20	3.69	1.92	1.31	3.42
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.77	11.94	0.00	11.94	4.19	2.05	1.45	3.60
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.82	11.94	0.00	11.94	4.31	2.08	1.52	3.64
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.82	11.94	0.00	11.94	4.31	2.08	1.52	3.64
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.92	13.90	0.00	13.90	5.13	2.26	1.57	3.86
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.98	13.90	0.00	13.90	5.29	2.30	1.63	3.93
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.98	13.90	0.00	13.90	5.29	2.30	1.63	3.93
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.99	12.34	0.00	12.34	4.76	2.18	1.59	3.93
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.99	12.34	0.00	12.34	4.76	2.18	1.59	3.93
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.07	13.85	0.00	13.85	5.61	2.37	1.66	4.11
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.22	15.89	0.00	15.89	6.74	2.60	1.77	4.40
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.45	15.48	0.00	15.48	7.30	2.70	2.02	4.75
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.45	15.48	0.00	15.48	7.30	2.70	2.02	4.75
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.65	18.14	0.00	18.14	8.91	2.98	2.15	5.10
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.65	18.14	0.00	18.14	8.91	2.98	2.15	5.10

Table 3-101

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.15	44.73	0.02	44.70	58.28	7.63	4.73	13.40
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	7.36	48.36	0.02	48.34	59.71	7.73	4.77	13.58
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	7.36	48.36	0.02	48.34	59.71	7.73	4.77	13.58
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	9.19	60.94	0.03	60.91	95.36	9.77	5.90	16.52
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	9.49	60.92	0.03	60.90	98.21	9.91	5.90	16.95
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	9.49	60.93	0.03	60.91	98.23	9.91	5.90	16.95
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	10.01	74.99	0.02	74.97	123.32	11.10	6.13	18.10
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	10.36	74.99	0.02	74.96	126.99	11.27	6.14	18.26
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	10.36	74.99	0.02	74.97	127.00	11.27	6.14	18.26
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	12.14	79.61	0.45	79.16	137.20	11.71	7.45	20.48
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.13	85.19	0.46	84.72	164.99	12.84	8.91	23.47
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	14.13	85.20	0.46	84.74	165.02	12.85	8.91	23.47
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.47	87.38	1.07	86.31	193.41	13.91	8.91	22.68
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	15.05	98.24	0.51	97.73	229.50	15.15	8.90	26.11
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	15.95	117.92	0.49	117.42	289.14	17.00	9.61	27.65
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.62	107.22	0.52	106.69	281.93	16.79	10.91	29.44
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.62	107.23	0.52	106.71	282.00	16.79	10.91	29.44
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.87	114.51	1.20	113.31	322.81	17.97	10.71	28.17
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	18.79	141.99	1.18	140.82	399.25	19.98	10.79	30.70
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	18.89	130.26	0.51	129.76	365.02	19.11	11.81	32.49
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	18.89	130.27	0.51	129.76	365.06	19.11	11.81	32.49
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.88	106.23	1.12	105.11	266.74	16.33	12.57	31.81
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	24.00	136.68	1.34	135.34	385.84	19.64	15.25	38.47
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	24.99	135.68	1.26	134.42	470.35	21.69	15.76	41.00
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	27.00	168.31	1.22	167.10	626.88	25.04	17.48	44.43
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	30.28	172.69	1.51	171.18	692.74	26.32	19.38	49.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	32.53	209.29	1.45	207.85	914.39	30.24	21.53	54.26

Table 3-105

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.56	55.32	0.01	55.31	88.85	9.43	6.96	17.11
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.86	59.60	0.01	59.58	90.86	9.53	7.04	17.42
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.86	59.60	0.01	59.58	90.86	9.53	7.04	17.42
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.88	74.66	0.01	74.64	146.48	12.10	8.70	21.34
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	12.28	75.87	0.01	75.86	150.71	12.28	8.89	21.34
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	12.28	75.87	0.01	75.86	150.71	12.28	8.89	21.34
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	12.54	89.04	0.01	89.02	179.61	13.40	8.94	22.73
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	13.01	89.04	0.01	89.02	184.62	13.59	9.21	22.85
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	13.01	89.04	0.01	89.02	184.62	13.59	9.21	22.85
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	19.30	122.44	0.07	122.36	301.85	17.37	14.24	32.32
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	22.22	130.04	0.07	129.97	350.09	18.71	16.73	37.05
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	22.22	130.05	0.07	129.97	350.10	18.71	16.73	37.05
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	24.34	152.18	0.08	152.09	515.25	22.70	17.74	40.97
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	25.51	174.80	0.08	174.72	628.51	25.07	18.77	41.89
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	28.22	163.39	0.08	163.31	614.51	24.79	21.13	45.95
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	28.22	163.40	0.08	163.31	614.53	24.79	21.14	45.95
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	30.09	192.03	0.08	191.95	767.67	27.71	21.99	49.15
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	30.09	192.03	0.08	191.95	767.69	27.71	21.99	49.15
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	31.77	236.45	1.80	234.66	946.42	30.76	21.78	51.45
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	39.86	270.76	1.92	268.84	1,136.61	33.71	26.81	64.28
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	40.83	295.76	2.02	293.74	1,749.55	41.83	26.22	69.02
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	43.11	335.86	1.97	333.89	2,184.32	46.74	28.05	74.12
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	52.60	339.30	2.18	337.11	2,296.24	47.92	36.46	88.23
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	53.13	302.22	2.52	299.69	1,348.74	36.73	41.10	76.74
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	57.18	397.84	2.10	395.75	3,063.95	55.35	37.65	96.88
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	69.32	376.69	2.90	373.79	2,697.93	51.94	53.70	104.81
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	74.74	437.58	2.79	434.80	3,560.82	59.67	56.41	115.26

Table 3-107

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	15.30	83.55	0.01	83.53	190.70	13.81	11.48	26.83
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	15.72	88.82	0.01	88.81	194.30	13.94	11.52	27.16
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	15.72	88.83	0.01	88.81	194.30	13.94	11.52	27.16
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	19.18	110.83	0.01	110.82	312.60	17.68	14.26	33.65
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	19.73	111.40	0.01	111.39	320.35	17.90	14.36	34.20
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	19.73	111.40	0.01	111.39	320.36	17.90	14.36	34.20
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	20.37	131.98	0.01	131.96	384.46	19.61	15.02	34.95
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	21.02	131.97	0.01	131.96	393.99	19.85	15.13	36.06
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	21.02	131.97	0.01	131.96	394.01	19.85	15.13	36.06
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	28.46	165.24	0.29	164.95	521.91	22.85	21.36	44.79
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	32.13	173.71	0.30	173.42	588.35	24.26	23.96	49.94
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	32.13	173.72	0.30	173.42	588.38	24.26	23.96	49.94
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	35.72	202.13	0.41	201.72	888.85	29.81	25.79	56.70
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	37.46	234.57	0.31	234.25	1,087.81	32.98	27.44	58.76
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	38.56	264.31	3.13	261.18	1,211.17	34.80	25.75	62.01
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	40.62	216.46	0.42	216.04	1,028.51	32.07	30.46	63.52
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	40.62	216.47	0.42	216.05	1,028.58	32.07	30.46	63.52
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	43.09	254.66	0.40	254.26	1,291.62	35.94	31.84	67.71
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	43.09	254.66	0.40	254.26	1,291.66	35.94	31.84	67.71
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	47.31	299.96	3.22	296.74	1,391.26	37.30	32.45	77.34
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	49.27	330.78	3.52	327.27	2,226.16	47.18	30.71	80.57
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	51.98	376.14	3.45	372.69	2,775.45	52.68	33.57	88.37
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	61.97	375.83	3.62	372.21	2,797.79	52.89	43.56	102.67
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	63.31	340.51	4.39	336.12	1,675.68	40.94	50.11	91.85
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	67.26	441.53	3.48	438.05	3,769.52	61.40	45.55	117.04
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	82.06	423.60	4.96	418.64	3,354.20	57.92	64.71	124.52
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	88.30	491.84	4.76	487.07	4,470.50	66.86	66.75	136.71

Table 3-111

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.00	0.06	0.00	0.06	0.00	0.01	0.00	0.01
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.00	0.06	0.00	0.06	0.00	0.01	0.00	0.01
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.00	0.06	0.00	0.06	0.00	0.01	0.00	0.01
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.00	0.08	0.00	0.08	0.00	0.01	0.00	0.02
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.00	0.08	0.00	0.08	0.00	0.01	0.00	0.02
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.00	0.08	0.00	0.08	0.00	0.01	0.00	0.02
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.00	0.10	0.00	0.10	0.00	0.01	0.01	0.02
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.00	0.10	0.00	0.10	0.00	0.02	0.01	0.02
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.00	0.10	0.00	0.10	0.00	0.02	0.01	0.02
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.20	3.64	0.00	3.64	0.41	0.64	0.36	1.12
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.59	4.22	0.00	4.22	0.54	0.74	0.49	1.31
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.59	4.22	0.00	4.22	0.54	0.74	0.49	1.31
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.61	4.46	0.00	4.46	0.60	0.77	0.48	1.34
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.66	5.10	0.00	5.10	0.74	0.86	0.53	1.43
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.73	5.17	0.00	5.17	0.81	0.90	0.62	1.59
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.73	5.17	0.00	5.17	0.81	0.90	0.62	1.59
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.81	5.96	0.00	5.96	1.01	1.00	0.67	1.71
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.81	5.96	0.00	5.96	1.01	1.00	0.67	1.71
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.41	23.35	0.01	23.34	14.44	3.80	2.14	6.16
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	4.17	28.74	0.01	28.73	22.81	4.78	2.77	7.63
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.44	33.23	0.01	33.22	27.72	5.26	3.02	8.09
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.01	29.91	0.01	29.90	25.68	5.07	3.53	9.03
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.01	29.91	0.01	29.90	25.68	5.07	3.53	9.03
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.22	37.49	0.01	37.48	41.70	6.46	4.37	11.36
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.22	37.50	0.01	37.49	41.70	6.46	4.37	11.36
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	6.71	45.47	0.01	45.46	53.15	7.29	4.41	12.43
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.71	45.47	0.01	45.46	53.15	7.29	4.41	12.43

Table 3-113

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.00	0.08	0.00	0.08	0.00	0.01	0.01	0.02
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.00	0.08	0.00	0.08	0.00	0.01	0.01	0.02
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.00	0.08	0.00	0.08	0.00	0.01	0.01	0.02
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.00	0.10	0.00	0.10	0.00	0.02	0.01	0.02
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.00	0.10	0.00	0.10	0.00	0.02	0.01	0.02
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.00	0.10	0.00	0.10	0.00	0.02	0.01	0.02
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.00	0.75	0.00	0.75	0.03	0.17	0.01	0.04
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.00	0.75	0.00	0.75	0.03	0.18	0.01	0.12
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.00	0.75	0.00	0.75	0.03	0.18	0.01	0.12
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.45	3.58	0.00	3.58	0.40	0.63	0.27	1.01
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.55	4.38	0.00	4.38	0.60	0.77	0.34	1.25
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.55	4.22	0.00	4.22	0.56	0.75	0.36	1.23
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.55	4.22	0.00	4.22	0.56	0.75	0.36	1.23
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.62	5.19	0.00	5.19	0.77	0.88	0.41	1.38
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.68	5.17	0.00	5.17	0.84	0.92	0.47	1.52
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.68	5.17	0.00	5.17	0.84	0.92	0.47	1.52
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.78	6.18	0.00	6.18	1.12	1.06	0.54	1.73
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.78	6.18	0.00	6.18	1.12	1.06	0.54	1.73
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.04	7.02	0.00	7.02	1.92	1.39	0.59	2.32
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.31	8.60	0.00	8.60	2.77	1.66	0.73	2.69
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.45	10.19	0.00	10.19	3.50	1.87	0.83	3.01
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.97	11.54	0.00	11.54	4.71	2.17	1.31	3.86
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.97	11.54	0.00	11.54	4.71	2.17	1.31	3.86
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.44	14.16	0.00	14.16	7.10	2.66	1.59	4.70
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.44	14.16	0.00	14.16	7.10	2.66	1.59	4.71
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.76	17.22	0.00	17.22	9.61	3.10	1.76	5.36
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.76	17.22	0.00	17.22	9.61	3.10	1.76	5.36

Table 3-114

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.68	11.55	0.00	11.55	4.23	2.06	1.20	3.46
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.74	11.74	0.00	11.74	4.35	2.09	1.26	3.49
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.74	11.74	0.00	11.74	4.35	2.09	1.26	3.49
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.08	12.94	0.01	12.93	5.55	2.36	1.14	3.81
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.09	14.70	0.00	14.70	6.55	2.56	1.52	4.25
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.16	14.70	0.00	14.70	6.77	2.60	1.60	4.33
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.16	14.70	0.00	14.70	6.77	2.60	1.60	4.33
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.35	17.95	0.00	17.95	8.44	2.91	1.58	4.77
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.43	17.95	0.00	17.95	8.71	2.95	1.70	4.86
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.43	17.95	0.00	17.95	8.72	2.95	1.70	4.86
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.52	15.78	0.01	15.77	8.38	2.89	1.37	4.67
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.75	18.95	0.01	18.95	10.45	3.23	1.58	5.13
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.95	19.99	0.00	19.99	10.86	3.30	1.91	5.50
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.38	18.22	0.01	18.21	11.80	3.44	2.17	6.20
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.38	18.22	0.01	18.21	11.80	3.44	2.17	6.20
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.49	21.70	0.00	21.70	13.97	3.74	2.47	6.50
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.49	21.70	0.00	21.70	13.97	3.74	2.47	6.50
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.66	24.66	0.01	24.65	17.07	4.13	2.40	6.77
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.98	29.02	0.01	29.02	21.50	4.64	2.68	7.47
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.13	23.16	0.01	23.15	18.36	4.29	2.61	7.64
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.13	23.16	0.01	23.15	18.36	4.29	2.61	7.64
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.35	27.04	0.01	27.04	22.21	4.71	3.04	8.18
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.35	27.04	0.01	27.04	22.21	4.71	3.04	8.19
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.60	28.78	0.01	28.77	24.32	4.93	2.96	8.70
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.60	28.78	0.01	28.77	24.32	4.93	2.96	8.70
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.77	33.05	0.01	33.04	28.61	5.35	3.09	9.01
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.77	33.05	0.01	33.04	28.61	5.35	3.09	9.01

Table 3-131

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.13	22.01	0.00	22.00	15.43	3.93	2.00	6.37
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	3.24	22.86	0.00	22.85	15.87	3.98	2.04	6.53
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.24	22.86	0.00	22.85	15.87	3.98	2.04	6.53
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.85	28.88	0.00	28.87	24.57	4.96	2.49	8.07
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.99	28.88	0.00	28.87	25.40	5.04	2.49	8.21
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.99	28.88	0.00	28.87	25.40	5.04	2.49	8.21
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.17	35.71	0.00	35.71	31.44	5.61	2.61	8.72
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.34	35.71	0.00	35.71	32.46	5.70	2.63	8.84
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.34	35.71	0.00	35.71	32.46	5.70	2.63	8.84
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.65	42.77	0.01	42.76	46.45	6.82	3.61	11.05
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.28	47.48	0.03	47.45	61.30	7.83	3.70	11.92
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	6.80	46.22	0.01	46.20	59.26	7.70	4.26	13.26
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	6.80	46.22	0.01	46.20	59.26	7.70	4.26	13.26
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.99	52.92	0.02	52.91	75.08	8.66	4.15	13.62
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.46	62.84	0.02	62.82	93.13	9.65	4.42	14.53
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.71	65.79	0.03	65.75	96.96	9.85	4.58	14.69
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	8.19	79.85	0.03	79.82	117.31	10.83	4.84	16.02
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	8.45	58.22	0.02	58.20	97.36	9.87	5.08	16.63
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	8.45	58.22	0.02	58.20	97.37	9.87	5.08	16.63
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	9.11	71.38	0.02	71.36	123.95	11.13	5.40	17.89
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	9.11	71.38	0.02	71.37	123.95	11.13	5.40	17.89
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.41	53.18	0.04	53.14	91.45	9.56	5.74	17.78
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.88	68.43	0.06	68.37	151.04	12.29	7.08	22.63
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	12.99	86.51	0.05	86.47	196.78	14.03	7.84	25.87
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	13.34	79.45	0.07	79.38	166.70	12.91	7.92	23.84
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.04	101.02	0.21	100.81	282.36	16.80	9.98	30.42
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	18.26	124.22	0.08	124.14	363.89	19.08	10.94	33.26

Table 3-132

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.14	10.21	0.00	10.21	3.06	1.75	0.74	2.61
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.18	10.21	0.00	10.21	3.16	1.78	0.77	2.63
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.18	10.21	0.00	10.21	3.16	1.78	0.77	2.63
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.41	13.00	0.00	13.00	4.83	2.20	0.92	3.19
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.47	13.00	0.00	13.00	5.02	2.24	0.96	3.24
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.47	13.00	0.00	13.00	5.02	2.24	0.96	3.24
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.53	15.84	0.00	15.84	6.14	2.48	0.95	3.53
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.61	15.84	0.00	15.84	6.36	2.52	1.00	3.67
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.61	15.84	0.00	15.84	6.36	2.52	1.00	3.67
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.93	25.31	0.00	25.31	16.51	4.06	1.86	6.26
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.61	27.91	0.00	27.91	21.75	4.66	2.48	7.41
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.61	27.92	0.00	27.91	21.75	4.66	2.48	7.41
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.74	31.66	0.00	31.66	26.65	5.16	2.31	7.60
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	4.03	37.45	0.00	37.45	32.85	5.73	2.48	8.18
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.63	35.39	0.00	35.39	35.73	5.98	2.94	9.31
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.63	35.39	0.00	35.39	35.73	5.98	2.94	9.31
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.98	43.16	0.00	43.16	45.18	6.72	3.15	10.13
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.98	43.16	0.00	43.16	45.18	6.72	3.15	10.13
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.07	46.27	0.03	46.24	55.39	7.44	3.72	11.48
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.58	58.57	0.03	58.53	90.27	9.50	4.41	14.12
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.98	68.15	0.03	68.12	109.33	10.46	4.47	15.21
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.55	59.52	0.03	59.49	99.64	9.98	5.93	17.91
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.55	59.53	0.03	59.50	99.64	9.98	5.93	17.91
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	12.08	76.11	0.03	76.07	170.51	13.06	7.24	23.37
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	12.08	76.11	0.03	76.08	170.51	13.06	7.24	23.37
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	13.17	94.56	0.03	94.53	219.86	14.83	8.06	25.30
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	13.17	94.56	0.03	94.53	219.87	14.83	8.06	25.30

Table 3-133

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.26	37.76	0.01	37.75	42.32	6.51	3.44	10.45
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.45	41.24	0.01	41.24	43.61	6.60	3.61	10.54
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.45	41.24	0.01	41.24	43.61	6.60	3.61	10.54
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.59	52.01	0.01	52.00	71.10	8.43	4.35	13.27
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.83	52.59	0.01	52.58	73.66	8.58	4.36	13.27
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.83	52.59	0.01	52.58	73.67	8.58	4.36	13.27
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	7.04	63.41	0.01	63.40	90.40	9.51	4.40	14.35
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.32	63.41	0.01	63.40	93.36	9.66	4.46	14.62
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.32	63.41	0.01	63.40	93.36	9.66	4.46	14.62
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.41	90.69	0.03	90.66	169.45	13.02	7.18	21.51
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	13.47	97.65	0.03	97.62	206.14	14.36	8.52	24.78
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	13.47	97.65	0.03	97.62	206.14	14.36	8.52	24.78
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.43	113.38	0.04	113.34	293.70	17.14	8.53	27.45
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	15.43	132.82	0.04	132.79	366.71	19.15	9.14	29.00
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	17.17	123.53	0.04	123.49	366.68	19.15	10.75	31.40
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	17.17	123.53	0.04	123.49	366.68	19.15	10.75	31.40
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	18.56	147.70	0.04	147.66	469.00	21.66	11.65	34.19
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	18.56	147.70	0.04	147.66	469.00	21.66	11.65	34.19
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	22.51	162.69	1.41	161.29	507.02	22.52	13.93	36.77
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	28.76	205.19	1.58	203.61	932.46	30.54	16.86	48.46
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	30.47	237.82	1.55	236.27	1,180.16	34.35	18.37	52.05
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	30.56	194.01	1.46	192.55	675.81	26.00	19.03	50.84
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	35.34	234.01	1.71	232.31	900.08	30.00	23.00	58.22
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	40.04	246.26	1.66	244.60	1,340.24	36.61	25.73	66.70
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	43.71	296.89	1.60	295.29	1,803.78	42.47	28.37	74.88
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	46.41	294.29	1.94	292.35	1,798.05	42.40	30.92	77.22
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	50.53	349.06	1.86	347.20	2,406.79	49.06	33.64	86.93

Table 3-137

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.20	14.83	0.00	14.83	6.52	2.55	1.75	4.45
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.27	14.83	0.00	14.83	6.67	2.58	1.79	4.52
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.27	14.83	0.00	14.83	6.67	2.58	1.79	4.52
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.71	18.60	0.00	18.60	10.04	3.17	2.15	5.32
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.82	18.60	0.00	18.60	10.30	3.21	2.20	5.38
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.82	18.60	0.00	18.60	10.30	3.21	2.20	5.38
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.92	22.30	0.00	22.30	12.44	3.53	2.21	5.71
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.05	22.30	0.00	22.30	12.77	3.57	2.32	5.76
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	3.05	22.30	0.00	22.30	12.77	3.57	2.32	5.76
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.51	29.60	0.00	29.60	23.24	4.82	3.48	8.35
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.27	31.72	0.00	31.72	28.57	5.35	4.02	9.78
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.27	31.72	0.00	31.72	28.57	5.35	4.02	9.78
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.53	36.95	0.00	36.95	36.39	6.03	4.17	10.07
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.69	44.67	0.02	44.65	47.24	6.87	3.60	10.98
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.89	42.39	0.00	42.39	43.80	6.62	4.34	10.79
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.53	40.04	0.00	40.04	45.38	6.74	4.93	11.73
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.53	40.04	0.00	40.04	45.39	6.74	4.93	11.73
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	7.02	55.66	0.02	55.64	76.85	8.77	4.29	13.38
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.05	47.51	0.00	47.50	55.81	7.47	5.09	12.78
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	7.05	47.51	0.00	47.50	55.81	7.47	5.09	12.78
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.40	64.61	0.02	64.59	93.45	9.67	4.48	14.16
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.21	54.39	0.02	54.37	74.72	8.64	5.27	15.34
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	8.21	54.39	0.02	54.38	74.73	8.64	5.27	15.34
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	10.26	68.79	0.02	68.77	125.90	11.22	6.51	19.15
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	10.26	68.79	0.02	68.77	125.91	11.22	6.51	19.15
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	11.04	83.25	0.02	83.23	160.56	12.67	6.65	20.79
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	11.04	83.25	0.02	83.23	160.56	12.67	6.65	20.79

Table 3-139

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	16.57	84.84	0.97	83.87	189.78	13.78	10.83	26.41
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	16.99	89.80	0.97	88.84	193.16	13.90	10.89	26.97
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	16.99	89.81	0.97	88.84	193.17	13.90	10.89	26.98
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	20.49	112.84	1.09	111.75	316.58	17.79	12.85	33.40
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	21.04	112.83	1.09	111.74	324.54	18.02	13.64	33.62
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	21.04	112.83	1.09	111.74	324.55	18.02	13.64	33.62
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	22.02	138.29	1.06	137.24	414.95	20.37	14.19	36.90
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	22.68	138.29	1.06	137.23	426.23	20.65	15.04	37.13
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	22.68	138.29	1.06	137.23	426.24	20.65	15.04	37.13
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	25.02	135.92	3.59	132.34	453.95	21.31	16.79	37.76
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	26.42	150.33	2.47	147.86	443.45	21.06	17.74	41.40
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	29.93	157.79	2.53	155.26	505.13	22.48	20.50	46.73
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	29.93	157.79	2.53	155.27	505.15	22.48	20.50	46.73
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	31.25	187.55	4.02	183.53	802.86	28.33	20.18	48.31
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	32.90	184.26	2.79	181.47	767.16	27.70	21.68	52.71
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	33.08	234.08	4.01	230.07	1,017.41	31.90	21.25	53.23
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	33.85	165.76	4.54	161.22	578.65	24.06	23.08	50.70
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	34.88	220.24	2.70	217.54	980.82	31.32	23.38	56.74
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	37.58	198.37	2.85	195.53	900.87	30.01	25.97	60.14
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	37.58	198.38	2.85	195.53	900.91	30.02	25.97	60.14
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	40.34	238.88	2.74	236.14	1,193.30	34.54	28.46	66.15
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	40.34	238.88	2.74	236.14	1,193.32	34.54	28.46	66.15
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	42.01	217.30	5.93	211.38	861.61	29.35	29.65	61.98
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	43.48	212.27	5.10	207.17	1,134.36	33.68	29.50	65.54
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	47.67	267.16	4.96	262.19	1,603.80	40.05	32.26	75.59
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	54.30	277.32	6.66	270.66	1,734.62	41.65	38.37	82.58
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	59.32	338.07	6.44	331.63	2,433.22	49.33	39.63	93.59

Table 3-140

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	7.95	40.72	0.03	40.69	48.67	6.98	5.99	13.66
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	8.16	43.39	0.03	43.36	49.64	7.05	6.17	13.89
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	8.16	43.39	0.03	43.36	49.64	7.05	6.17	13.89
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	9.71	53.66	0.03	53.63	76.10	8.72	7.13	16.47
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	9.98	53.66	0.03	53.62	78.00	8.83	7.42	17.05
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	9.98	53.66	0.03	53.62	78.00	8.83	7.42	17.05
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	10.40	64.87	0.03	64.84	96.43	9.82	7.80	17.78
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	10.71	64.87	0.03	64.84	99.09	9.95	7.88	18.11
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	10.71	64.87	0.03	64.84	99.09	9.95	7.88	18.11
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	13.11	72.07	0.08	72.00	118.46	10.88	9.80	21.00
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	14.32	94.57	1.05	93.52	184.55	13.58	8.97	23.58
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	14.95	76.18	0.08	76.10	137.95	11.75	11.44	24.02
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	14.95	76.18	0.08	76.10	137.96	11.75	11.44	24.02
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	15.99	87.77	0.09	87.68	187.44	13.69	11.89	25.76
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	17.01	102.64	0.09	102.56	229.35	15.14	12.69	27.32
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	17.54	117.23	1.18	116.05	302.39	17.39	10.53	29.08
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	18.27	94.20	0.09	94.11	222.23	14.91	13.78	29.25
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	18.27	94.20	0.09	94.11	222.24	14.91	13.78	29.25
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	18.41	134.22	1.16	133.06	371.05	19.26	10.94	31.07
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	19.61	112.24	0.09	112.15	278.79	16.70	14.78	31.02
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	19.61	112.24	0.09	112.15	278.79	16.70	14.78	31.02
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	19.66	109.72	1.08	108.64	261.36	16.17	12.99	31.50
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	19.66	109.72	1.08	108.64	261.37	16.17	12.99	31.50
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	24.43	136.94	1.22	135.72	445.30	21.10	15.92	39.96
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	24.43	136.95	1.22	135.73	445.32	21.10	15.92	39.96
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	26.20	164.71	1.18	163.53	578.99	24.06	17.29	44.24
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	26.20	164.72	1.18	163.54	579.00	24.06	17.29	44.24

Table 3-141

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.02	5.62	0.00	5.62	0.91	0.95	0.35	1.42
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.02	5.62	0.00	5.62	0.94	0.97	0.40	1.43
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.02	5.62	0.00	5.62	0.94	0.97	0.40	1.43
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.13	7.15	0.00	7.15	1.43	1.19	0.45	1.76
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.13	7.15	0.00	7.15	1.48	1.22	0.50	1.80
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.13	7.15	0.00	7.15	1.48	1.22	0.50	1.80
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.34	8.52	0.00	8.52	1.82	1.35	0.47	1.90
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.35	8.52	0.00	8.52	1.89	1.37	0.51	1.95
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.35	8.52	0.00	8.52	1.89	1.37	0.51	1.95
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.29	11.82	0.00	11.82	3.88	1.97	0.79	2.91
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.60	14.87	0.00	14.87	6.19	2.49	0.95	3.53
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.62	13.22	0.00	13.22	5.34	2.31	1.07	3.52
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.62	13.22	0.00	13.22	5.34	2.31	1.07	3.52
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.65	14.04	0.00	14.04	6.48	2.54	0.93	3.70
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.72	17.65	0.00	17.65	7.63	2.76	1.06	3.85
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	2.03	17.16	0.00	17.16	8.69	2.95	1.29	4.47
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	2.03	17.16	0.00	17.16	8.69	2.95	1.29	4.47
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	2.07	18.03	0.00	18.03	10.11	3.18	1.14	4.48
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	2.20	20.87	0.00	20.87	11.05	3.32	1.35	4.89
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	2.20	20.87	0.00	20.87	11.05	3.32	1.35	4.89
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	2.21	21.23	0.00	21.23	12.19	3.49	1.22	4.81
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	2.98	20.06	0.00	20.06	14.28	3.78	1.93	6.38
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	2.98	20.06	0.00	20.06	14.28	3.78	1.93	6.38
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	3.80	26.74	0.00	26.74	23.55	4.85	2.30	8.15
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	3.80	26.75	0.00	26.74	23.56	4.85	2.30	8.15
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.20	33.07	0.00	33.07	30.66	5.54	2.55	8.75
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.20	33.07	0.00	33.07	30.66	5.54	2.55	8.75

Table 3-142

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.37	10.84	0.00	10.84	3.39	1.84	1.07	3.04
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.44	10.84	0.00	10.84	3.48	1.86	1.11	3.07
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.44	10.84	0.00	10.84	3.48	1.86	1.11	3.07
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.70	13.65	0.00	13.65	5.24	2.29	1.36	3.66
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.78	13.65	0.00	13.65	5.42	2.33	1.39	3.68
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.78	13.65	0.00	13.65	5.42	2.33	1.39	3.68
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.82	15.98	0.00	15.98	6.38	2.53	1.38	3.80
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.91	15.98	0.00	15.98	6.60	2.57	1.51	3.95
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.91	15.98	0.00	15.98	6.60	2.57	1.51	3.95
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	2.93	21.96	0.00	21.96	13.00	3.60	2.25	5.85
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	3.59	24.09	0.00	24.09	16.74	4.09	2.78	6.91
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	3.59	24.09	0.00	24.09	16.74	4.09	2.78	6.91
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	3.61	27.66	0.00	27.66	20.47	4.52	2.70	6.86
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	3.80	31.52	0.00	31.52	24.25	4.92	2.92	7.31
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	4.44	30.75	0.00	30.74	26.86	5.18	3.47	8.20
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	4.44	30.75	0.00	30.75	26.86	5.18	3.47	8.20
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	4.72	36.20	0.00	36.20	32.66	5.72	3.55	8.83
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	4.72	36.20	0.00	36.20	32.66	5.72	3.55	8.83
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	6.54	44.10	0.00	44.10	48.83	6.99	4.81	11.61
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	8.11	55.14	0.01	55.12	77.95	8.83	5.72	14.29
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	8.41	62.88	0.01	62.87	91.17	9.55	5.78	14.95
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	9.53	54.77	0.01	54.76	79.46	8.91	6.74	16.06
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	9.53	54.77	0.01	54.76	79.46	8.91	6.74	16.06
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	11.92	70.00	0.02	69.98	132.35	11.50	8.66	20.48
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	11.92	70.00	0.02	69.98	132.35	11.50	8.66	20.48
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	12.65	82.26	0.01	82.25	162.70	12.76	8.84	21.52
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	12.65	82.26	0.01	82.25	162.70	12.76	8.84	21.52

Table 3-143

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	5.069130475	32.455	0.0029	32.4521	33.31157095	5.771617707	3.5166	9.899375
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	5.228321942	35.3489	0.0029	35.346	34.31034272	5.857503113	3.7931	9.9119
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	5.228359794	35.3492	0.0029	35.3463	34.31078452	5.857540826	3.7931	9.911975
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	6.263624663	43.709	0.0036	43.7054	53.89910562	7.341601026	4.56155	12.1604
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	6.470911558	44.5867	0.0036	44.5831	55.85064617	7.473328988	4.59295	12.514475
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	6.470988395	44.5874	0.0036	44.5838	55.85205592	7.473423306	4.593025	12.5146
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	6.765581362	53.182	0.0036	53.1784	68.74149988	8.291049384	4.733075	13.13595
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	7.015824837	53.1809	0.0036	53.1773	71.13559963	8.434192293	4.788625	13.60805
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	7.015870766	53.1811	0.0036	53.1775	71.13673901	8.434259837	4.788625	13.608125
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	9.006797004	63.1969	0.01	63.1869	92.58456219	9.622087206	6.035125	16.698125
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	10.57652246	68.0829	0.0104	68.0725	114.2722698	10.68982085	7.135575	19.2394
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	10.57673518	68.0864	0.0104	68.076	114.2798407	10.69017496	7.135875	19.2396
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	11.26273846	78.5791	0.015	78.5641	152.1959822	12.33677357	7.355975	20.7632
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.68335915	69.8264	0.1032	69.7232	139.1872174	11.79776324	7.201175	19.1824
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	12.01371461	90.55	0.0148	90.5352	188.8041211	13.74060119	7.811925	22.322025
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	13.30951503	85.7612	0.0152	85.746	191.473119	13.83738122	9.11665	23.946325
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.30982237	85.7664	0.0152	85.7512	191.4876225	13.83790528	9.11685	23.946525
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	14.34942445	101.495	0.0148	101.4802	243.7280031	15.61179052	9.3651	26.00185
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	14.34958263	101.4969	0.0148	101.4821	243.7367185	15.61206964	9.365175	26.001975
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	14.45843569	95.7843	0.1232	95.6611	226.1364909	15.03783531	9.128825	24.03635
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	15.24761355	118.1218	0.1228	117.999	275.5098914	16.59849064	9.5851	26.182425
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	16.1927034	87.1057	0.1074	86.9983	197.738333	14.06194627	10.63115	26.769225
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	20.32724773	109.3209	0.1325	109.1884	338.4493865	18.39699395	13.235825	34.53845
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	20.40650191	117.7984	0.1354	117.663	310.1901932	17.61221716	13.6753	34.00945
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	21.93505051	135.1402	0.1318	135.0084	443.1196708	21.05040785	14.236625	37.970075
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	25.68763499	147.3456	0.192	147.1536	541.8899466	23.27852973	17.08875	44.1754
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	27.75117461	176.6545	0.185	176.4695	700.7048501	26.47083017	18.080425	47.392125

Table 3-149

BMP	GeoMean	Max	Min	Range	Var	StdDev	Q1	Q2
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	4.23	25.46	0.00	25.46	19.35	4.40	3.40	8.04
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	4.39	26.21	0.00	26.21	19.84	4.45	3.52	8.07
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	4.39	26.21	0.00	26.21	19.84	4.45	3.52	8.07
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	5.20	32.52	0.00	32.52	30.32	5.51	4.14	9.72
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	5.41	33.19	0.00	33.19	31.27	5.59	4.29	9.75
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	5.41	33.19	0.00	33.19	31.27	5.59	4.29	9.75
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	5.54	38.86	0.00	38.86	36.92	6.08	4.28	10.24
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	5.77	38.86	0.00	38.86	38.14	6.18	4.40	10.46
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	5.77	38.86	0.00	38.86	38.14	6.18	4.40	10.46
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	10.60	63.43	0.00	63.43	124.05	11.14	7.27	20.48
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	11.17	66.45	0.01	66.44	104.57	10.23	8.16	19.17
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	13.10	88.12	0.00	88.11	201.45	14.19	8.87	25.67
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	13.21	70.87	0.02	70.85	125.12	11.19	10.12	22.44
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	13.76	83.03	0.02	83.01	167.93	12.96	10.31	23.30
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	13.83	104.02	0.00	104.02	247.34	15.73	9.64	26.48
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	14.37	93.83	0.02	93.81	199.76	14.13	10.78	24.75
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	16.33	89.64	0.03	89.61	205.25	14.33	12.52	27.68
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	17.22	104.02	0.02	103.99	249.83	15.81	13.15	29.33
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	36.55	206.96	1.33	205.63	756.43	27.50	27.66	54.18
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	45.33	256.04	1.49	254.55	1,293.65	35.97	33.84	68.21
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	46.67	229.55	1.56	227.99	913.56	30.23	36.68	67.57
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	46.67	229.55	1.56	227.99	913.57	30.23	36.68	67.57
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	46.74	285.26	1.42	283.84	1,543.55	39.29	35.13	71.32
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	58.85	285.09	1.79	283.31	1,661.73	40.76	46.38	86.48
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	58.85	285.10	1.79	283.31	1,661.75	40.76	46.38	86.48
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	61.97	329.87	1.71	328.16	2,094.77	45.77	48.34	93.45
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	61.97	329.87	1.71	328.16	2,094.78	45.77	48.34	93.45

Table 4-6				Percent From Baseline		
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9405	0.9967	0.6511	-0.64%	0.04%	-7.20%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9463	0.9965	0.6989	-0.02%	0.02%	-0.40%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9466	0.9963	0.7017	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9498	0.9959	0.7425	0.34%	-0.05%	5.81%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9597	0.9967	0.7557	1.39%	0.03%	7.69%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9593	0.9966	0.7569	1.34%	0.03%	7.87%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9614	0.9960	0.7814	1.57%	-0.04%	11.37%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9617	0.9954	0.7903	1.60%	-0.10%	12.63%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9689	0.9995	0.8173	2.36%	0.31%	16.48%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9690	0.9995	0.8178	2.37%	0.31%	16.55%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9697	0.9955	0.8200	2.44%	-0.09%	16.87%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9726	0.9995	0.8255	2.75%	0.31%	17.65%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9705	0.9993	0.8309	2.53%	0.29%	18.42%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9707	0.9993	0.8322	2.55%	0.29%	18.60%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9739	0.9995	0.8435	2.88%	0.31%	20.21%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9769	0.9996	0.8592	3.20%	0.32%	22.44%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9770	0.9996	0.8606	3.22%	0.32%	22.64%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9823	0.9994	0.8637	3.77%	0.31%	23.09%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9818	0.9994	0.8642	3.73%	0.31%	23.16%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9819	0.9994	0.8660	3.73%	0.31%	23.42%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9792	0.9996	0.8676	3.45%	0.32%	23.65%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9808	0.9995	0.8919	3.62%	0.31%	27.10%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9809	0.9995	0.8923	3.62%	0.31%	27.16%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9814	0.9995	0.8934	3.68%	0.31%	27.32%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9845	0.9995	0.9068	4.01%	0.32%	29.24%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9845	0.9995	0.9073	4.01%	0.32%	29.30%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9849	0.9995	0.9116	4.05%	0.32%	29.92%

Table 4-8

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9765	0.9969	0.8355	0.56%	0.02%	-0.43%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9710	0.9967	0.8388	0.00%	0.00%	-0.04%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9711	0.9967	0.8392	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9629	0.9940	0.8499	-0.84%	-0.28%	1.28%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9629	0.9940	0.8502	-0.84%	-0.28%	1.32%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9704	0.9941	0.8612	-0.07%	-0.27%	2.63%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9704	0.9941	0.8615	-0.06%	-0.27%	2.67%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9843	0.9993	0.8681	1.36%	0.26%	3.45%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9826	0.9993	0.8688	1.18%	0.26%	3.53%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9826	0.9993	0.8690	1.19%	0.26%	3.56%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9685	0.9945	0.8699	-0.26%	-0.23%	3.67%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9745	0.9953	0.8774	0.35%	-0.14%	4.55%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9801	0.9992	0.8956	0.93%	0.25%	6.73%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9802	0.9992	0.8959	0.94%	0.25%	6.76%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9884	0.9993	0.9002	1.79%	0.26%	7.27%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9883	0.9993	0.9004	1.77%	0.26%	7.30%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9883	0.9993	0.9006	1.77%	0.26%	7.32%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9819	0.9992	0.9025	1.12%	0.25%	7.54%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9839	0.9993	0.9083	1.32%	0.26%	8.24%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9840	0.9993	0.9085	1.33%	0.26%	8.27%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9853	0.9994	0.9126	1.46%	0.27%	8.75%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9846	0.9991	0.9205	1.40%	0.24%	9.69%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9846	0.9991	0.9206	1.40%	0.24%	9.70%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9849	0.9991	0.9208	1.42%	0.24%	9.73%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9874	0.9993	0.9292	1.69%	0.26%	10.73%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9875	0.9993	0.9293	1.69%	0.26%	10.74%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9877	0.9993	0.9321	1.71%	0.26%	11.07%

Table 4-13				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9499	0.9896	0.8154	-1.92%	-0.47%	-2.51%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9499	0.9896	0.8156	-1.92%	-0.47%	-2.49%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9544	0.9909	0.8183	-1.46%	-0.34%	-2.16%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9605	0.9917	0.8246	-0.82%	-0.25%	-1.42%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9606	0.9917	0.8248	-0.82%	-0.25%	-1.39%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9685	0.9942	0.8363	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9685	0.9942	0.8364	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9723	0.9946	0.8401	0.39%	0.04%	0.44%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9771	0.9988	0.8492	0.89%	0.46%	1.53%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9771	0.9988	0.8493	0.89%	0.46%	1.53%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9636	0.9929	0.8497	-0.51%	-0.14%	1.59%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9791	0.9988	0.8500	1.09%	0.46%	1.62%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9813	0.9987	0.8668	1.31%	0.45%	3.63%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9813	0.9987	0.8668	1.31%	0.45%	3.63%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9815	0.9987	0.8677	1.34%	0.45%	3.74%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9720	0.9981	0.8732	0.36%	0.39%	4.39%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9720	0.9981	0.8733	0.36%	0.39%	4.40%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9741	0.9982	0.8803	0.58%	0.40%	5.25%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9776	0.9982	0.8854	0.94%	0.40%	5.85%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9776	0.9982	0.8855	0.94%	0.40%	5.86%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9746	0.9979	0.8859	0.62%	0.37%	5.92%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9746	0.9979	0.8859	0.63%	0.37%	5.92%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9750	0.9979	0.8860	0.66%	0.37%	5.93%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9792	0.9983	0.8903	1.10%	0.41%	6.44%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9796	0.9980	0.8952	1.14%	0.38%	7.03%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9796	0.9980	0.8953	1.14%	0.38%	7.03%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9799	0.9981	0.8954	1.17%	0.39%	7.04%

Table 4-18

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9366	0.9954	0.6540	-0.84%	0.06%	-9.09%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9414	0.9947	0.7040	-0.34%	-0.01%	-2.16%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9446	0.9948	0.7195	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9449	0.9940	0.7544	0.04%	-0.08%	4.85%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9555	0.9949	0.7567	1.16%	0.01%	5.18%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9576	0.9957	0.7592	1.38%	0.09%	5.52%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9573	0.9949	0.7948	1.35%	0.00%	10.47%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9581	0.9935	0.7952	1.43%	-0.13%	10.52%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9667	0.9986	0.7961	2.34%	0.38%	10.66%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9624	0.9985	0.7977	1.89%	0.37%	10.88%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9624	0.9985	0.7979	1.89%	0.37%	10.90%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9625	0.9984	0.8088	1.89%	0.36%	12.42%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9625	0.9984	0.8091	1.90%	0.36%	12.46%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9666	0.9985	0.8222	2.33%	0.37%	14.29%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9666	0.9942	0.8260	2.33%	-0.06%	14.80%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9706	0.9986	0.8374	2.75%	0.38%	16.40%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9706	0.9986	0.8378	2.76%	0.38%	16.44%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9736	0.9987	0.8450	3.07%	0.38%	17.45%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9771	0.9990	0.8483	3.44%	0.42%	17.90%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9766	0.9990	0.8486	3.39%	0.42%	17.94%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9767	0.9990	0.8496	3.40%	0.42%	18.09%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9731	0.9989	0.8668	3.02%	0.41%	20.48%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9732	0.9989	0.8672	3.03%	0.41%	20.53%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9738	0.9989	0.8674	3.09%	0.41%	20.56%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9787	0.9991	0.8830	3.61%	0.43%	22.74%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9787	0.9991	0.8834	3.61%	0.43%	22.78%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9791	0.9992	0.8883	3.66%	0.44%	23.47%

Table 4-20

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9018	0.9869	0.4783	-0.96%	-0.03%	-10.05%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9105	0.9872	0.5318	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9125	0.9868	0.5457	0.22%	-0.05%	2.62%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9295	0.9876	0.5941	2.08%	0.04%	11.72%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9184	0.9868	0.5962	0.87%	-0.04%	12.12%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9275	0.9932	0.6169	1.86%	0.61%	16.01%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9275	0.9932	0.6170	1.87%	0.61%	16.03%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9340	0.9882	0.6324	2.58%	0.09%	18.92%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9347	0.9933	0.6381	2.66%	0.62%	19.99%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9343	0.9870	0.6413	2.61%	-0.02%	20.59%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9328	0.9929	0.6587	2.44%	0.58%	23.86%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9328	0.9929	0.6588	2.45%	0.58%	23.90%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9380	0.9879	0.6735	3.02%	0.07%	26.66%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9389	0.9931	0.6764	3.12%	0.59%	27.20%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9487	0.9881	0.7087	4.20%	0.08%	33.27%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9469	0.9938	0.7202	4.00%	0.66%	35.44%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9470	0.9938	0.7204	4.00%	0.66%	35.48%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9485	0.9964	0.7291	4.18%	0.93%	37.11%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9486	0.9964	0.7292	4.18%	0.93%	37.13%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9495	0.9964	0.7293	4.28%	0.93%	37.14%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9514	0.9939	0.7312	4.49%	0.68%	37.50%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9502	0.9962	0.7473	4.36%	0.91%	40.53%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9502	0.9962	0.7476	4.36%	0.91%	40.58%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9512	0.9962	0.7478	4.46%	0.91%	40.62%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9599	0.9967	0.7904	5.43%	0.96%	48.63%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9599	0.9967	0.7907	5.43%	0.96%	48.69%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9607	0.9967	0.7986	5.51%	0.96%	50.19%

Table 4-21

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9331	0.9947	0.6210	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9332	0.9947	0.6210	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9385	0.9943	0.6751	0.57%	-0.04%	8.71%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9385	0.9943	0.6752	0.57%	-0.04%	8.72%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9503	0.9950	0.6816	1.83%	0.04%	9.75%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9529	0.9944	0.7171	2.11%	-0.03%	15.46%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9532	0.9942	0.7371	2.14%	-0.05%	18.68%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9532	0.9942	0.7372	2.15%	-0.05%	18.70%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9571	0.9984	0.7453	2.56%	0.38%	20.02%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9571	0.9984	0.7454	2.57%	0.38%	20.03%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9621	0.9984	0.7638	3.10%	0.38%	23.00%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9631	0.9944	0.7691	3.21%	-0.03%	23.85%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9601	0.9984	0.7723	2.88%	0.37%	24.36%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9601	0.9984	0.7725	2.89%	0.37%	24.39%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9644	0.9984	0.7868	3.35%	0.37%	26.70%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9685	0.9986	0.8127	3.79%	0.39%	30.87%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9685	0.9986	0.8129	3.79%	0.39%	30.90%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9717	0.9986	0.8219	4.12%	0.39%	32.34%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9743	0.9995	0.8511	4.41%	0.48%	37.04%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9743	0.9995	0.8511	4.41%	0.48%	37.05%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9749	0.9995	0.8512	4.47%	0.48%	37.06%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9744	0.9995	0.8533	4.42%	0.48%	37.41%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9744	0.9995	0.8536	4.42%	0.48%	37.45%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9750	0.9995	0.8539	4.48%	0.48%	37.49%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9794	0.9995	0.8767	4.96%	0.49%	41.17%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9794	0.9995	0.8770	4.96%	0.49%	41.21%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9799	0.9995	0.8829	5.00%	0.49%	42.16%

Table 4-23

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.893150932	0.991539196	0.474603929	-0.24%	-0.02%	-3.60%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.895266252	0.991689375	0.492328929	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.901920534	0.991186071	0.535961607	0.74%	-0.05%	8.86%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.915570984	0.991633304	0.545252143	2.27%	-0.01%	10.75%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.90352607	0.991342679	0.553313393	0.92%	-0.03%	12.39%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.920826761	0.991430982	0.591803929	2.86%	-0.03%	20.20%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.925265614	0.992285089	0.612982143	3.35%	0.06%	24.51%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.924189973	0.992145625	0.620367232	3.23%	0.05%	26.01%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.937341185	0.992504821	0.66578	4.70%	0.08%	35.23%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.946488388	0.99848375	0.724754911	5.72%	0.69%	47.21%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.946496288	0.99848375	0.724774554	5.72%	0.69%	47.21%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.952517846	0.998474286	0.743669732	6.39%	0.68%	51.05%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.950370562	0.998415625	0.759153125	6.16%	0.68%	54.20%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.950376886	0.998415625	0.759215714	6.16%	0.68%	54.21%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.955682637	0.998419196	0.774238125	6.75%	0.68%	57.26%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.960263599	0.998603661	0.803045893	7.26%	0.70%	63.11%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.960268506	0.99860375	0.803112857	7.26%	0.70%	63.13%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.96428088	0.998690268	0.8113125	7.71%	0.71%	64.79%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.971866505	0.999735625	0.854488393	8.56%	0.81%	73.56%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.971873328	0.999735625	0.854505804	8.56%	0.81%	73.56%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.972501153	0.999735714	0.854536964	8.63%	0.81%	73.57%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.97387547	0.999718482	0.869966518	8.78%	0.81%	76.70%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.973881495	0.999718571	0.870016786	8.78%	0.81%	76.71%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.974507252	0.999718571	0.870125089	8.85%	0.81%	76.74%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.978769287	0.999748393	0.893115	9.33%	0.81%	81.41%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.978773185	0.999748393	0.893160804	9.33%	0.81%	81.42%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.979264788	0.999748393	0.898418304	9.38%	0.81%	82.48%

Table 4-29

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9518	0.9894	0.8373	-1.75%	-0.40%	-1.36%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9519	0.9894	0.8374	-1.75%	-0.40%	-1.35%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9614	0.9923	0.8403	-0.76%	-0.11%	-1.00%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9614	0.9924	0.8405	-0.76%	-0.11%	-0.98%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9563	0.9905	0.8437	-1.28%	-0.29%	-0.60%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9727	0.9940	0.8450	0.40%	0.06%	-0.45%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9688	0.9934	0.8487	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9688	0.9934	0.8489	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9645	0.9926	0.8538	-0.44%	-0.09%	0.58%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9839	0.9988	0.8754	1.56%	0.54%	3.13%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9824	0.9987	0.8759	1.41%	0.53%	3.19%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9824	0.9987	0.8760	1.41%	0.53%	3.20%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9774	0.9980	0.8937	0.89%	0.46%	5.28%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9774	0.9980	0.8938	0.89%	0.46%	5.30%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9791	0.9981	0.8998	1.06%	0.47%	6.00%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9816	0.9980	0.9036	1.33%	0.46%	6.44%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9816	0.9980	0.9037	1.33%	0.46%	6.46%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9879	0.9988	0.9042	1.98%	0.54%	6.52%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9878	0.9988	0.9044	1.96%	0.54%	6.55%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9878	0.9988	0.9045	1.96%	0.54%	6.55%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9829	0.9981	0.9077	1.45%	0.47%	6.93%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9815	0.9979	0.9129	1.31%	0.45%	7.54%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9815	0.9979	0.9129	1.31%	0.45%	7.55%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9817	0.9979	0.9130	1.34%	0.45%	7.56%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9848	0.9980	0.9189	1.66%	0.46%	8.25%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9848	0.9980	0.9189	1.66%	0.46%	8.26%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9850	0.9981	0.9190	1.68%	0.47%	8.27%

Table 4-30

					Percent From Baseline	
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9490	0.9887	0.8280	-1.71%	-0.46%	-1.41%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9490	0.9887	0.8281	-1.70%	-0.46%	-1.40%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9592	0.9916	0.8326	-0.65%	-0.16%	-0.86%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9593	0.9916	0.8328	-0.64%	-0.16%	-0.84%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9703	0.9938	0.8350	0.50%	0.06%	-0.57%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9655	0.9932	0.8397	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9655	0.9932	0.8398	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9543	0.9902	0.8419	-1.16%	-0.31%	0.25%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9630	0.9923	0.8477	-0.26%	-0.10%	0.94%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9817	0.9987	0.8681	1.68%	0.55%	3.36%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9799	0.9987	0.8689	1.49%	0.55%	3.46%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9799	0.9987	0.8690	1.49%	0.55%	3.47%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9750	0.9979	0.8832	0.99%	0.47%	5.16%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9751	0.9979	0.8833	0.99%	0.47%	5.18%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9770	0.9980	0.8900	1.19%	0.48%	5.98%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9797	0.9980	0.8953	1.48%	0.48%	6.60%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9797	0.9980	0.8954	1.48%	0.48%	6.62%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9812	0.9981	0.8997	1.63%	0.49%	7.13%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9864	0.9987	0.9002	2.17%	0.55%	7.19%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9862	0.9987	0.9006	2.15%	0.55%	7.24%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9862	0.9987	0.9007	2.15%	0.55%	7.25%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9801	0.9978	0.9071	1.51%	0.46%	8.01%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9801	0.9978	0.9072	1.51%	0.46%	8.02%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9804	0.9978	0.9073	1.54%	0.46%	8.03%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9837	0.9980	0.9160	1.89%	0.47%	9.07%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9837	0.9980	0.9161	1.89%	0.47%	9.08%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9839	0.9980	0.9183	1.91%	0.48%	9.34%

Table 4-33

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9632	0.9986	0.7907	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9632	0.9986	0.7908	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9648	0.9984	0.8076	0.16%	-0.01%	2.13%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9648	0.9984	0.8077	0.16%	-0.01%	2.15%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9641	0.9996	0.8102	0.09%	0.10%	2.46%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9641	0.9996	0.8102	0.09%	0.10%	2.46%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9721	0.9986	0.8160	0.92%	0.00%	3.19%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9681	0.9996	0.8250	0.51%	0.10%	4.34%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9663	0.9996	0.8285	0.31%	0.10%	4.77%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9663	0.9996	0.8286	0.32%	0.10%	4.78%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9727	0.9985	0.8331	0.98%	-0.01%	5.35%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9699	0.9996	0.8393	0.69%	0.10%	6.14%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9722	0.9986	0.8398	0.93%	0.00%	6.21%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9722	0.9986	0.8400	0.93%	0.00%	6.22%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9728	0.9997	0.8558	1.00%	0.11%	8.23%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9729	0.9997	0.8559	1.00%	0.11%	8.23%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9734	0.9997	0.8559	1.06%	0.11%	8.24%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9732	0.9997	0.8593	1.03%	0.11%	8.67%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9732	0.9997	0.8594	1.03%	0.11%	8.68%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9780	0.9986	0.8600	1.53%	0.01%	8.76%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9741	0.9997	0.8654	1.13%	0.11%	9.44%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9741	0.9997	0.8654	1.13%	0.11%	9.45%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9747	0.9997	0.8655	1.19%	0.11%	9.45%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9760	0.9997	0.8659	1.32%	0.11%	9.50%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9791	0.9997	0.8889	1.65%	0.12%	12.41%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9791	0.9997	0.8889	1.65%	0.12%	12.42%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9796	0.9997	0.8943	1.69%	0.11%	13.10%

Table 4-38

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9584	0.9934	0.8296	-0.85%	-0.25%	-0.78%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9584	0.9934	0.8297	-0.85%	-0.25%	-0.77%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9732	0.9964	0.8338	0.68%	0.04%	-0.28%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9666	0.9959	0.8360	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9666	0.9959	0.8362	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9726	0.9988	0.8444	0.62%	0.29%	0.99%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9726	0.9988	0.8445	0.62%	0.29%	0.99%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9756	0.9988	0.8445	0.94%	0.29%	1.00%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9668	0.9926	0.8455	0.02%	-0.33%	1.12%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9668	0.9926	0.8456	0.02%	-0.33%	1.13%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9717	0.9986	0.8505	0.53%	0.27%	1.71%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9717	0.9986	0.8505	0.53%	0.27%	1.72%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9650	0.9935	0.8516	-0.16%	-0.24%	1.84%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9745	0.9987	0.8603	0.82%	0.28%	2.89%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9716	0.9943	0.8631	0.51%	-0.17%	3.22%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9782	0.9989	0.8637	1.20%	0.30%	3.29%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9782	0.9989	0.8637	1.20%	0.30%	3.30%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9786	0.9989	0.8639	1.24%	0.31%	3.31%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9773	0.9988	0.8727	1.11%	0.29%	4.37%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9774	0.9988	0.8728	1.11%	0.29%	4.38%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9760	0.9988	0.8744	0.97%	0.29%	4.57%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9760	0.9988	0.8744	0.97%	0.29%	4.58%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9765	0.9988	0.8745	1.02%	0.29%	4.58%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9794	0.9988	0.8785	1.33%	0.29%	5.07%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9806	0.9990	0.8916	1.45%	0.31%	6.63%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9806	0.9990	0.8916	1.45%	0.31%	6.63%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9810	0.9990	0.8964	1.49%	0.31%	7.20%

Table 4-39

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.942283319	0.996907857	0.651256518	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.942323029	0.996911696	0.651303393	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.948177914	0.996724286	0.701178125	0.62%	-0.02%	7.66%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.948217834	0.996728482	0.701274643	0.63%	-0.02%	7.67%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.957432523	0.996970982	0.707177679	1.60%	0.01%	8.58%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.961024216	0.996743125	0.739434643	1.98%	-0.02%	13.53%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.960406504	0.996903304	0.757795982	1.92%	0.00%	16.35%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.960435547	0.996908036	0.757917054	1.92%	0.00%	16.37%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.969440251	0.996947411	0.787749375	2.88%	0.00%	20.95%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.963590014	0.999175089	0.802596607	2.26%	0.23%	23.23%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.963620047	0.999176339	0.802677143	2.26%	0.23%	23.24%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.967823712	0.999184643	0.818811518	2.71%	0.23%	25.72%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.965908538	0.999142321	0.823579196	2.50%	0.22%	26.45%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.965950531	0.999143304	0.823789107	2.51%	0.22%	26.48%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.969686397	0.999150982	0.835302679	2.90%	0.22%	28.25%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.972809239	0.99924375	0.854654821	3.24%	0.23%	31.22%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.972836831	0.999244643	0.854874911	3.24%	0.23%	31.26%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.97562828	0.999252679	0.861849464	3.53%	0.23%	32.33%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.980704135	0.999711964	0.896350893	4.07%	0.28%	37.62%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.981129155	0.999713393	0.897154375	4.12%	0.28%	37.75%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.980732591	0.99971125	0.897558839	4.08%	0.28%	37.81%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.980850506	0.999717589	0.897702321	4.09%	0.28%	37.83%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.980887016	0.999716875	0.898022321	4.09%	0.28%	37.88%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.981350335	0.999718929	0.898258125	4.14%	0.28%	37.92%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.984485536	0.999762321	0.913782054	4.47%	0.29%	40.30%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.984510652	0.999761875	0.914094821	4.48%	0.29%	40.35%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.984866553	0.999756607	0.918143661	4.51%	0.29%	40.97%

Table 4-41

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9305	0.9947	0.5923	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9305	0.9947	0.5923	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9480	0.9948	0.6477	1.87%	0.01%	9.34%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9382	0.9947	0.6478	0.83%	0.00%	9.37%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9383	0.9947	0.6479	0.83%	0.00%	9.38%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9527	0.9946	0.6864	2.38%	-0.01%	15.89%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9532	0.9953	0.7158	2.44%	0.06%	20.85%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9532	0.9953	0.7159	2.44%	0.06%	20.87%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9631	0.9953	0.7459	3.50%	0.06%	25.93%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9525	0.9982	0.7464	2.36%	0.35%	26.00%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9525	0.9982	0.7465	2.36%	0.35%	26.02%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9578	0.9982	0.7644	2.93%	0.35%	29.05%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9559	0.9981	0.7762	2.72%	0.34%	31.05%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9559	0.9981	0.7765	2.73%	0.34%	31.08%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9605	0.9981	0.7897	3.22%	0.34%	33.32%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9649	0.9984	0.8177	3.69%	0.37%	38.05%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9649	0.9984	0.8180	3.69%	0.37%	38.09%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9683	0.9983	0.8262	4.06%	0.36%	39.48%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9725	0.9992	0.8551	4.51%	0.45%	44.35%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9726	0.9992	0.8551	4.52%	0.45%	44.36%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9732	0.9992	0.8552	4.58%	0.45%	44.38%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9737	0.9992	0.8641	4.64%	0.45%	45.88%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9737	0.9992	0.8644	4.64%	0.45%	45.93%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9743	0.9992	0.8647	4.70%	0.45%	45.97%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9787	0.9993	0.8879	5.17%	0.46%	49.89%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9787	0.9993	0.8881	5.17%	0.46%	49.93%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9792	0.9993	0.8935	5.23%	0.46%	50.84%

Table 4-42

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9285	0.9968	0.6082	-1.61%	-0.08%	-6.65%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9437	0.9976	0.6516	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9347	0.9968	0.6614	-0.95%	-0.08%	1.50%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9498	0.9976	0.7006	0.64%	0.00%	7.53%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9560	0.9976	0.7053	1.31%	0.00%	8.24%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9497	0.9972	0.7259	0.64%	-0.04%	11.41%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9601	0.9975	0.7384	1.74%	-0.01%	13.33%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9617	0.9978	0.7582	1.91%	0.02%	16.36%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9688	0.9978	0.7883	2.66%	0.02%	20.98%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9663	0.9998	0.8104	2.39%	0.22%	24.37%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9663	0.9998	0.8104	2.39%	0.22%	24.38%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9704	0.9998	0.8262	2.84%	0.22%	26.80%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9688	0.9998	0.8319	2.66%	0.22%	27.67%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9688	0.9998	0.8320	2.66%	0.22%	27.68%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9725	0.9998	0.8437	3.05%	0.22%	29.48%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9753	0.9998	0.8622	3.35%	0.22%	32.33%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9753	0.9998	0.8623	3.35%	0.22%	32.35%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9780	0.9998	0.8697	3.64%	0.22%	33.48%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9822	0.9998	0.9018	4.08%	0.22%	38.40%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9822	0.9998	0.9022	4.09%	0.22%	38.46%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9826	0.9998	0.9030	4.13%	0.22%	38.59%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9827	0.9997	0.9059	4.14%	0.22%	39.03%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9828	0.9997	0.9059	4.14%	0.22%	39.04%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9832	0.9997	0.9061	4.19%	0.22%	39.06%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9860	0.9998	0.9213	4.49%	0.22%	41.40%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9860	0.9998	0.9214	4.49%	0.22%	41.41%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9863	0.9998	0.9259	4.52%	0.22%	42.11%

Table 4-43

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9377	0.9965	0.6229	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9377	0.9965	0.6229	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9445	0.9964	0.6764	0.72%	-0.01%	8.58%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9445	0.9964	0.6764	0.72%	-0.01%	8.58%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9538	0.9966	0.6788	1.71%	0.00%	8.96%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9581	0.9964	0.7150	2.17%	-0.01%	14.77%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9577	0.9968	0.7390	2.13%	0.03%	18.63%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9577	0.9968	0.7390	2.13%	0.03%	18.64%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9672	0.9968	0.7697	3.14%	0.03%	23.56%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9610	0.9991	0.7869	2.48%	0.26%	26.32%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9610	0.9991	0.7869	2.48%	0.26%	26.32%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9656	0.9991	0.8038	2.97%	0.26%	29.03%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9639	0.9991	0.8118	2.79%	0.25%	30.31%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9639	0.9991	0.8118	2.79%	0.25%	30.32%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9680	0.9991	0.8241	3.22%	0.25%	32.29%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9712	0.9992	0.8464	3.57%	0.26%	35.87%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9712	0.9992	0.8464	3.57%	0.26%	35.88%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9743	0.9992	0.8538	3.89%	0.26%	37.06%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9795	0.9998	0.8889	4.45%	0.32%	42.68%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9795	0.9998	0.8889	4.45%	0.32%	42.69%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9799	0.9998	0.8889	4.50%	0.32%	42.69%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9802	0.9997	0.8936	4.53%	0.32%	43.45%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9802	0.9997	0.8937	4.53%	0.32%	43.46%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9807	0.9997	0.8937	4.58%	0.32%	43.47%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9840	0.9998	0.9117	4.93%	0.33%	46.35%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9840	0.9998	0.9117	4.93%	0.33%	46.35%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9843	0.9998	0.9164	4.97%	0.33%	47.11%

Table 4-57

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9517	0.9924	0.8002	-0.74%	-0.26%	-1.11%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9517	0.9924	0.8003	-0.74%	-0.26%	-1.10%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9588	0.9950	0.8091	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9588	0.9950	0.8091	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9678	0.9952	0.8185	0.94%	0.02%	1.15%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9613	0.9913	0.8232	0.26%	-0.37%	1.74%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9614	0.9913	0.8233	0.26%	-0.37%	1.75%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9602	0.9923	0.8272	0.14%	-0.27%	2.23%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9677	0.9926	0.8445	0.92%	-0.24%	4.37%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9758	0.9989	0.8712	1.77%	0.39%	7.67%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9758	0.9989	0.8713	1.77%	0.39%	7.68%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9803	0.9993	0.8716	2.24%	0.43%	7.72%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9779	0.9993	0.8728	1.99%	0.43%	7.87%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9779	0.9993	0.8729	1.99%	0.43%	7.87%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9782	0.9992	0.8796	2.02%	0.42%	8.70%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9803	0.9990	0.8900	2.24%	0.41%	9.99%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9803	0.9990	0.8901	2.24%	0.41%	10.00%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9821	0.9991	0.8949	2.43%	0.41%	10.60%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9855	0.9992	0.9242	2.78%	0.43%	14.22%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9855	0.9992	0.9242	2.78%	0.43%	14.22%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9857	0.9992	0.9243	2.81%	0.43%	14.23%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9884	0.9994	0.9292	3.09%	0.45%	14.84%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9882	0.9994	0.9295	3.06%	0.45%	14.87%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9882	0.9994	0.9295	3.06%	0.45%	14.88%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9880	0.9994	0.9348	3.04%	0.44%	15.53%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9880	0.9994	0.9349	3.05%	0.44%	15.54%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9882	0.9994	0.9378	3.07%	0.44%	15.90%

Table 4-61

					Percent From Baseline	
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.963928526	0.997972411	0.817641071	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.963934626	0.997973571	0.817663482	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.962388152	0.997168393	0.822270536	-0.16%	-0.08%	0.56%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.962399194	0.997170089	0.822333036	-0.16%	-0.08%	0.57%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.972097601	0.998039821	0.827329643	0.85%	0.01%	1.18%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.971445123	0.999222857	0.838862857	0.78%	0.13%	2.59%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.971447381	0.999223036	0.838874107	0.78%	0.13%	2.59%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.974677108	0.999197589	0.841574196	1.11%	0.12%	2.92%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.96991742	0.997173125	0.846367946	0.62%	-0.08%	3.51%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.96984406	0.997026875	0.846701429	0.61%	-0.09%	3.55%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.969853168	0.99702875	0.8467675	0.61%	-0.09%	3.56%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.972862369	0.999168482	0.850014107	0.93%	0.12%	3.96%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.972866268	0.999168571	0.850049018	0.93%	0.12%	3.96%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.975744976	0.999148393	0.860311161	1.23%	0.12%	5.22%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.979140792	0.999539107	0.865035714	1.58%	0.16%	5.79%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.978744929	0.999538929	0.865165625	1.54%	0.16%	5.81%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.97874726	0.999538929	0.865228304	1.54%	0.16%	5.82%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.975424371	0.997056607	0.866020804	1.19%	-0.09%	5.91%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.978164271	0.9992625	0.874485982	1.48%	0.13%	6.95%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.978167276	0.999262679	0.874520536	1.48%	0.13%	6.95%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.980312344	0.999245268	0.88099	1.70%	0.13%	7.74%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.979115601	0.999519464	0.883947589	1.57%	0.15%	8.11%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.979120145	0.999519464	0.883962143	1.58%	0.15%	8.11%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.97955692	0.999519643	0.884007054	1.62%	0.15%	8.11%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.983066037	0.999581607	0.901818393	1.98%	0.16%	10.29%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.983068525	0.999581696	0.901833125	1.98%	0.16%	10.29%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.983400618	0.999569375	0.907034286	2.02%	0.16%	10.93%

Table 4-72

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9312	0.9956	0.5623	-1.04%	-0.40%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9409	0.9996	0.5623	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9419	0.9959	0.6198	0.11%	-0.38%	10.23%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9355	0.9955	0.6222	-0.58%	-0.42%	10.65%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9355	0.9955	0.6222	-0.58%	-0.42%	10.65%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9501	0.9988	0.6428	0.97%	-0.08%	14.32%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9506	0.9958	0.6626	1.03%	-0.39%	17.84%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9536	0.9960	0.6967	1.35%	-0.36%	23.91%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9583	0.9997	0.6967	1.84%	0.00%	23.91%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9598	0.9963	0.7287	2.01%	-0.34%	29.60%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9555	0.9988	0.7496	1.55%	-0.08%	33.32%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9587	0.9989	0.7682	1.89%	-0.08%	36.63%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9590	0.9988	0.7821	1.92%	-0.09%	39.09%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9591	0.9988	0.7821	1.93%	-0.09%	39.09%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9618	0.9988	0.7957	2.22%	-0.08%	41.51%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9728	0.9998	0.7972	3.39%	0.01%	41.78%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9675	0.9989	0.8242	2.82%	-0.07%	46.59%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9642	0.9989	0.8242	2.47%	-0.07%	46.59%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9696	0.9990	0.8323	3.05%	-0.07%	48.02%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9749	0.9998	0.8348	3.61%	0.01%	48.46%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9755	0.9998	0.8652	3.67%	0.01%	53.87%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9755	0.9998	0.8652	3.67%	0.01%	53.87%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9771	0.9998	0.8781	3.85%	0.01%	56.16%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9771	0.9998	0.8781	3.85%	0.01%	56.17%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9798	0.9998	0.8934	4.14%	0.01%	58.89%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9816	0.9998	0.9008	4.32%	0.02%	60.20%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9816	0.9998	0.9008	4.32%	0.02%	60.21%

Table 4-73

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9452	0.9975	0.6691	-0.59%	0.05%	-6.94%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9505	0.9973	0.7164	-0.03%	0.03%	-0.36%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9508	0.9970	0.7190	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9536	0.9966	0.7586	0.30%	-0.03%	5.52%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9622	0.9974	0.7704	1.20%	0.05%	7.15%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9633	0.9972	0.7711	1.32%	0.03%	7.25%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9648	0.9967	0.7970	1.47%	-0.02%	10.85%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9644	0.9962	0.8028	1.43%	-0.08%	11.66%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9722	0.9963	0.8322	2.25%	-0.07%	15.76%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9730	0.9996	0.8373	2.33%	0.27%	16.46%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9730	0.9996	0.8373	2.33%	0.27%	16.46%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9763	0.9996	0.8396	2.68%	0.26%	16.78%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9744	0.9996	0.8499	2.48%	0.27%	18.21%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9744	0.9996	0.8500	2.48%	0.27%	18.23%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9773	0.9996	0.8612	2.78%	0.27%	19.78%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9797	0.9997	0.8745	3.04%	0.27%	21.64%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9797	0.9997	0.8747	3.04%	0.27%	21.66%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9849	0.9995	0.8766	3.59%	0.25%	21.92%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9846	0.9995	0.8770	3.56%	0.25%	21.99%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9847	0.9995	0.8777	3.56%	0.25%	22.07%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9818	0.9996	0.8819	3.26%	0.27%	22.66%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9835	0.9995	0.9066	3.44%	0.26%	26.10%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9835	0.9995	0.9068	3.44%	0.26%	26.12%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9839	0.9995	0.9069	3.48%	0.26%	26.15%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9866	0.9996	0.9190	3.77%	0.26%	27.82%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9866	0.9996	0.9192	3.77%	0.26%	27.85%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9869	0.9996	0.9234	3.79%	0.26%	28.44%

Table 4-76				Percent From Baseline		
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9658	0.9938	0.8573	-1.89%	-0.26%	-4.77%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9723	0.9950	0.8615	-1.22%	-0.14%	-4.31%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9753	0.9953	0.8768	-0.92%	-0.11%	-2.61%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9700	0.9943	0.8779	-1.46%	-0.21%	-2.48%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9826	0.9969	0.8972	-0.18%	0.06%	-0.34%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9786	0.9966	0.8979	-0.59%	0.03%	-0.26%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9844	0.9963	0.9002	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9858	0.9972	0.9021	0.14%	0.09%	0.20%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9883	0.9982	0.9035	0.40%	0.19%	0.36%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9878	0.9987	0.9282	0.35%	0.23%	3.10%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9878	0.9987	0.9282	0.35%	0.23%	3.11%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9879	0.9987	0.9285	0.36%	0.24%	3.13%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9902	0.9989	0.9362	0.59%	0.25%	4.00%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9902	0.9989	0.9362	0.59%	0.25%	4.00%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9902	0.9989	0.9364	0.60%	0.25%	4.02%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9899	0.9991	0.9402	0.56%	0.28%	4.44%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9895	0.9990	0.9404	0.53%	0.27%	4.47%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9896	0.9990	0.9407	0.53%	0.27%	4.49%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9915	0.9992	0.9443	0.73%	0.29%	4.89%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9915	0.9992	0.9445	0.73%	0.29%	4.91%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9944	0.9994	0.9462	1.02%	0.30%	5.11%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9944	0.9994	0.9463	1.02%	0.30%	5.12%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9946	0.9994	0.9469	1.03%	0.31%	5.19%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9945	0.9992	0.9479	1.03%	0.29%	5.29%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9945	0.9992	0.9479	1.03%	0.29%	5.30%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9918	0.9992	0.9483	0.76%	0.29%	5.34%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9945	0.9992	0.9486	1.03%	0.29%	5.37%

Table 4-85

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9298	0.9945	0.5924	-0.01%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9299	0.9945	0.5925	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9472	0.9946	0.6473	1.87%	0.01%	9.26%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9374	0.9945	0.6477	0.82%	-0.01%	9.33%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9375	0.9945	0.6479	0.82%	-0.01%	9.36%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9520	0.9945	0.6859	2.38%	-0.01%	15.77%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9524	0.9951	0.7152	2.43%	0.06%	20.71%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9525	0.9951	0.7154	2.43%	0.06%	20.75%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9517	0.9981	0.7445	2.35%	0.36%	25.66%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9518	0.9981	0.7447	2.36%	0.36%	25.70%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9624	0.9952	0.7453	3.50%	0.07%	25.81%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9570	0.9981	0.7624	2.92%	0.36%	28.68%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9550	0.9980	0.7743	2.71%	0.35%	30.69%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9551	0.9980	0.7749	2.72%	0.35%	30.79%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9598	0.9980	0.7879	3.21%	0.35%	32.99%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9641	0.9983	0.8157	3.68%	0.38%	37.69%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9642	0.9983	0.8164	3.69%	0.38%	37.79%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9676	0.9983	0.8243	4.06%	0.38%	39.14%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9719	0.9992	0.8529	4.52%	0.47%	43.96%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9719	0.9992	0.8530	4.52%	0.47%	43.97%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9725	0.9992	0.8532	4.59%	0.47%	44.01%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9730	0.9992	0.8621	4.64%	0.47%	45.51%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9730	0.9992	0.8623	4.64%	0.47%	45.54%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9737	0.9992	0.8629	4.72%	0.47%	45.65%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9781	0.9993	0.8860	5.19%	0.48%	49.55%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9781	0.9993	0.8861	5.19%	0.48%	49.57%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9786	0.9993	0.8915	5.25%	0.48%	50.48%

Table 4-92

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9884	0.9988	0.9350	-0.42%	-0.04%	-0.13%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9875	0.9988	0.9351	-0.51%	-0.05%	-0.12%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9875	0.9988	0.9353	-0.51%	-0.05%	-0.10%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9926	0.9992	0.9361	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9926	0.9992	0.9362	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9898	0.9989	0.9385	-0.28%	-0.03%	0.25%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9932	0.9993	0.9387	0.06%	0.00%	0.26%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9898	0.9989	0.9387	-0.28%	-0.03%	0.27%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9905	0.9989	0.9470	-0.21%	-0.03%	1.16%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9946	0.9997	0.9589	0.21%	0.05%	2.42%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9946	0.9997	0.9589	0.21%	0.05%	2.42%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9951	0.9997	0.9594	0.25%	0.05%	2.48%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9952	0.9997	0.9596	0.26%	0.05%	2.50%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9952	0.9997	0.9597	0.26%	0.05%	2.51%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9953	0.9997	0.9601	0.27%	0.05%	2.55%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9936	0.9997	0.9604	0.10%	0.05%	2.58%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9936	0.9997	0.9604	0.10%	0.05%	2.59%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9937	0.9997	0.9605	0.11%	0.05%	2.59%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9932	0.9997	0.9620	0.06%	0.05%	2.75%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9932	0.9997	0.9621	0.07%	0.05%	2.76%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9937	0.9997	0.9623	0.12%	0.05%	2.78%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9947	0.9997	0.9641	0.22%	0.05%	2.98%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9947	0.9997	0.9641	0.22%	0.05%	2.98%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9952	0.9997	0.9642	0.26%	0.05%	2.99%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9944	0.9998	0.9659	0.19%	0.05%	3.17%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9944	0.9998	0.9660	0.19%	0.05%	3.18%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9948	0.9997	0.9690	0.23%	0.05%	3.50%

Table 4-98

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9507	0.9897	0.8228	-2.56%	-0.34%	-5.75%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9602	0.9918	0.8267	-1.59%	-0.13%	-5.30%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9560	0.9901	0.8421	-2.02%	-0.31%	-3.54%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9639	0.9926	0.8444	-1.21%	-0.06%	-3.28%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9649	0.9940	0.8635	-1.11%	0.09%	-1.09%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9715	0.9951	0.8640	-0.43%	0.20%	-1.03%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9779	0.9941	0.8706	0.23%	0.10%	-0.27%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9757	0.9931	0.8730	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9802	0.9959	0.8762	0.46%	0.28%	0.36%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9845	0.9975	0.9191	0.90%	0.44%	5.28%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9846	0.9975	0.9193	0.91%	0.44%	5.30%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9847	0.9975	0.9194	0.92%	0.44%	5.32%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9875	0.9977	0.9303	1.21%	0.46%	6.57%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9876	0.9977	0.9304	1.21%	0.46%	6.58%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9876	0.9977	0.9306	1.22%	0.46%	6.59%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9874	0.9983	0.9368	1.20%	0.52%	7.30%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9874	0.9983	0.9370	1.20%	0.52%	7.33%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9880	0.9983	0.9386	1.26%	0.52%	7.51%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9897	0.9984	0.9422	1.44%	0.53%	7.93%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9898	0.9984	0.9423	1.44%	0.53%	7.94%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9932	0.9991	0.9453	1.80%	0.60%	8.28%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9902	0.9984	0.9453	1.48%	0.54%	8.28%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9933	0.9991	0.9453	1.80%	0.60%	8.28%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9935	0.9991	0.9455	1.83%	0.61%	8.30%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9935	0.9989	0.9469	1.82%	0.58%	8.46%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9935	0.9989	0.9470	1.82%	0.58%	8.47%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9935	0.9989	0.9471	1.82%	0.58%	8.49%

Table 4-101

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9628	0.9979	0.7988	-0.17%	0.12%	-3.31%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9626	0.9975	0.8099	-0.18%	0.08%	-1.97%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9599	0.9952	0.8208	-0.46%	-0.15%	-0.65%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9644	0.9967	0.8262	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9720	0.9971	0.8329	0.79%	0.03%	0.82%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9703	0.9976	0.8397	0.61%	0.09%	1.64%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9679	0.9947	0.8432	0.37%	-0.20%	2.06%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9680	0.9952	0.8445	0.37%	-0.15%	2.22%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9738	0.9960	0.8618	0.97%	-0.07%	4.32%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9765	0.9990	0.8618	1.26%	0.23%	4.32%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9791	0.9990	0.8620	1.52%	0.23%	4.34%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9766	0.9990	0.8621	1.26%	0.23%	4.35%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9759	0.9990	0.8683	1.19%	0.23%	5.10%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9759	0.9990	0.8686	1.19%	0.23%	5.14%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9783	0.9990	0.8769	1.43%	0.23%	6.14%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9805	0.9991	0.8884	1.67%	0.24%	7.54%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9805	0.9991	0.8888	1.67%	0.24%	7.58%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9823	0.9991	0.8941	1.85%	0.24%	8.22%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9846	0.9994	0.8961	2.09%	0.27%	8.46%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9849	0.9994	0.8966	2.12%	0.27%	8.52%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9846	0.9994	0.8969	2.09%	0.27%	8.56%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9826	0.9993	0.9053	1.88%	0.26%	9.57%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9826	0.9993	0.9055	1.89%	0.26%	9.60%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9829	0.9993	0.9058	1.92%	0.26%	9.63%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9858	0.9995	0.9187	2.22%	0.28%	11.20%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9858	0.9995	0.9189	2.22%	0.28%	11.22%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9861	0.9995	0.9225	2.25%	0.27%	11.66%

Table 4-105

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9306	0.9975	0.6083	-1.45%	-0.06%	-5.38%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9443	0.9981	0.6429	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9371	0.9974	0.6617	-0.76%	-0.07%	2.92%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9509	0.9980	0.6935	0.70%	-0.01%	7.87%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9568	0.9982	0.6981	1.32%	0.01%	8.58%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9519	0.9977	0.7277	0.81%	-0.03%	13.19%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9613	0.9981	0.7324	1.80%	0.01%	13.93%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9629	0.9982	0.7538	1.97%	0.02%	17.25%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9700	0.9983	0.7846	2.72%	0.03%	22.04%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9699	0.9998	0.8261	2.71%	0.18%	28.50%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9699	0.9998	0.8261	2.71%	0.18%	28.50%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9739	0.9998	0.8415	3.13%	0.18%	30.89%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9727	0.9998	0.8480	3.00%	0.18%	31.91%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9727	0.9998	0.8481	3.00%	0.18%	31.92%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9760	0.9998	0.8593	3.36%	0.18%	33.66%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9784	0.9998	0.8769	3.61%	0.18%	36.39%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9784	0.9998	0.8769	3.61%	0.18%	36.40%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9809	0.9998	0.8838	3.87%	0.18%	37.48%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9849	0.9998	0.9064	4.30%	0.18%	41.00%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9849	0.9998	0.9068	4.30%	0.18%	41.06%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9853	0.9998	0.9071	4.34%	0.18%	41.10%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9859	0.9998	0.9213	4.40%	0.18%	43.31%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9859	0.9998	0.9213	4.40%	0.18%	43.31%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9862	0.9998	0.9215	4.44%	0.17%	43.33%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9885	0.9998	0.9351	4.68%	0.18%	45.46%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9885	0.9998	0.9352	4.68%	0.18%	45.46%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9888	0.9998	0.9392	4.71%	0.18%	46.09%

Table 4-107

BMP	Mean ER	Max ER	Min ER	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9182	0.9957	0.5592	-1.76%	-0.11%	-7.22%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9347	0.9968	0.6027	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9254	0.9955	0.6185	-1.00%	-0.12%	2.62%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9417	0.9965	0.6586	0.75%	-0.02%	9.27%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9483	0.9968	0.6608	1.46%	0.00%	9.64%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9426	0.9961	0.6919	0.85%	-0.07%	14.80%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9532	0.9966	0.6990	1.98%	-0.01%	15.97%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9557	0.9969	0.7249	2.25%	0.02%	20.27%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9635	0.9970	0.7570	3.08%	0.03%	25.61%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9581	0.9995	0.7688	2.50%	0.28%	27.57%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9581	0.9995	0.7689	2.50%	0.28%	27.57%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9630	0.9996	0.7868	3.03%	0.28%	30.54%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9612	0.9995	0.7964	2.84%	0.27%	32.15%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9612	0.9995	0.7965	2.84%	0.27%	32.16%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9655	0.9995	0.8095	3.30%	0.28%	34.31%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9693	0.9996	0.8341	3.70%	0.29%	38.39%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9693	0.9996	0.8341	3.71%	0.29%	38.40%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9725	0.9996	0.8419	4.05%	0.29%	39.69%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9772	0.9998	0.8763	4.55%	0.30%	45.40%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9772	0.9998	0.8763	4.55%	0.30%	45.40%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9777	0.9998	0.8764	4.61%	0.30%	45.41%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9782	0.9998	0.8832	4.65%	0.30%	46.54%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9782	0.9998	0.8833	4.66%	0.30%	46.55%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9787	0.9998	0.8834	4.71%	0.30%	46.57%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9824	0.9998	0.9033	5.10%	0.30%	49.88%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9824	0.9998	0.9034	5.10%	0.30%	49.89%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9828	0.9998	0.9084	5.15%	0.30%	50.73%

Table 4-111

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9839	0.9987	0.8750	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9839	0.9987	0.8752	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9861	0.9987	0.8786	0.22%	0.01%	0.40%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9773	0.9978	0.8994	-0.67%	-0.08%	2.78%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9773	0.9978	0.8996	-0.67%	-0.08%	2.79%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9817	0.9980	0.8996	-0.23%	-0.07%	2.80%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9817	0.9980	0.8998	-0.23%	-0.07%	2.82%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9799	0.9979	0.9080	-0.42%	-0.08%	3.76%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9835	0.9980	0.9163	-0.05%	-0.07%	4.70%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9922	0.9993	0.9419	0.84%	0.06%	7.62%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9922	0.9993	0.9419	0.84%	0.06%	7.63%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9923	0.9993	0.9422	0.85%	0.06%	7.66%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9935	0.9993	0.9506	0.98%	0.06%	8.62%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9935	0.9993	0.9506	0.98%	0.06%	8.62%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9936	0.9993	0.9508	0.98%	0.06%	8.64%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9939	0.9996	0.9535	1.01%	0.09%	8.95%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9936	0.9996	0.9537	0.98%	0.09%	8.98%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9936	0.9996	0.9539	0.98%	0.09%	9.00%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9948	0.9996	0.9570	1.10%	0.09%	9.36%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9948	0.9996	0.9572	1.10%	0.09%	9.37%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9950	0.9996	0.9606	1.13%	0.10%	9.77%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9961	0.9997	0.9611	1.23%	0.10%	9.82%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9961	0.9997	0.9612	1.23%	0.10%	9.83%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9962	0.9997	0.9616	1.25%	0.10%	9.88%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9966	0.9996	0.9638	1.28%	0.09%	10.13%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9966	0.9996	0.9639	1.28%	0.09%	10.14%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9966	0.9996	0.9642	1.28%	0.09%	10.17%

Table 4-113

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9285	0.9824	0.7541	-4.04%	-0.80%	-12.30%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9285	0.9824	0.7545	-4.03%	-0.80%	-12.25%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9432	0.9879	0.7587	-2.51%	-0.25%	-11.77%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9433	0.9879	0.7591	-2.50%	-0.25%	-11.71%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9311	0.9833	0.7705	-3.77%	-0.71%	-10.39%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9446	0.9882	0.7878	-2.37%	-0.21%	-8.38%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9675	0.9903	0.8597	0.00%	0.00%	-0.02%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9675	0.9903	0.8598	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9685	0.9909	0.8645	0.11%	0.05%	0.54%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9733	0.9948	0.8856	0.59%	0.45%	2.99%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9733	0.9948	0.8857	0.60%	0.45%	3.01%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9735	0.9948	0.8860	0.62%	0.45%	3.04%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9786	0.9954	0.9036	1.15%	0.51%	5.09%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9787	0.9954	0.9038	1.15%	0.51%	5.11%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9788	0.9955	0.9040	1.17%	0.52%	5.14%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9800	0.9966	0.9070	1.29%	0.64%	5.49%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9793	0.9965	0.9075	1.22%	0.62%	5.55%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9794	0.9965	0.9079	1.22%	0.62%	5.58%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9834	0.9968	0.9150	1.65%	0.66%	6.42%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9835	0.9968	0.9152	1.65%	0.66%	6.44%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9839	0.9969	0.9205	1.69%	0.66%	7.06%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9909	0.9985	0.9414	2.42%	0.83%	9.48%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9909	0.9985	0.9414	2.42%	0.83%	9.49%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9912	0.9986	0.9428	2.44%	0.83%	9.64%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9904	0.9982	0.9438	2.36%	0.79%	9.77%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9904	0.9982	0.9439	2.36%	0.79%	9.78%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9904	0.9982	0.9453	2.37%	0.79%	9.93%

Table 4-114

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9492	0.9900	0.8071	-2.56%	-0.44%	-6.64%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9492	0.9900	0.8072	-2.56%	-0.44%	-6.63%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9596	0.9917	0.8089	-1.50%	-0.27%	-6.43%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9596	0.9917	0.8091	-1.50%	-0.27%	-6.41%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9522	0.9914	0.8154	-2.26%	-0.30%	-5.67%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9613	0.9926	0.8358	-1.32%	-0.18%	-3.32%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9742	0.9944	0.8644	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9742	0.9944	0.8645	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9759	0.9946	0.8699	0.18%	0.02%	0.63%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9862	0.9988	0.8975	1.24%	0.44%	3.82%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9862	0.9988	0.8976	1.24%	0.44%	3.82%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9784	0.9980	0.8983	0.44%	0.36%	3.91%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9784	0.9980	0.8984	0.44%	0.36%	3.92%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9871	0.9989	0.8991	1.32%	0.45%	4.01%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9826	0.9982	0.8992	0.87%	0.39%	4.02%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9826	0.9982	0.8993	0.87%	0.39%	4.03%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9796	0.9981	0.9020	0.56%	0.37%	4.34%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9835	0.9983	0.9081	0.96%	0.39%	5.05%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9840	0.9984	0.9236	1.00%	0.40%	6.84%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9840	0.9984	0.9236	1.01%	0.40%	6.84%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9841	0.9984	0.9237	1.02%	0.40%	6.85%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9871	0.9986	0.9265	1.32%	0.42%	7.17%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9871	0.9986	0.9265	1.33%	0.42%	7.17%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9872	0.9986	0.9265	1.34%	0.43%	7.18%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9907	0.9991	0.9327	1.70%	0.47%	7.89%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9907	0.9991	0.9327	1.70%	0.47%	7.89%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9908	0.9991	0.9342	1.71%	0.47%	8.06%

Table 4-131

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9731	0.9983	0.8426	0.09%	0.23%	-0.37%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9775	0.9970	0.8433	0.54%	0.10%	-0.28%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9723	0.9960	0.8457	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9614	0.9931	0.8534	-1.11%	-0.30%	0.90%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9690	0.9970	0.8577	-0.33%	0.10%	1.42%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9692	0.9939	0.8615	-0.31%	-0.22%	1.87%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9686	0.9941	0.8716	-0.38%	-0.19%	3.06%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9851	0.9992	0.8738	1.32%	0.32%	3.32%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9753	0.9969	0.8739	0.31%	0.08%	3.33%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9835	0.9992	0.8742	1.16%	0.32%	3.38%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9835	0.9992	0.8743	1.16%	0.32%	3.38%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9743	0.9951	0.8764	0.21%	-0.09%	3.63%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9801	0.9990	0.8982	0.81%	0.30%	6.21%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9801	0.9990	0.8983	0.81%	0.30%	6.22%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9886	0.9992	0.9037	1.69%	0.31%	6.86%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9888	0.9992	0.9038	1.70%	0.31%	6.87%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9887	0.9992	0.9038	1.69%	0.31%	6.87%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9818	0.9990	0.9046	0.98%	0.30%	6.97%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9838	0.9992	0.9097	1.19%	0.31%	7.57%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9839	0.9992	0.9098	1.19%	0.32%	7.58%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9852	0.9992	0.9139	1.33%	0.32%	8.07%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9840	0.9989	0.9198	1.21%	0.29%	8.77%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9840	0.9989	0.9199	1.21%	0.29%	8.78%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9842	0.9989	0.9200	1.23%	0.29%	8.79%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9869	0.9991	0.9241	1.51%	0.31%	9.27%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9870	0.9991	0.9242	1.51%	0.31%	9.29%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9871	0.9991	0.9243	1.53%	0.31%	9.30%

Table 4-132

					Percent From Baseline	
BMP	Mean ER	Max ER	Min ER	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9816	0.9981	0.8476	0.47%	0.02%	-0.40%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9770	0.9980	0.8510	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9770	0.9980	0.8510	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9720	0.9966	0.8758	-0.51%	-0.14%	2.91%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9720	0.9966	0.8759	-0.51%	-0.13%	2.92%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9776	0.9964	0.8870	0.06%	-0.15%	4.22%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9776	0.9964	0.8871	0.06%	-0.15%	4.23%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9903	0.9994	0.8924	1.36%	0.15%	4.86%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9894	0.9995	0.8931	1.27%	0.15%	4.94%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9894	0.9995	0.8931	1.27%	0.15%	4.95%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9767	0.9966	0.8934	-0.04%	-0.14%	4.97%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9810	0.9965	0.9012	0.40%	-0.15%	5.89%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9875	0.9994	0.9307	1.07%	0.15%	9.36%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9875	0.9994	0.9307	1.07%	0.15%	9.36%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9885	0.9994	0.9350	1.17%	0.15%	9.86%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9898	0.9995	0.9387	1.30%	0.16%	10.30%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9898	0.9995	0.9387	1.30%	0.16%	10.31%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9944	0.9996	0.9392	1.77%	0.16%	10.36%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9943	0.9996	0.9392	1.77%	0.16%	10.36%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9943	0.9996	0.9393	1.77%	0.16%	10.37%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9905	0.9995	0.9417	1.38%	0.16%	10.66%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9921	0.9995	0.9547	1.54%	0.16%	12.18%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9921	0.9995	0.9548	1.54%	0.16%	12.19%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9922	0.9995	0.9548	1.55%	0.16%	12.19%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9935	0.9996	0.9583	1.68%	0.16%	12.61%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9935	0.9996	0.9584	1.68%	0.16%	12.61%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9936	0.9996	0.9584	1.69%	0.16%	12.62%

Table 4-133

BMP	Mean ER	Max ER	Min ER	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9496	0.9981	0.6847	-0.48%	0.04%	-5.94%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9543	0.9977	0.7280	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9551	0.9981	0.7305	0.09%	0.03%	0.35%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9578	0.9975	0.7674	0.37%	-0.02%	5.41%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9663	0.9979	0.7800	1.26%	0.02%	7.15%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9659	0.9982	0.7827	1.22%	0.05%	7.52%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9683	0.9976	0.8043	1.48%	-0.01%	10.48%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9678	0.9973	0.8110	1.42%	-0.04%	11.40%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9751	0.9974	0.8395	2.19%	-0.04%	15.32%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9804	0.9997	0.8446	2.74%	0.19%	16.02%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9776	0.9997	0.8459	2.45%	0.20%	16.20%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9776	0.9997	0.8459	2.45%	0.20%	16.20%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9791	0.9997	0.8726	2.60%	0.20%	19.87%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9791	0.9997	0.8726	2.60%	0.20%	19.87%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9879	0.9995	0.8799	3.52%	0.18%	20.86%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9877	0.9995	0.8810	3.50%	0.18%	21.02%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9877	0.9995	0.8810	3.50%	0.18%	21.02%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9815	0.9997	0.8828	2.86%	0.20%	21.27%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9835	0.9998	0.8941	3.06%	0.20%	22.81%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9835	0.9998	0.8941	3.06%	0.20%	22.81%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9852	0.9997	0.9006	3.25%	0.20%	23.71%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9870	0.9996	0.9246	3.43%	0.18%	27.01%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9870	0.9996	0.9247	3.44%	0.18%	27.01%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9873	0.9996	0.9247	3.46%	0.18%	27.02%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9894	0.9996	0.9347	3.69%	0.19%	28.39%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9894	0.9996	0.9347	3.69%	0.19%	28.39%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9896	0.9996	0.9384	3.71%	0.19%	28.91%

Table 4-137

					Percent From Baseline	
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9828	0.9994	0.8739	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9828	0.9994	0.8740	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9859	0.9994	0.8755	0.32%	0.00%	0.18%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9808	0.9994	0.8978	-0.20%	0.00%	2.72%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9808	0.9994	0.8979	-0.20%	0.00%	2.73%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9838	0.9994	0.9108	0.11%	0.00%	4.21%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9844	0.9995	0.9108	0.17%	0.01%	4.22%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9845	0.9995	0.9109	0.17%	0.01%	4.22%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9867	0.9995	0.9213	0.40%	0.01%	5.41%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9902	0.9998	0.9375	0.76%	0.04%	7.26%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9902	0.9998	0.9375	0.76%	0.04%	7.27%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9912	0.9998	0.9384	0.86%	0.04%	7.37%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9897	0.9997	0.9445	0.71%	0.04%	8.07%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9897	0.9997	0.9446	0.71%	0.04%	8.08%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9907	0.9997	0.9480	0.81%	0.04%	8.47%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9915	0.9998	0.9532	0.89%	0.04%	9.06%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9915	0.9998	0.9532	0.89%	0.04%	9.07%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9923	0.9998	0.9556	0.97%	0.04%	9.33%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9946	0.9998	0.9597	1.20%	0.04%	9.81%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9946	0.9998	0.9598	1.20%	0.04%	9.82%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9947	0.9998	0.9603	1.21%	0.04%	9.87%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9937	0.9998	0.9656	1.12%	0.04%	10.48%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9938	0.9998	0.9656	1.12%	0.04%	10.49%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9939	0.9998	0.9657	1.13%	0.04%	10.49%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9948	0.9998	0.9709	1.23%	0.04%	11.09%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9948	0.9998	0.9709	1.23%	0.04%	11.09%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9949	0.9998	0.9722	1.23%	0.04%	11.24%

Table 4-139

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9364	0.9918	0.6825	-0.60%	0.09%	-7.20%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9377	0.9907	0.7239	-0.46%	-0.03%	-1.57%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9421	0.9910	0.7355	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9382	0.9891	0.7589	-0.41%	-0.19%	3.19%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9547	0.9965	0.7696	1.34%	0.56%	4.64%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9547	0.9965	0.7696	1.34%	0.56%	4.64%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9519	0.9901	0.7711	1.04%	-0.08%	4.84%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9553	0.9925	0.7740	1.41%	0.16%	5.24%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9538	0.9957	0.7802	1.24%	0.48%	6.09%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9538	0.9957	0.7803	1.24%	0.48%	6.09%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9595	0.9966	0.7858	1.85%	0.57%	6.85%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9582	0.9959	0.7934	1.71%	0.49%	7.88%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9521	0.9875	0.7943	1.06%	-0.35%	8.01%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9509	0.9902	0.7994	0.93%	-0.07%	8.70%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9631	0.9959	0.8137	2.24%	0.49%	10.64%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9632	0.9959	0.8138	2.24%	0.49%	10.65%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9663	0.9960	0.8213	2.58%	0.50%	11.67%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9609	0.9894	0.8231	2.00%	-0.16%	11.92%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9651	0.9968	0.8363	2.44%	0.58%	13.71%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9651	0.9968	0.8363	2.44%	0.58%	13.72%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9657	0.9968	0.8364	2.50%	0.59%	13.73%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9699	0.9977	0.8542	2.96%	0.68%	16.14%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9699	0.9977	0.8542	2.96%	0.68%	16.15%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9704	0.9977	0.8542	3.01%	0.68%	16.15%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9717	0.9969	0.8574	3.14%	0.60%	16.58%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9717	0.9969	0.8574	3.14%	0.60%	16.58%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9721	0.9970	0.8629	3.19%	0.61%	17.33%

Table 4-140

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9681	0.9982	0.8359	-0.12%	-0.01%	-0.29%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9681	0.9982	0.8360	-0.12%	-0.01%	-0.28%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9692	0.9983	0.8383	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9692	0.9983	0.8383	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9759	0.9983	0.8542	0.69%	0.00%	1.90%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9743	0.9983	0.8552	0.52%	-0.01%	2.01%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9742	0.9984	0.8608	0.52%	0.01%	2.68%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9742	0.9984	0.8608	0.52%	0.01%	2.69%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9788	0.9985	0.8761	0.99%	0.01%	4.50%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9790	0.9997	0.8933	1.01%	0.13%	6.56%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9790	0.9997	0.8934	1.01%	0.13%	6.57%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9792	0.9996	0.8954	1.03%	0.13%	6.81%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9792	0.9996	0.8954	1.03%	0.13%	6.81%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9813	0.9996	0.9017	1.25%	0.13%	7.56%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9813	0.9997	0.9019	1.25%	0.13%	7.59%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9829	0.9997	0.9132	1.41%	0.13%	8.93%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9829	0.9997	0.9132	1.41%	0.13%	8.94%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9846	0.9997	0.9173	1.59%	0.13%	9.42%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9870	0.9997	0.9338	1.84%	0.14%	11.39%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9870	0.9997	0.9338	1.84%	0.14%	11.39%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9873	0.9997	0.9339	1.87%	0.14%	11.40%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9876	0.9997	0.9365	1.89%	0.14%	11.71%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9876	0.9997	0.9365	1.89%	0.14%	11.71%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9878	0.9997	0.9365	1.92%	0.14%	11.72%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9893	0.9998	0.9450	2.07%	0.14%	12.73%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9893	0.9998	0.9450	2.07%	0.14%	12.73%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9895	0.9998	0.9478	2.09%	0.14%	13.06%

Table 4-141

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.983718741	0.996357143	0.874238125	0.15%	0.03%	-0.44%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.96988995	0.99485375	0.877815893	-1.26%	-0.12%	-0.03%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.982244332	0.996044554	0.877989732	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9699228	0.994857232	0.878003214	-1.26%	-0.12%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.982258988	0.996049554	0.878107946	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.975379209	0.995766607	0.882582232	-0.70%	-0.03%	0.51%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.97540618	0.995769286	0.882770179	-0.70%	-0.03%	0.53%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.971761369	0.995195268	0.886503125	-1.07%	-0.09%	0.96%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.976654245	0.996135893	0.890067589	-0.57%	0.01%	1.36%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.992945893	0.999347054	0.920530536	1.09%	0.33%	4.83%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.992490363	0.999333839	0.921225446	1.04%	0.33%	4.91%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.992495478	0.999334286	0.921282857	1.04%	0.33%	4.92%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.989363363	0.999194554	0.942135089	0.72%	0.32%	7.29%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.989374657	0.999195	0.942290893	0.72%	0.32%	7.31%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.989948952	0.999224375	0.94411	0.78%	0.32%	7.52%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.995125323	0.999457679	0.946680714	1.31%	0.34%	7.81%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.995088757	0.999456786	0.946989018	1.31%	0.34%	7.84%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.995091961	0.999457143	0.947044018	1.31%	0.34%	7.85%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.99124542	0.999315982	0.947911607	0.91%	0.33%	7.95%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.991254045	0.999316429	0.948010179	0.92%	0.33%	7.96%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.99168752	0.999329464	0.949772946	0.96%	0.33%	8.16%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.991866592	0.999252768	0.950678304	0.98%	0.32%	8.26%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.99187513	0.999253929	0.950740982	0.98%	0.32%	8.27%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.99194085	0.999254911	0.950841875	0.99%	0.32%	8.28%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.993310639	0.999351071	0.957678661	1.13%	0.33%	9.06%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.993315649	0.999351875	0.957706875	1.13%	0.33%	9.06%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.993374617	0.999360446	0.957792589	1.13%	0.33%	9.07%

Table 4-142

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9845	0.9997	0.9086	0.00%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9845	0.9997	0.9086	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9882	0.9997	0.9099	0.38%	0.00%	0.14%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9845	0.9997	0.9159	0.00%	0.00%	0.80%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9845	0.9997	0.9159	0.00%	0.00%	0.80%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9875	0.9998	0.9286	0.30%	0.01%	2.19%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9875	0.9998	0.9286	0.30%	0.01%	2.20%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9879	0.9997	0.9288	0.35%	0.00%	2.22%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9900	0.9998	0.9390	0.56%	0.01%	3.34%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9930	0.9998	0.9422	0.86%	0.01%	3.70%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9930	0.9998	0.9423	0.86%	0.01%	3.70%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9938	0.9998	0.9425	0.95%	0.01%	3.73%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9932	0.9998	0.9620	0.88%	0.01%	5.88%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9932	0.9998	0.9621	0.88%	0.01%	5.88%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9963	0.9999	0.9623	1.20%	0.01%	5.91%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9963	0.9999	0.9624	1.20%	0.01%	5.91%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9963	0.9998	0.9624	1.20%	0.01%	5.92%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9939	0.9998	0.9655	0.96%	0.01%	6.26%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9943	0.9998	0.9685	1.00%	0.01%	6.59%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9943	0.9998	0.9685	1.00%	0.01%	6.59%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9949	0.9998	0.9706	1.06%	0.01%	6.82%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9961	0.9998	0.9782	1.18%	0.01%	7.65%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9961	0.9998	0.9782	1.18%	0.01%	7.65%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9962	0.9998	0.9782	1.19%	0.01%	7.66%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9967	0.9998	0.9818	1.24%	0.01%	8.05%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9967	0.9998	0.9818	1.24%	0.01%	8.05%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9968	0.9998	0.9829	1.25%	0.01%	8.17%

Table 4-143					Percent From Baseline	
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.966113417	0.998777768	0.825985268	-0.09%	0.18%	-1.10%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.964651144	0.998230446	0.829388571	-0.24%	0.12%	-0.69%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.973749197	0.997980804	0.832526429	0.70%	0.10%	-0.31%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.967015327	0.997020714	0.835137768	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.960561494	0.995015268	0.836261607	-0.67%	-0.20%	0.13%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.968390086	0.994214018	0.851654643	0.14%	-0.28%	1.98%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.971836566	0.998145268	0.852148661	0.50%	0.11%	2.04%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.96822419	0.995269107	0.858269196	0.13%	-0.18%	2.77%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.981877994	0.99941625	0.865517321	1.54%	0.24%	3.64%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.979764531	0.999415446	0.865957411	1.32%	0.24%	3.69%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.979772692	0.999415982	0.866076161	1.32%	0.24%	3.70%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.973969061	0.996321429	0.869476071	0.72%	-0.07%	4.11%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.978251622	0.999378661	0.885514821	1.16%	0.24%	6.03%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.978267458	0.999379196	0.885637679	1.16%	0.24%	6.05%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.98030557	0.999375625	0.893179911	1.37%	0.24%	6.95%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.987091087	0.999371518	0.900054196	2.08%	0.24%	7.77%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.986891237	0.999370536	0.900292679	2.06%	0.24%	7.80%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.982411042	0.999482768	0.900377054	1.59%	0.25%	7.81%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.986896092	0.999370804	0.900385179	2.06%	0.24%	7.81%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.982423031	0.999483214	0.9004975	1.59%	0.25%	7.83%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.983951909	0.999495804	0.905504554	1.75%	0.25%	8.43%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.984109146	0.999295268	0.917215625	1.77%	0.23%	9.83%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.984119653	0.999295893	0.91725	1.77%	0.23%	9.83%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.984379193	0.999296875	0.917388839	1.80%	0.23%	9.85%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.986972129	0.999400446	0.927013125	2.06%	0.24%	11.00%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.986977857	0.999400804	0.927040804	2.06%	0.24%	11.00%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.987188704	0.999411339	0.930435804	2.09%	0.24%	11.41%

Table 4-149

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.941664839	0.998374464	0.703473125	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.941666355	0.998374464	0.703475536	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.945802251	0.998296964	0.739870268	0.44%	-0.01%	5.17%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.945803312	0.998296964	0.739876786	0.44%	-0.01%	5.17%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.954922576	0.998537054	0.743255714	1.41%	0.02%	5.65%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.957478146	0.998457321	0.766031429	1.68%	0.01%	8.89%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.957019234	0.998500089	0.789128839	1.63%	0.01%	12.18%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.957020109	0.998500089	0.789136696	1.63%	0.01%	12.18%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.965676637	0.998612679	0.809557589	2.55%	0.02%	15.08%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.981678895	0.99979	0.905391339	4.25%	0.14%	28.70%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.984649694	0.999850804	0.905395	4.56%	0.15%	28.70%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.983980014	0.999730357	0.914457679	4.49%	0.14%	29.99%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.983032958	0.999773304	0.915926518	4.39%	0.14%	30.20%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.985874233	0.999828661	0.91594	4.69%	0.15%	30.20%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.985068415	0.999697946	0.923041696	4.61%	0.13%	31.21%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.986146767	0.999789821	0.931802679	4.72%	0.14%	32.46%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.987736903	0.99972	0.935814554	4.89%	0.13%	33.03%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.988435874	0.999840357	0.942884286	4.97%	0.15%	34.03%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.992693204	0.999850804	0.957629911	5.42%	0.15%	36.13%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.992694684	0.999850804	0.957675804	5.42%	0.15%	36.13%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.992851258	0.999845893	0.958377857	5.44%	0.15%	36.23%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.993128704	0.999828661	0.966006607	5.47%	0.15%	37.32%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.993131651	0.999828661	0.966052411	5.47%	0.15%	37.33%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.993295382	0.999817411	0.9660725	5.48%	0.14%	37.33%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.994285459	0.999840357	0.972292946	5.59%	0.15%	38.21%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.994287478	0.999840357	0.972333304	5.59%	0.15%	38.22%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.994419389	0.999836964	0.974205714	5.60%	0.15%	38.48%

Table 5-6				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9957	0.9992	0.8480	0.01%	0.02%	-1.64%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9957	0.9990	0.8621	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9977	0.9997	0.8651	0.20%	0.07%	0.35%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9966	0.9997	0.8657	0.09%	0.06%	0.42%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9968	0.9997	0.8677	0.11%	0.06%	0.66%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9968	0.9997	0.8690	0.11%	0.06%	0.80%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8873	0.03%	0.04%	2.92%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8890	0.03%	0.04%	3.12%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8895	0.03%	0.04%	3.18%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9940	0.9991	0.8988	-0.16%	0.01%	4.26%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9972	0.9996	0.9004	0.15%	0.05%	4.44%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9946	0.9993	0.9072	-0.11%	0.03%	5.23%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9959	0.9997	0.9107	0.02%	0.07%	5.64%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9959	0.9997	0.9108	0.02%	0.07%	5.65%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9958	0.9997	0.9154	0.01%	0.06%	6.19%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9941	0.9995	0.9308	-0.15%	0.05%	7.97%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9941	0.9995	0.9308	-0.15%	0.05%	7.97%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9941	0.9995	0.9342	-0.16%	0.05%	8.37%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9952	0.9996	0.9533	-0.05%	0.05%	10.58%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9952	0.9996	0.9533	-0.05%	0.06%	10.58%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9952	0.9996	0.9533	-0.05%	0.06%	10.58%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9966	0.9998	0.9689	0.10%	0.07%	12.39%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9966	0.9998	0.9689	0.10%	0.07%	12.39%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9953	0.9993	0.9692	-0.04%	0.02%	12.43%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9956	0.9996	0.9710	0.00%	0.05%	12.63%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9965	0.9998	0.9711	0.09%	0.07%	12.64%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9978	0.9997	0.9824	0.21%	0.06%	13.95%

Table 5-8

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9882	0.9975	0.8481	-0.07%	0.00%	-0.88%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9889	0.9976	0.8557	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9889	0.9976	0.8558	0.00%	0.00%	0.02%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9948	0.9994	0.8808	0.59%	0.18%	2.93%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9949	0.9993	0.8829	0.61%	0.18%	3.18%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9949	0.9993	0.8830	0.61%	0.18%	3.19%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9801	0.9973	0.8971	-0.89%	-0.02%	4.85%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9801	0.9976	0.8979	-0.89%	0.00%	4.94%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9801	0.9976	0.8979	-0.89%	0.00%	4.94%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9841	0.9978	0.9019	-0.49%	0.02%	5.41%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9841	0.9978	0.9019	-0.49%	0.02%	5.41%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9949	0.9993	0.9062	0.60%	0.17%	5.91%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9949	0.9993	0.9071	0.60%	0.17%	6.01%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9949	0.9993	0.9072	0.60%	0.17%	6.02%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9838	0.9977	0.9158	-0.51%	0.02%	7.03%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9919	0.9992	0.9289	0.30%	0.17%	8.56%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9919	0.9992	0.9289	0.30%	0.17%	8.56%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9920	0.9993	0.9322	0.31%	0.17%	8.94%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9927	0.9993	0.9363	0.39%	0.18%	9.42%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9927	0.9993	0.9363	0.38%	0.17%	9.42%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9927	0.9993	0.9363	0.38%	0.17%	9.42%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9934	0.9994	0.9384	0.46%	0.18%	9.67%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9934	0.9994	0.9384	0.46%	0.18%	9.67%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9911	0.9991	0.9394	0.22%	0.16%	9.79%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9910	0.9991	0.9394	0.21%	0.16%	9.79%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9910	0.9991	0.9394	0.21%	0.16%	9.79%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9935	0.9994	0.9428	0.46%	0.18%	10.19%

Table 5-13

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9957	0.9992	0.8480	0.01%	0.02%	-1.64%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9957	0.9990	0.8621	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9977	0.9997	0.8651	0.20%	0.07%	0.35%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9966	0.9997	0.8657	0.09%	0.06%	0.42%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9968	0.9997	0.8677	0.11%	0.06%	0.66%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9968	0.9997	0.8690	0.11%	0.06%	0.80%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8873	0.03%	0.04%	2.92%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8890	0.03%	0.04%	3.12%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8895	0.03%	0.04%	3.18%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9940	0.9991	0.8988	-0.16%	0.01%	4.26%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9972	0.9996	0.9004	0.15%	0.05%	4.44%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9946	0.9993	0.9072	-0.11%	0.03%	5.23%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9959	0.9997	0.9107	0.02%	0.07%	5.64%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9959	0.9997	0.9108	0.02%	0.07%	5.65%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9958	0.9997	0.9154	0.01%	0.06%	6.19%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9941	0.9995	0.9308	-0.15%	0.05%	7.97%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9941	0.9995	0.9308	-0.15%	0.05%	7.97%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9941	0.9995	0.9342	-0.16%	0.05%	8.37%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9952	0.9996	0.9533	-0.05%	0.05%	10.58%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9952	0.9996	0.9533	-0.05%	0.06%	10.58%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9952	0.9996	0.9533	-0.05%	0.06%	10.58%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9966	0.9998	0.9689	0.10%	0.07%	12.39%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9966	0.9998	0.9689	0.10%	0.07%	12.39%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9953	0.9993	0.9692	-0.04%	0.02%	12.43%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9956	0.9996	0.9710	0.00%	0.05%	12.63%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9965	0.9998	0.9711	0.09%	0.07%	12.64%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9978	0.9997	0.9824	0.21%	0.06%	13.95%

Table 5-18

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9930	0.9987	0.8207	0.09%	0.00%	-0.42%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9921	0.9987	0.8242	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9959	0.9994	0.8274	0.38%	0.07%	0.40%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9950	0.9996	0.8400	0.29%	0.09%	1.93%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9950	0.9995	0.8450	0.30%	0.08%	2.53%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9950	0.9995	0.8453	0.30%	0.08%	2.56%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9938	0.9993	0.8697	0.17%	0.06%	5.52%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9938	0.9993	0.8715	0.17%	0.06%	5.75%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9938	0.9993	0.8719	0.17%	0.06%	5.79%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9883	0.9987	0.8861	-0.39%	-0.01%	7.51%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9945	0.9994	0.8891	0.25%	0.07%	7.88%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9902	0.9986	0.9005	-0.18%	-0.02%	9.26%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9926	0.9995	0.9012	0.05%	0.08%	9.35%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9926	0.9995	0.9012	0.05%	0.08%	9.35%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9929	0.9996	0.9063	0.08%	0.09%	9.97%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9918	0.9995	0.9201	-0.03%	0.08%	11.64%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9917	0.9994	0.9201	-0.03%	0.07%	11.64%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9918	0.9994	0.9201	-0.03%	0.07%	11.64%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9895	0.9992	0.9227	-0.26%	0.05%	11.95%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9895	0.9992	0.9227	-0.26%	0.05%	11.95%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9895	0.9992	0.9266	-0.26%	0.05%	12.43%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9914	0.9991	0.9405	-0.07%	0.04%	14.11%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9943	0.9997	0.9414	0.22%	0.09%	14.23%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9943	0.9997	0.9414	0.22%	0.09%	14.23%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9926	0.9995	0.9451	0.05%	0.08%	14.67%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9945	0.9997	0.9471	0.24%	0.10%	14.92%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9959	0.9996	0.9649	0.39%	0.09%	17.08%

Table 5-20

					Percent From Baseline	
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.996284014	0.999493839	0.819094732	0.03%	0.01%	-1.71%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.996001525	0.999351786	0.833306161	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.997938919	0.999889732	0.835145536	0.19%	0.05%	0.22%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.997014392	0.999775714	0.844365089	0.10%	0.04%	1.33%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.997129912	0.999778571	0.851169911	0.11%	0.04%	2.14%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.99713059	0.999778571	0.851394554	0.11%	0.04%	2.17%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.996159398	0.999590268	0.873364554	0.02%	0.02%	4.81%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.996173049	0.999590268	0.876776071	0.02%	0.02%	5.22%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.996173898	0.999590268	0.877001607	0.02%	0.02%	5.24%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.99462228	0.999312411	0.893904732	-0.14%	0.00%	7.27%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.997551848	0.999697946	0.895441161	0.16%	0.03%	7.46%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.995321335	0.999544643	0.902624554	-0.07%	0.02%	8.32%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.996310744	0.999808125	0.906965089	0.03%	0.05%	8.84%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.996311494	0.999808125	0.906972857	0.03%	0.05%	8.84%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.996308444	0.999785893	0.911140536	0.03%	0.04%	9.34%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.994368748	0.999614821	0.927865	-0.16%	0.03%	11.35%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.994369742	0.999614821	0.927869107	-0.16%	0.03%	11.35%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.994374049	0.999614821	0.930953661	-0.16%	0.03%	11.72%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.995459771	0.999664554	0.951599375	-0.05%	0.03%	14.20%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.995449213	0.999666607	0.951600714	-0.06%	0.03%	14.20%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.995450062	0.999666607	0.951602054	-0.06%	0.03%	14.20%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.997053594	0.999836696	0.967764821	0.11%	0.05%	16.14%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.997054267	0.999836696	0.967765714	0.11%	0.05%	16.14%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.995895039	0.999565089	0.969539375	-0.01%	0.02%	16.35%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.99703939	0.999836518	0.970367857	0.10%	0.05%	16.45%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.996340335	0.999848661	0.9716125	0.03%	0.05%	16.60%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998130903	0.999864018	0.982070179	0.21%	0.05%	17.85%

Table 5-21

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9958	0.9994	0.8390	-0.04%	0.00%	-1.97%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9963	0.9994	0.8559	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9963	0.9994	0.8561	0.00%	0.00%	0.03%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9968	0.9997	0.8599	0.06%	0.03%	0.48%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9970	0.9997	0.8645	0.08%	0.04%	1.01%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9970	0.9997	0.8647	0.08%	0.04%	1.04%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9962	0.9995	0.8831	-0.01%	0.02%	3.18%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9962	0.9995	0.8854	0.00%	0.02%	3.45%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9962	0.9995	0.8856	0.00%	0.02%	3.47%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9950	0.9993	0.8977	-0.12%	-0.01%	4.89%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9950	0.9993	0.8978	-0.12%	-0.01%	4.89%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9948	0.9992	0.9057	-0.15%	-0.02%	5.82%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9963	0.9997	0.9098	0.00%	0.04%	6.30%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9963	0.9997	0.9098	0.00%	0.04%	6.30%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9962	0.9997	0.9140	-0.01%	0.03%	6.79%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9946	0.9995	0.9302	-0.16%	0.02%	8.68%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9946	0.9995	0.9302	-0.16%	0.02%	8.68%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9946	0.9995	0.9332	-0.16%	0.02%	9.04%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9956	0.9996	0.9567	-0.07%	0.02%	11.78%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9956	0.9996	0.9567	-0.07%	0.03%	11.78%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9956	0.9996	0.9567	-0.07%	0.03%	11.78%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9970	0.9998	0.9716	0.07%	0.04%	13.52%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9970	0.9998	0.9716	0.07%	0.04%	13.52%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9961	0.9995	0.9731	-0.02%	0.01%	13.70%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9961	0.9995	0.9731	-0.02%	0.01%	13.70%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9969	0.9998	0.9735	0.06%	0.04%	13.74%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9959	0.9993	0.9746	-0.04%	0.00%	13.88%

Table 5-23

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.999498375	0.999988929	0.917499375	-0.01%	0.00%	-1.21%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.999164606	0.999958214	0.917812054	-0.04%	0.00%	-1.18%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.999261661	0.999961696	0.920882857	-0.03%	0.00%	-0.85%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.999261771	0.999961696	0.920936696	-0.03%	0.00%	-0.84%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998860309	0.99989875	0.927982946	-0.07%	-0.01%	-0.08%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.999551813	0.999971071	0.928769196	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.999730341	0.999995089	0.929015625	0.02%	0.00%	0.03%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998873497	0.99989875	0.929764196	-0.07%	-0.01%	0.11%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998873651	0.99989875	0.929835	-0.07%	-0.01%	0.11%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.999577113	0.999973125	0.949855179	0.00%	0.00%	2.27%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.999767954	0.999994911	0.949949018	0.02%	0.00%	2.28%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.999553738	0.999979286	0.951565536	0.00%	0.00%	2.45%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.999200692	0.9999575	0.952728482	-0.04%	0.00%	2.58%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.999281303	0.999959821	0.95292	-0.03%	0.00%	2.60%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.99928145	0.999959821	0.952921429	-0.03%	0.00%	2.60%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.998765904	0.999889375	0.962843036	-0.08%	-0.01%	3.67%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.998786855	0.999893214	0.963043839	-0.08%	-0.01%	3.69%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998787013	0.999893214	0.963044375	-0.08%	-0.01%	3.69%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.998884467	0.999907054	0.986405982	-0.07%	-0.01%	6.21%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998902751	0.999910268	0.986406071	-0.06%	-0.01%	6.21%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998902895	0.999910268	0.986406161	-0.06%	-0.01%	6.21%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.99934252	0.99996625	0.992370089	-0.02%	0.00%	6.85%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.999342628	0.99996625	0.992370179	-0.02%	0.00%	6.85%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.999267804	0.999964286	0.992960804	-0.03%	0.00%	6.91%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.999659419	0.999985268	0.995100089	0.01%	0.00%	7.14%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.999623774	0.999980714	0.995474732	0.01%	0.00%	7.18%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.999795307	0.999994107	0.997215179	0.02%	0.00%	7.37%

Table 5-29

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9808	0.9949	0.8523	-0.11%	0.02%	-0.83%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9644	0.9928	0.8525	-1.79%	-0.18%	-0.81%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9645	0.9931	0.8535	-1.78%	-0.16%	-0.69%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9645	0.9931	0.8535	-1.78%	-0.16%	-0.69%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9819	0.9947	0.8594	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9819	0.9947	0.8594	0.00%	0.00%	0.01%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9715	0.9949	0.8601	-1.06%	0.02%	0.08%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9715	0.9949	0.8601	-1.06%	0.02%	0.09%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9710	0.9944	0.8762	-1.11%	-0.02%	1.95%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9929	0.9988	0.8852	1.12%	0.42%	3.00%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9931	0.9988	0.8871	1.14%	0.41%	3.22%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9931	0.9988	0.8871	1.14%	0.41%	3.22%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9932	0.9988	0.9086	1.15%	0.41%	5.72%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9933	0.9988	0.9094	1.16%	0.41%	5.81%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9933	0.9988	0.9094	1.16%	0.41%	5.82%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9893	0.9981	0.9216	0.75%	0.34%	7.24%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9893	0.9980	0.9216	0.75%	0.34%	7.24%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9893	0.9980	0.9216	0.75%	0.34%	7.24%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9900	0.9982	0.9225	0.82%	0.36%	7.34%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9900	0.9982	0.9225	0.82%	0.36%	7.34%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9869	0.9979	0.9237	0.51%	0.33%	7.48%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9868	0.9979	0.9237	0.50%	0.33%	7.48%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9868	0.9979	0.9237	0.50%	0.33%	7.48%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9901	0.9982	0.9272	0.83%	0.35%	7.89%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9877	0.9981	0.9290	0.59%	0.35%	8.10%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9877	0.9981	0.9290	0.59%	0.35%	8.10%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9879	0.9981	0.9327	0.61%	0.35%	8.53%

Table 5-30

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9808	0.9949	0.8458	-0.10%	0.02%	-1.05%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9647	0.9931	0.8531	-1.74%	-0.16%	-0.20%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9647	0.9931	0.8542	-1.74%	-0.16%	-0.06%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9647	0.9931	0.8542	-1.74%	-0.16%	-0.06%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9818	0.9947	0.8547	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9818	0.9947	0.8548	0.00%	0.00%	0.01%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9718	0.9951	0.8606	-1.01%	0.04%	0.69%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9718	0.9951	0.8606	-1.01%	0.04%	0.69%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9714	0.9946	0.8772	-1.05%	-0.01%	2.63%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9930	0.9988	0.8821	1.14%	0.41%	3.20%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9932	0.9987	0.8845	1.16%	0.41%	3.48%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9932	0.9987	0.8845	1.16%	0.41%	3.48%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9932	0.9987	0.9066	1.16%	0.41%	6.07%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9932	0.9987	0.9078	1.17%	0.41%	6.20%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9932	0.9987	0.9078	1.17%	0.41%	6.20%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9894	0.9981	0.9219	0.77%	0.34%	7.85%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9893	0.9980	0.9219	0.77%	0.33%	7.85%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9893	0.9980	0.9219	0.77%	0.33%	7.85%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9902	0.9983	0.9228	0.85%	0.36%	7.96%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9902	0.9983	0.9228	0.85%	0.36%	7.96%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9870	0.9978	0.9233	0.53%	0.32%	8.02%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9869	0.9978	0.9233	0.52%	0.32%	8.02%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9869	0.9978	0.9233	0.52%	0.32%	8.02%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9902	0.9982	0.9279	0.86%	0.36%	8.55%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9879	0.9981	0.9291	0.62%	0.35%	8.70%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9879	0.9981	0.9291	0.62%	0.35%	8.70%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9881	0.9980	0.9324	0.64%	0.34%	9.09%

Table 5-33

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	Percent From Baseline ER (Max-based)	Percent From Baseline ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.995998837	0.999595625	0.853071964	-0.04%	0.00%	-1.06%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.996435768	0.999599375	0.862196161	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.996436112	0.999599375	0.862295625	0.00%	0.00%	0.01%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.995187649	0.999583036	0.909757946	-0.13%	0.00%	5.52%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.995188101	0.999583036	0.909759196	-0.13%	0.00%	5.52%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998353184	0.999864554	0.912943214	0.19%	0.03%	5.89%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998454349	0.999860357	0.915258482	0.20%	0.03%	6.15%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998454431	0.999860357	0.915282411	0.20%	0.03%	6.16%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.99493821	0.999595089	0.916217411	-0.15%	0.00%	6.27%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998219745	0.999823214	0.919472946	0.18%	0.02%	6.64%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.99823185	0.99982	0.921211339	0.18%	0.02%	6.84%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.99823194	0.99982	0.921252411	0.18%	0.02%	6.85%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998093164	0.999829107	0.9508275	0.17%	0.02%	10.28%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.998147505	0.999831339	0.951034196	0.17%	0.02%	10.30%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.998147593	0.999831339	0.951034554	0.17%	0.02%	10.30%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.997751633	0.999779464	0.956686964	0.13%	0.02%	10.96%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.997759171	0.999779464	0.95689	0.13%	0.02%	10.98%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.997759271	0.999779464	0.956890357	0.13%	0.02%	10.98%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.996100615	0.999668125	0.963514554	-0.03%	0.01%	11.75%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.996101003	0.999668125	0.963515089	-0.03%	0.01%	11.75%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.995856121	0.999690446	0.969174196	-0.06%	0.01%	12.41%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.99812138	0.999810625	0.972915179	0.17%	0.02%	12.84%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998127866	0.999815268	0.972915357	0.17%	0.02%	12.84%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998127947	0.999815268	0.972915446	0.17%	0.02%	12.84%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.998454254	0.999860179	0.977435179	0.20%	0.03%	13.37%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998454336	0.999860179	0.977435357	0.20%	0.03%	13.37%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998393657	0.999856071	0.979292768	0.20%	0.03%	13.58%

Table 5-38

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.987909994	0.997382679	0.849492768	-0.08%	0.00%	-0.87%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.988657502	0.997397411	0.856986696	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.988657945	0.997397679	0.857035089	0.00%	0.00%	0.01%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.994917005	0.99942125	0.869846786	0.63%	0.20%	1.50%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.995116635	0.999397946	0.872503214	0.65%	0.20%	1.81%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.995116764	0.999397946	0.872528036	0.65%	0.20%	1.81%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.994740506	0.999315982	0.88141875	0.62%	0.19%	2.85%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.994757608	0.999315982	0.883201607	0.62%	0.19%	3.06%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.994757713	0.999315982	0.883216607	0.62%	0.19%	3.06%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.979453496	0.997250446	0.894663214	-0.93%	-0.01%	4.40%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.979485307	0.997537589	0.895513929	-0.93%	0.01%	4.50%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.979485997	0.997537589	0.895517321	-0.93%	0.01%	4.50%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.983613872	0.997581071	0.900040179	-0.51%	0.02%	5.02%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.983614442	0.99758125	0.900041964	-0.51%	0.02%	5.02%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.983335386	0.997569375	0.913493036	-0.54%	0.02%	6.59%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.992613896	0.999320804	0.917714107	0.40%	0.19%	7.09%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.992614068	0.999320804	0.917714732	0.40%	0.19%	7.09%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.992653865	0.999361161	0.921896339	0.40%	0.20%	7.57%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.991575932	0.999210625	0.927557232	0.30%	0.18%	8.23%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.99157609	0.999210625	0.927557679	0.30%	0.18%	8.23%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.991591694	0.999210625	0.931158839	0.30%	0.18%	8.65%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.993215409	0.999381161	0.937314554	0.46%	0.20%	9.37%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9931952	0.999344196	0.937315089	0.46%	0.20%	9.37%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.993195312	0.999344196	0.937315179	0.46%	0.20%	9.37%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.994041722	0.99943125	0.944594107	0.54%	0.20%	10.22%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.994041872	0.99943125	0.944594554	0.54%	0.20%	10.22%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.994039643	0.999468393	0.948629375	0.54%	0.21%	10.69%

Table 5-39

				Percent From Baseline		
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9977	0.9998	0.8417	-0.02%	0.00%	-1.82%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9980	0.9998	0.8573	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9980	0.9998	0.8579	0.00%	0.00%	0.06%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9976	0.9997	0.9031	-0.04%	-0.01%	5.34%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9976	0.9997	0.9032	-0.04%	-0.01%	5.35%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9984	0.9998	0.9085	0.04%	0.01%	5.97%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9984	0.9999	0.9112	0.05%	0.01%	6.28%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9984	0.9999	0.9113	0.05%	0.01%	6.30%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9975	0.9997	0.9114	-0.05%	0.00%	6.31%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9978	0.9997	0.9206	-0.02%	0.00%	7.38%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9978	0.9997	0.9219	-0.01%	-0.01%	7.53%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9978	0.9997	0.9221	-0.01%	-0.01%	7.56%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9981	0.9999	0.9454	0.01%	0.01%	10.27%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9981	0.9999	0.9455	0.01%	0.01%	10.29%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9981	0.9999	0.9456	0.01%	0.01%	10.29%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9970	0.9997	0.9572	-0.10%	0.00%	11.65%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9970	0.9997	0.9573	-0.10%	0.00%	11.67%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9970	0.9997	0.9573	-0.10%	0.00%	11.67%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9976	0.9998	0.9654	-0.04%	0.00%	12.60%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9976	0.9998	0.9654	-0.04%	0.00%	12.60%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9976	0.9998	0.9654	-0.04%	0.00%	12.60%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9985	0.9999	0.9780	0.05%	0.01%	14.08%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9985	0.9999	0.9780	0.05%	0.01%	14.08%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9985	0.9999	0.9800	0.05%	0.01%	14.31%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9981	0.9998	0.9832	0.01%	0.00%	14.68%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9981	0.9998	0.9832	0.01%	0.00%	14.68%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9980	0.9997	0.9845	0.00%	-0.01%	14.83%

Table 5-41

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9980	0.9999	0.8457	-0.03%	0.00%	-1.68%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9983	0.9998	0.8602	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9983	0.9998	0.8609	0.00%	0.00%	0.08%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9981	0.9999	0.9005	-0.02%	0.00%	4.69%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9981	0.9999	0.9005	-0.02%	0.00%	4.69%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9979	0.9999	0.9089	-0.04%	0.00%	5.67%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9985	0.9999	0.9099	0.02%	0.00%	5.78%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9986	0.9999	0.9116	0.03%	0.00%	5.97%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9986	0.9999	0.9117	0.03%	0.00%	5.98%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9981	0.9998	0.9211	-0.02%	0.00%	7.08%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9981	0.9998	0.9224	-0.02%	-0.01%	7.23%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9981	0.9998	0.9226	-0.02%	-0.01%	7.25%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9984	0.9999	0.9444	0.01%	0.00%	9.78%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9984	0.9999	0.9446	0.01%	0.00%	9.81%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9984	0.9999	0.9446	0.01%	0.00%	9.81%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9975	0.9998	0.9564	-0.08%	-0.01%	11.19%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9975	0.9998	0.9567	-0.08%	-0.01%	11.22%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9975	0.9998	0.9567	-0.08%	-0.01%	11.22%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9979	0.9998	0.9711	-0.04%	0.00%	12.89%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9979	0.9998	0.9711	-0.03%	0.00%	12.89%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9979	0.9998	0.9711	-0.03%	0.00%	12.89%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9987	0.9999	0.9822	0.04%	0.01%	14.18%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9987	0.9999	0.9822	0.04%	0.01%	14.18%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9986	0.9999	0.9837	0.03%	0.00%	14.35%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9983	0.9999	0.9860	0.00%	0.00%	14.62%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9985	0.9999	0.9864	0.02%	0.00%	14.67%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9985	0.9999	0.9864	0.02%	0.00%	14.67%

Table 5-42

				Percent From Baseline		
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998332906	0.999879643	0.853441518	0.00%	0.00%	-1.43%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998320092	0.999864018	0.865857411	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.998152322	0.999890714	0.902454643	-0.02%	0.00%	4.23%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998300953	0.999881607	0.911190268	0.00%	0.00%	5.24%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998499725	0.999894821	0.912758125	0.02%	0.00%	5.42%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.99860929	0.999889464	0.913284196	0.03%	0.00%	5.48%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998609448	0.999889464	0.91330375	0.03%	0.00%	5.48%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998096898	0.999808125	0.923120714	-0.02%	-0.01%	6.61%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.999259167	0.999955982	0.923503661	0.09%	0.01%	6.66%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998110125	0.999803393	0.924230446	-0.02%	-0.01%	6.74%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998110361	0.999803393	0.924270179	-0.02%	-0.01%	6.75%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.999244171	0.999965179	0.941780714	0.09%	0.01%	8.77%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998360514	0.999865982	0.945439196	0.00%	0.00%	9.19%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.998425252	0.999874018	0.945716161	0.01%	0.00%	9.22%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.998425457	0.999874018	0.945717679	0.01%	0.00%	9.22%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.997572498	0.999767946	0.957284464	-0.07%	-0.01%	10.56%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.997582271	0.999767946	0.957549732	-0.07%	-0.01%	10.59%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.997582535	0.999767946	0.957550446	-0.07%	-0.01%	10.59%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.997972614	0.999799911	0.971576696	-0.03%	-0.01%	12.21%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.997980568	0.999804464	0.971577054	-0.03%	-0.01%	12.21%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.997980796	0.999804464	0.971577321	-0.03%	-0.01%	12.21%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.998680853	0.999895625	0.982493661	0.04%	0.00%	13.47%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998681013	0.999895625	0.982493839	0.04%	0.00%	13.47%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.99861265	0.9998925	0.984016339	0.03%	0.00%	13.65%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.998502089	0.999909018	0.986891964	0.02%	0.00%	13.98%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998604865	0.999927143	0.987824018	0.03%	0.01%	14.09%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.999406085	0.999973125	0.992174107	0.11%	0.01%	14.59%

Table 5-43

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998252001	0.999885357	0.840781607	-0.02%	0.00%	-1.97%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998472864	0.999872857	0.857664821	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998473	0.999872857	0.857756607	0.00%	0.00%	0.01%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.99832936	0.999885268	0.902763929	-0.01%	0.00%	5.26%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.998329485	0.999885268	0.902766964	-0.01%	0.00%	5.26%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998651994	0.999908393	0.909064464	0.02%	0.00%	5.99%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998204865	0.999893571	0.911024018	-0.03%	0.00%	6.22%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998738147	0.999902143	0.911954464	0.03%	0.00%	6.33%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998738226	0.999902143	0.911984821	0.03%	0.00%	6.33%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998188546	0.99981875	0.920834286	-0.03%	-0.01%	7.37%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998200171	0.999814732	0.922410625	-0.03%	-0.01%	7.55%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998200311	0.999814732	0.922462589	-0.03%	-0.01%	7.56%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998528349	0.999882857	0.945742143	0.01%	0.00%	10.27%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.998574979	0.999886607	0.945939643	0.01%	0.00%	10.29%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.998575066	0.999886607	0.945940089	0.01%	0.00%	10.29%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.997685674	0.999773036	0.957473214	-0.08%	-0.01%	11.64%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.997691818	0.999773036	0.957675179	-0.08%	-0.01%	11.66%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.997691974	0.999773036	0.957675893	-0.08%	-0.01%	11.66%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.998067577	0.999807411	0.971761786	-0.04%	-0.01%	13.30%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998073078	0.999812589	0.971762054	-0.04%	-0.01%	13.30%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998073215	0.999812589	0.971762232	-0.04%	-0.01%	13.30%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.998815111	0.999909196	0.982665893	0.03%	0.00%	14.57%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998815181	0.999909196	0.982665982	0.03%	0.00%	14.57%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.99876293	0.999905893	0.984239375	0.03%	0.00%	14.76%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.998666818	0.99990875	0.987067321	0.02%	0.00%	15.09%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998666929	0.99990875	0.9870675	0.02%	0.00%	15.09%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998549561	0.999921696	0.98729	0.01%	0.00%	15.11%

Table 5-57

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	Percent From Baseline ER (Max-based)	Percent From Baseline ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9884	0.9975	0.8404	-0.07%	0.00%	-1.27%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9892	0.9975	0.8511	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9892	0.9975	0.8512	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9953	0.9993	0.8892	0.62%	0.18%	4.48%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9955	0.9993	0.8925	0.64%	0.18%	4.86%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9955	0.9993	0.8925	0.64%	0.18%	4.86%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9806	0.9975	0.9032	-0.86%	0.00%	6.12%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9806	0.9975	0.9032	-0.86%	0.00%	6.12%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9804	0.9972	0.9058	-0.89%	-0.03%	6.42%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9844	0.9977	0.9123	-0.48%	0.01%	7.19%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9844	0.9977	0.9123	-0.48%	0.01%	7.19%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9841	0.9977	0.9208	-0.51%	0.02%	8.19%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9964	0.9994	0.9364	0.73%	0.19%	10.01%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9964	0.9994	0.9375	0.73%	0.19%	10.15%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9964	0.9994	0.9375	0.73%	0.19%	10.15%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9925	0.9992	0.9390	0.34%	0.17%	10.32%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9925	0.9992	0.9390	0.34%	0.17%	10.32%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9925	0.9992	0.9411	0.34%	0.17%	10.57%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9939	0.9993	0.9448	0.48%	0.18%	11.00%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9939	0.9993	0.9448	0.48%	0.18%	11.00%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9939	0.9993	0.9479	0.48%	0.18%	11.37%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9934	0.9993	0.9538	0.43%	0.17%	12.06%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9934	0.9993	0.9538	0.43%	0.17%	12.06%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9934	0.9993	0.9538	0.43%	0.17%	12.06%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9946	0.9994	0.9572	0.55%	0.19%	12.46%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9946	0.9994	0.9572	0.55%	0.18%	12.46%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9946	0.9994	0.9572	0.55%	0.18%	12.46%

Table 5-61

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.993714966	0.998806429	0.859173125	-0.06%	0.01%	-1.15%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.994294527	0.998740268	0.869142411	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.994294678	0.998740268	0.869164554	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.997038902	0.999636071	0.877730982	0.28%	0.09%	0.99%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.997221988	0.999660536	0.881585893	0.29%	0.09%	1.43%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.997222051	0.999660536	0.881601964	0.29%	0.09%	1.43%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.996890309	0.999584821	0.888860893	0.26%	0.08%	2.27%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.996911447	0.999584821	0.8917525	0.26%	0.08%	2.60%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.996911512	0.999584821	0.891769643	0.26%	0.08%	2.60%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.99102526	0.998713571	0.914587589	-0.33%	0.00%	5.23%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.991025473	0.998713571	0.914588304	-0.33%	0.00%	5.23%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.990740073	0.998441607	0.920496429	-0.36%	-0.03%	5.91%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.99646884	0.999658839	0.927403304	0.22%	0.09%	6.70%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.99646891	0.999658839	0.927403571	0.22%	0.09%	6.70%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.996369425	0.999637232	0.930002589	0.21%	0.09%	7.00%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.995848504	0.999574286	0.936378304	0.16%	0.08%	7.74%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.995848577	0.999574286	0.936378571	0.16%	0.08%	7.74%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.995834475	0.999574286	0.938588839	0.15%	0.08%	7.99%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.99267601	0.998836071	0.946407589	-0.16%	0.01%	8.89%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.992676199	0.998836161	0.946408125	-0.16%	0.01%	8.89%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.992361656	0.998788393	0.953305179	-0.19%	0.00%	9.68%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.996509119	0.999620893	0.964141071	0.22%	0.09%	10.93%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.996519159	0.999633125	0.96414125	0.22%	0.09%	10.93%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.996519223	0.999633125	0.964141339	0.22%	0.09%	10.93%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.99704152	0.999708214	0.969532946	0.28%	0.10%	11.55%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.997041581	0.999708214	0.969533125	0.28%	0.10%	11.55%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.996937771	0.999696964	0.971620982	0.27%	0.10%	11.79%

Table 5-72

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	Percent From Baseline ER (Max-based)	Percent From Baseline ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9989	0.9999	0.8348	0.01%	0.00%	-2.52%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9989	0.9999	0.8564	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9990	0.9999	0.8564	0.02%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9991	1.0000	0.9019	0.02%	0.00%	5.31%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9991	1.0000	0.9019	0.02%	0.00%	5.31%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9990	0.9999	0.9095	0.01%	0.00%	6.20%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9991	1.0000	0.9098	0.02%	0.00%	6.23%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9991	1.0000	0.9132	0.03%	0.00%	6.63%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9991	1.0000	0.9132	0.02%	0.00%	6.63%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9988	0.9999	0.9213	-0.01%	0.00%	7.57%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9987	0.9999	0.9232	-0.02%	-0.01%	7.80%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9987	0.9999	0.9233	-0.02%	-0.01%	7.80%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9991	1.0000	0.9466	0.02%	0.00%	10.53%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9992	1.0000	0.9468	0.03%	0.00%	10.55%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9991	1.0000	0.9468	0.02%	0.00%	10.55%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9986	0.9999	0.9581	-0.02%	-0.01%	11.87%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9985	0.9999	0.9583	-0.04%	-0.01%	11.90%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9985	0.9999	0.9583	-0.04%	-0.01%	11.90%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9988	0.9999	0.9822	-0.01%	0.00%	14.68%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9987	0.9999	0.9822	-0.02%	0.00%	14.68%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9987	0.9999	0.9822	-0.02%	0.00%	14.68%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9993	1.0000	0.9897	0.04%	0.00%	15.56%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9992	1.0000	0.9897	0.04%	0.00%	15.57%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9992	1.0000	0.9897	0.03%	0.00%	15.57%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9992	1.0000	0.9906	0.03%	0.00%	15.67%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9992	1.0000	0.9912	0.03%	0.00%	15.74%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9992	1.0000	0.9925	0.04%	0.00%	15.89%

Table 5-73

					Percent From Baseline	
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9959	0.9993	0.8519	0.01%	0.02%	-1.56%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9958	0.9991	0.8654	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9977	0.9997	0.8669	0.19%	0.06%	0.17%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9966	0.9996	0.8672	0.08%	0.06%	0.21%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9968	0.9997	0.8708	0.10%	0.06%	0.63%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9968	0.9997	0.8709	0.10%	0.06%	0.63%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8882	0.02%	0.04%	2.64%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8901	0.02%	0.04%	2.85%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9960	0.9995	0.8902	0.02%	0.04%	2.87%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9942	0.9992	0.9018	-0.16%	0.01%	4.21%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9973	0.9996	0.9033	0.15%	0.05%	4.38%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9948	0.9994	0.9102	-0.11%	0.03%	5.18%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9959	0.9997	0.9132	0.01%	0.06%	5.53%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9959	0.9997	0.9132	0.01%	0.06%	5.53%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9958	0.9997	0.9179	0.00%	0.06%	6.07%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9941	0.9995	0.9327	-0.17%	0.04%	7.78%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9941	0.9995	0.9327	-0.17%	0.04%	7.78%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9941	0.9995	0.9361	-0.17%	0.04%	8.17%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9952	0.9996	0.9526	-0.06%	0.05%	10.08%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9952	0.9996	0.9526	-0.06%	0.05%	10.08%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9952	0.9996	0.9526	-0.06%	0.05%	10.08%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9966	0.9998	0.9683	0.08%	0.07%	11.90%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9966	0.9998	0.9684	0.08%	0.07%	11.90%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9954	0.9993	0.9696	-0.04%	0.02%	12.05%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9965	0.9998	0.9706	0.07%	0.07%	12.16%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9957	0.9996	0.9714	-0.01%	0.05%	12.25%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9978	0.9997	0.9825	0.20%	0.06%	13.54%

Table 5-76

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9677	0.9943	0.8601	-1.90%	-0.20%	-4.59%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9739	0.9953	0.8624	-1.27%	-0.10%	-4.33%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9765	0.9966	0.8775	-1.00%	0.02%	-2.66%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9714	0.9945	0.8786	-1.52%	-0.18%	-2.54%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9851	0.9974	0.8989	-0.14%	0.11%	-0.29%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9864	0.9963	0.9015	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9816	0.9968	0.9029	-0.49%	0.05%	0.16%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9873	0.9972	0.9030	0.08%	0.09%	0.17%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9914	0.9983	0.9059	0.50%	0.19%	0.49%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9881	0.9987	0.9286	0.17%	0.23%	3.01%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9880	0.9987	0.9286	0.16%	0.23%	3.01%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9880	0.9987	0.9286	0.16%	0.23%	3.01%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9904	0.9989	0.9365	0.40%	0.25%	3.89%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9903	0.9989	0.9365	0.40%	0.25%	3.89%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9903	0.9989	0.9365	0.40%	0.25%	3.89%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9909	0.9991	0.9420	0.45%	0.28%	4.49%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9907	0.9990	0.9425	0.43%	0.27%	4.55%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9907	0.9990	0.9425	0.43%	0.27%	4.55%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9925	0.9992	0.9450	0.61%	0.29%	4.83%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9925	0.9992	0.9450	0.61%	0.29%	4.83%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9955	0.9994	0.9471	0.92%	0.30%	5.06%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9955	0.9994	0.9471	0.92%	0.30%	5.06%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9955	0.9994	0.9477	0.92%	0.31%	5.13%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9948	0.9992	0.9481	0.84%	0.29%	5.17%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9948	0.9992	0.9481	0.84%	0.29%	5.17%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9926	0.9992	0.9486	0.62%	0.29%	5.23%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9948	0.9992	0.9488	0.85%	0.29%	5.25%

Table 5-85

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9980	0.9999	0.8494	-0.03%	0.00%	-1.50%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9983	0.9999	0.8624	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9983	0.9999	0.8638	0.00%	0.00%	0.16%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9981	0.9999	0.9016	-0.02%	0.00%	4.54%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9981	0.9999	0.9016	-0.02%	0.00%	4.54%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9980	0.9999	0.9103	-0.03%	0.00%	5.55%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9985	0.9999	0.9112	0.02%	0.00%	5.66%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9986	0.9999	0.9125	0.03%	0.00%	5.81%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9986	0.9999	0.9128	0.03%	0.00%	5.84%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9981	0.9998	0.9223	-0.02%	-0.01%	6.94%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9981	0.9998	0.9234	-0.02%	-0.01%	7.07%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9981	0.9998	0.9236	-0.02%	-0.01%	7.09%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9983	0.9999	0.9447	0.00%	0.00%	9.54%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9984	0.9999	0.9449	0.01%	0.00%	9.57%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9984	0.9999	0.9449	0.01%	0.00%	9.57%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9975	0.9998	0.9567	-0.08%	-0.01%	10.93%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9975	0.9998	0.9569	-0.08%	-0.01%	10.96%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9975	0.9998	0.9569	-0.08%	-0.01%	10.96%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9979	0.9998	0.9705	-0.04%	-0.01%	12.53%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9979	0.9998	0.9705	-0.04%	-0.01%	12.53%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9979	0.9998	0.9705	-0.04%	-0.01%	12.53%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9987	0.9999	0.9817	0.04%	0.00%	13.84%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9987	0.9999	0.9817	0.04%	0.00%	13.84%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9986	0.9999	0.9834	0.03%	0.00%	14.03%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9983	0.9999	0.9860	0.00%	0.00%	14.33%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9985	0.9999	0.9864	0.02%	0.00%	14.37%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9985	0.9999	0.9864	0.02%	0.00%	14.37%

Table 5-95

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9900	0.9988	0.9379	-0.50%	-0.04%	-0.04%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9950	0.9992	0.9382	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9950	0.9992	0.9382	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9899	0.9988	0.9392	-0.52%	-0.05%	0.11%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9899	0.9988	0.9392	-0.52%	-0.05%	0.11%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9918	0.9989	0.9398	-0.32%	-0.03%	0.17%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9918	0.9989	0.9398	-0.32%	-0.03%	0.17%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9948	0.9993	0.9403	-0.02%	0.00%	0.22%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9918	0.9990	0.9478	-0.33%	-0.03%	1.03%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9978	0.9997	0.9624	0.28%	0.05%	2.58%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9978	0.9997	0.9624	0.28%	0.05%	2.58%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9978	0.9997	0.9626	0.28%	0.05%	2.60%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9980	0.9997	0.9626	0.30%	0.05%	2.60%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9980	0.9997	0.9626	0.30%	0.05%	2.60%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9980	0.9997	0.9627	0.29%	0.05%	2.61%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9963	0.9997	0.9654	0.12%	0.05%	2.89%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9962	0.9997	0.9654	0.12%	0.05%	2.89%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9962	0.9997	0.9654	0.12%	0.05%	2.89%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9972	0.9997	0.9655	0.21%	0.05%	2.91%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9970	0.9997	0.9655	0.19%	0.05%	2.91%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9970	0.9997	0.9655	0.19%	0.05%	2.91%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9972	0.9998	0.9677	0.22%	0.05%	3.15%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9972	0.9998	0.9677	0.22%	0.05%	3.15%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9966	0.9997	0.9681	0.16%	0.05%	3.18%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9966	0.9997	0.9685	0.16%	0.05%	3.22%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9966	0.9997	0.9685	0.16%	0.05%	3.22%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9973	0.9997	0.9705	0.22%	0.05%	3.44%

Table 5-98

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9548	0.9908	0.8278	-2.58%	-0.33%	-5.42%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9635	0.9926	0.8286	-1.69%	-0.15%	-5.33%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9662	0.9941	0.8459	-1.42%	0.00%	-3.35%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9586	0.9906	0.8490	-2.19%	-0.35%	-3.00%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9762	0.9962	0.8670	-0.39%	0.21%	-0.94%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9807	0.9948	0.8721	0.06%	0.08%	-0.36%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9707	0.9958	0.8725	-0.96%	0.17%	-0.31%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9801	0.9941	0.8753	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9863	0.9965	0.8801	0.63%	0.25%	0.55%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9851	0.9975	0.9199	0.51%	0.34%	5.10%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9850	0.9975	0.9199	0.51%	0.34%	5.10%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9850	0.9975	0.9199	0.51%	0.34%	5.10%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9880	0.9977	0.9307	0.81%	0.37%	6.33%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9879	0.9977	0.9307	0.80%	0.37%	6.33%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9879	0.9977	0.9307	0.80%	0.37%	6.33%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9892	0.9983	0.9398	0.93%	0.42%	7.37%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9892	0.9983	0.9398	0.93%	0.42%	7.37%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9895	0.9983	0.9411	0.96%	0.43%	7.52%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9912	0.9984	0.9431	1.14%	0.44%	7.75%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9912	0.9984	0.9431	1.14%	0.44%	7.75%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9914	0.9984	0.9460	1.16%	0.44%	8.09%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9951	0.9991	0.9464	1.53%	0.51%	8.13%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9951	0.9991	0.9464	1.53%	0.51%	8.13%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9950	0.9991	0.9465	1.53%	0.51%	8.14%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9939	0.9989	0.9471	1.42%	0.49%	8.21%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9939	0.9989	0.9471	1.42%	0.49%	8.21%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9939	0.9989	0.9474	1.42%	0.49%	8.24%

Table 5-101

					Percent From Baseline	
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9919	0.9985	0.8560	0.02%	0.04%	-0.84%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9917	0.9981	0.8633	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9950	0.9992	0.8661	0.34%	0.11%	0.33%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9957	0.9995	0.8853	0.40%	0.13%	2.55%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9959	0.9995	0.8873	0.42%	0.14%	2.78%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9959	0.9995	0.8874	0.42%	0.14%	2.79%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9857	0.9982	0.9064	-0.60%	0.01%	5.00%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9958	0.9994	0.9095	0.42%	0.13%	5.35%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9925	0.9989	0.9095	0.08%	0.08%	5.36%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9958	0.9994	0.9103	0.42%	0.13%	5.45%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9958	0.9994	0.9105	0.42%	0.13%	5.47%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9872	0.9983	0.9130	-0.45%	0.02%	5.76%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9885	0.9984	0.9239	-0.32%	0.03%	7.02%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9939	0.9995	0.9310	0.22%	0.14%	7.85%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9939	0.9995	0.9310	0.22%	0.14%	7.85%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9895	0.9989	0.9338	-0.22%	0.08%	8.17%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9939	0.9995	0.9344	0.22%	0.14%	8.24%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9945	0.9995	0.9478	0.28%	0.14%	9.79%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9945	0.9995	0.9478	0.28%	0.14%	9.79%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9945	0.9995	0.9478	0.28%	0.14%	9.79%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9932	0.9994	0.9491	0.16%	0.13%	9.94%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9932	0.9994	0.9491	0.16%	0.13%	9.94%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9932	0.9994	0.9502	0.16%	0.13%	10.07%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9939	0.9991	0.9504	0.23%	0.10%	10.10%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9950	0.9996	0.9507	0.34%	0.15%	10.13%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9950	0.9996	0.9507	0.34%	0.15%	10.13%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9950	0.9996	0.9540	0.33%	0.15%	10.50%

Table 5-105

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9989	0.9999	0.8493	-0.01%	0.00%	-1.89%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9989	0.9999	0.8657	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9990	0.9999	0.9040	0.00%	0.00%	4.43%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9990	0.9999	0.9118	0.00%	0.00%	5.33%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9989	0.9999	0.9140	-0.01%	0.00%	5.59%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9990	0.9999	0.9151	0.01%	0.00%	5.71%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9990	0.9999	0.9151	0.01%	0.00%	5.71%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9986	0.9998	0.9243	-0.04%	-0.01%	6.77%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9995	1.0000	0.9251	0.06%	0.00%	6.86%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9986	0.9999	0.9254	-0.04%	-0.01%	6.90%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9986	0.9999	0.9254	-0.04%	-0.01%	6.90%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9996	1.0000	0.9441	0.06%	0.00%	9.06%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9989	0.9999	0.9474	-0.01%	0.00%	9.45%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9990	0.9999	0.9477	0.00%	0.00%	9.48%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9990	0.9999	0.9477	0.00%	0.00%	9.48%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9984	0.9998	0.9588	-0.06%	-0.01%	10.76%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9984	0.9998	0.9590	-0.06%	-0.01%	10.79%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9984	0.9998	0.9590	-0.06%	-0.01%	10.79%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9986	0.9999	0.9812	-0.04%	-0.01%	13.35%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9986	0.9999	0.9812	-0.04%	-0.01%	13.35%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9986	0.9999	0.9812	-0.04%	-0.01%	13.35%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9991	0.9999	0.9891	0.01%	0.00%	14.26%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9991	0.9999	0.9891	0.01%	0.00%	14.26%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9990	0.9999	0.9899	0.01%	0.00%	14.36%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9991	1.0000	0.9901	0.02%	0.00%	14.37%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9991	1.0000	0.9922	0.02%	0.00%	14.62%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9997	1.0000	0.9955	0.07%	0.00%	14.99%

Table 5-107

					Percent From Baseline	
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9986	0.9999	0.8388	0.00%	0.00%	-2.13%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9985	0.9999	0.8570	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9984	0.9999	0.9025	-0.01%	0.00%	5.31%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9987	0.9999	0.9091	0.02%	0.00%	6.07%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9985	0.9999	0.9105	0.00%	0.00%	6.25%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9988	0.9999	0.9121	0.03%	0.00%	6.43%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9988	0.9999	0.9121	0.03%	0.00%	6.43%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9994	1.0000	0.9190	0.08%	0.01%	7.23%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9982	0.9998	0.9208	-0.03%	0.00%	7.44%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9982	0.9998	0.9225	-0.03%	-0.01%	7.64%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9982	0.9998	0.9226	-0.03%	-0.01%	7.65%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9994	1.0000	0.9422	0.09%	0.01%	9.94%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9986	0.9999	0.9460	0.01%	0.00%	10.38%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9986	0.9999	0.9462	0.01%	0.00%	10.41%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9986	0.9999	0.9462	0.01%	0.00%	10.41%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9978	0.9998	0.9577	-0.07%	-0.01%	11.74%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9978	0.9998	0.9579	-0.07%	-0.01%	11.77%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9978	0.9998	0.9579	-0.07%	-0.01%	11.77%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9981	0.9998	0.9730	-0.04%	-0.01%	13.54%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9981	0.9998	0.9730	-0.04%	-0.01%	13.54%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9981	0.9998	0.9730	-0.04%	-0.01%	13.54%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9989	0.9999	0.9836	0.03%	0.00%	14.77%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9989	0.9999	0.9836	0.03%	0.00%	14.77%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9988	0.9999	0.9850	0.03%	0.00%	14.93%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9987	0.9999	0.9875	0.02%	0.00%	15.23%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9988	1.0000	0.9885	0.03%	0.01%	15.34%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9995	1.0000	0.9926	0.10%	0.01%	15.82%

Table 5-111

BMP	Mean ER	Max ER	Min ER	ER (Mean-based)	Percent From Baseline ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9921	0.9987	0.8834	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9921	0.9987	0.8835	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9917	0.9988	0.8852	-0.04%	0.01%	0.20%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9881	0.9980	0.9040	-0.40%	-0.07%	2.33%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9881	0.9980	0.9040	-0.40%	-0.07%	2.33%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9852	0.9979	0.9146	-0.69%	-0.08%	3.53%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9852	0.9979	0.9147	-0.69%	-0.08%	3.54%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9854	0.9979	0.9162	-0.68%	-0.08%	3.71%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9880	0.9980	0.9196	-0.41%	-0.07%	4.10%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9923	0.9993	0.9424	0.02%	0.06%	6.67%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9922	0.9993	0.9424	0.02%	0.06%	6.67%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9922	0.9993	0.9424	0.02%	0.06%	6.67%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9936	0.9993	0.9509	0.16%	0.06%	7.64%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9936	0.9993	0.9509	0.15%	0.06%	7.64%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9936	0.9993	0.9509	0.15%	0.06%	7.64%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9950	0.9996	0.9555	0.29%	0.09%	8.16%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9948	0.9996	0.9560	0.28%	0.09%	8.22%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9948	0.9996	0.9560	0.28%	0.09%	8.22%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9958	0.9996	0.9577	0.38%	0.09%	8.41%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9958	0.9996	0.9577	0.38%	0.09%	8.41%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9959	0.9996	0.9613	0.39%	0.09%	8.81%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9973	0.9997	0.9624	0.53%	0.10%	8.94%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9973	0.9997	0.9624	0.53%	0.10%	8.94%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9973	0.9997	0.9627	0.53%	0.10%	8.97%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9966	0.9996	0.9640	0.46%	0.09%	9.12%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9966	0.9996	0.9640	0.46%	0.09%	9.12%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9966	0.9996	0.9644	0.46%	0.09%	9.17%

Table 5-113

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9319	0.9839	0.7606	-4.04%	-0.65%	-11.78%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9319	0.9839	0.7606	-4.04%	-0.65%	-11.77%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9461	0.9895	0.7608	-2.59%	-0.09%	-11.75%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9461	0.9895	0.7609	-2.59%	-0.09%	-11.74%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9331	0.9838	0.7731	-3.92%	-0.66%	-10.33%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9463	0.9893	0.7890	-2.57%	-0.10%	-8.48%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9712	0.9903	0.8621	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9712	0.9903	0.8622	0.00%	0.00%	0.01%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9707	0.9910	0.8661	-0.05%	0.07%	0.46%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9736	0.9948	0.8862	0.24%	0.45%	2.80%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9734	0.9948	0.8862	0.23%	0.45%	2.80%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9734	0.9948	0.8863	0.23%	0.45%	2.80%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9789	0.9955	0.9041	0.79%	0.52%	4.87%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9787	0.9954	0.9041	0.78%	0.51%	4.88%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9787	0.9954	0.9041	0.78%	0.51%	4.88%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9810	0.9966	0.9088	1.01%	0.64%	5.41%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9805	0.9965	0.9096	0.96%	0.62%	5.51%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9805	0.9965	0.9096	0.96%	0.62%	5.51%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9844	0.9968	0.9158	1.36%	0.66%	6.23%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9844	0.9968	0.9158	1.36%	0.66%	6.23%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9847	0.9969	0.9212	1.39%	0.67%	6.85%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9921	0.9985	0.9423	2.16%	0.83%	9.30%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9921	0.9985	0.9423	2.16%	0.83%	9.30%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9922	0.9986	0.9436	2.16%	0.83%	9.46%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9905	0.9982	0.9440	1.99%	0.79%	9.50%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9905	0.9982	0.9440	1.99%	0.79%	9.50%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9905	0.9982	0.9455	1.99%	0.79%	9.67%

Table 5-114

BMP	Mean ER	Max ER	Min ER	Percent From Baseline		
				ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9641	0.9934	0.8118	-1.62%	-0.10%	-6.55%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9641	0.9934	0.8119	-1.62%	-0.10%	-6.55%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9547	0.9918	0.8164	-2.58%	-0.26%	-6.03%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9547	0.9918	0.8164	-2.58%	-0.26%	-6.03%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9557	0.9922	0.8202	-2.48%	-0.23%	-5.58%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9642	0.9934	0.8375	-1.61%	-0.11%	-3.59%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9800	0.9944	0.8687	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9800	0.9944	0.8687	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9796	0.9948	0.8730	-0.04%	0.03%	0.50%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9873	0.9983	0.9022	0.75%	0.38%	3.86%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9874	0.9983	0.9022	0.75%	0.38%	3.86%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9922	0.9988	0.9033	1.25%	0.44%	3.98%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9922	0.9988	0.9033	1.25%	0.44%	3.98%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9921	0.9989	0.9043	1.24%	0.45%	4.09%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9842	0.9980	0.9081	0.43%	0.36%	4.53%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9842	0.9980	0.9081	0.43%	0.36%	4.53%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9845	0.9981	0.9104	0.47%	0.37%	4.79%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9876	0.9983	0.9106	0.78%	0.39%	4.82%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9898	0.9987	0.9280	1.00%	0.42%	6.83%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9897	0.9986	0.9280	0.99%	0.42%	6.83%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9897	0.9986	0.9280	0.99%	0.42%	6.83%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9872	0.9984	0.9294	0.74%	0.40%	6.98%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9871	0.9984	0.9294	0.73%	0.40%	6.98%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9871	0.9984	0.9294	0.73%	0.40%	6.98%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9940	0.9991	0.9356	1.43%	0.47%	7.70%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9940	0.9991	0.9356	1.43%	0.47%	7.70%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9940	0.9991	0.9368	1.43%	0.47%	7.83%

Table 5-131

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9878	0.9972	0.8518	0.09%	0.03%	-0.63%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9869	0.9969	0.8572	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9925	0.9984	0.8614	0.56%	0.15%	0.50%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9756	0.9966	0.8793	-1.15%	-0.03%	2.58%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9806	0.9971	0.8824	-0.64%	0.01%	2.94%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9941	0.9992	0.8832	0.73%	0.23%	3.04%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9943	0.9992	0.8848	0.74%	0.23%	3.22%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9943	0.9992	0.8848	0.74%	0.23%	3.22%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9788	0.9964	0.8987	-0.83%	-0.05%	4.85%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9828	0.9983	0.9009	-0.42%	0.13%	5.11%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9875	0.9983	0.9077	0.05%	0.14%	5.90%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9943	0.9992	0.9081	0.74%	0.22%	5.94%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9943	0.9992	0.9085	0.74%	0.22%	5.99%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9943	0.9992	0.9085	0.74%	0.22%	5.99%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9900	0.9987	0.9229	0.31%	0.18%	7.67%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9915	0.9991	0.9271	0.46%	0.22%	8.16%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9915	0.9991	0.9271	0.46%	0.22%	8.16%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9915	0.9991	0.9271	0.46%	0.22%	8.16%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9922	0.9992	0.9282	0.54%	0.22%	8.29%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9922	0.9992	0.9282	0.54%	0.22%	8.29%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9904	0.9990	0.9296	0.35%	0.21%	8.46%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9904	0.9990	0.9296	0.35%	0.21%	8.46%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9895	0.9989	0.9326	0.26%	0.20%	8.80%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9894	0.9989	0.9326	0.25%	0.20%	8.80%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9894	0.9989	0.9326	0.25%	0.20%	8.80%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9906	0.9991	0.9332	0.37%	0.21%	8.87%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9923	0.9992	0.9338	0.55%	0.23%	8.95%

Table 5-132

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9913	0.9981	0.8572	-0.06%	0.00%	-0.80%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9919	0.9982	0.8641	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9919	0.9982	0.8641	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9956	0.9994	0.8976	0.38%	0.12%	3.88%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9958	0.9995	0.8990	0.39%	0.13%	4.04%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9958	0.9995	0.8991	0.39%	0.13%	4.04%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9863	0.9982	0.9078	-0.57%	0.00%	5.05%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9863	0.9982	0.9078	-0.57%	0.00%	5.05%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9861	0.9980	0.9146	-0.58%	-0.02%	5.85%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9889	0.9985	0.9235	-0.30%	0.03%	6.87%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9889	0.9985	0.9235	-0.30%	0.03%	6.87%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9887	0.9983	0.9348	-0.33%	0.01%	8.18%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9935	0.9994	0.9409	0.16%	0.13%	8.89%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9935	0.9994	0.9409	0.16%	0.13%	8.89%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9967	0.9996	0.9409	0.49%	0.14%	8.89%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9967	0.9996	0.9412	0.49%	0.14%	8.92%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9967	0.9996	0.9412	0.49%	0.14%	8.92%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9936	0.9994	0.9438	0.16%	0.12%	9.22%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9947	0.9995	0.9472	0.28%	0.13%	9.62%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9947	0.9995	0.9472	0.28%	0.13%	9.62%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9947	0.9995	0.9509	0.28%	0.13%	10.04%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9945	0.9995	0.9592	0.25%	0.13%	11.01%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9944	0.9995	0.9592	0.25%	0.13%	11.01%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9944	0.9995	0.9592	0.25%	0.13%	11.01%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9955	0.9996	0.9595	0.36%	0.14%	11.04%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9955	0.9996	0.9595	0.36%	0.14%	11.04%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9955	0.9996	0.9595	0.36%	0.14%	11.04%

Table 5-133

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9968	0.9996	0.8495	0.00%	0.01%	-1.78%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9968	0.9995	0.8649	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9982	0.9998	0.8660	0.15%	0.03%	0.12%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9971	0.9997	0.8662	0.03%	0.02%	0.15%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9973	0.9997	0.8706	0.05%	0.02%	0.66%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9973	0.9997	0.8707	0.05%	0.02%	0.66%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9965	0.9995	0.8877	-0.02%	0.01%	2.63%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9965	0.9995	0.8901	-0.02%	0.01%	2.90%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9965	0.9995	0.8901	-0.02%	0.01%	2.91%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9958	0.9994	0.9029	-0.10%	-0.01%	4.39%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9980	0.9998	0.9040	0.12%	0.03%	4.52%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9961	0.9996	0.9109	-0.07%	0.01%	5.31%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9967	0.9997	0.9139	-0.01%	0.03%	5.66%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9967	0.9997	0.9139	-0.01%	0.03%	5.66%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9966	0.9997	0.9181	-0.02%	0.02%	6.15%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9952	0.9996	0.9334	-0.16%	0.01%	7.92%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9952	0.9996	0.9334	-0.16%	0.01%	7.92%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9952	0.9996	0.9365	-0.16%	0.01%	8.27%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9960	0.9996	0.9601	-0.07%	0.01%	11.00%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9960	0.9996	0.9601	-0.07%	0.01%	11.00%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9960	0.9996	0.9601	-0.07%	0.01%	11.00%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9973	0.9998	0.9741	0.05%	0.03%	12.62%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9973	0.9998	0.9741	0.05%	0.03%	12.62%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9972	0.9998	0.9759	0.04%	0.03%	12.83%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9966	0.9995	0.9762	-0.01%	0.00%	12.86%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9968	0.9996	0.9776	0.01%	0.01%	13.02%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9984	0.9998	0.9862	0.16%	0.03%	14.02%

Table 5-137

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9948	0.9994	0.8864	-0.05%	0.00%	-0.16%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9953	0.9994	0.8878	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9953	0.9994	0.8879	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9926	0.9994	0.9302	-0.27%	0.00%	4.77%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9926	0.9994	0.9302	-0.27%	0.00%	4.77%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9924	0.9994	0.9345	-0.30%	0.00%	5.25%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9940	0.9995	0.9433	-0.13%	0.01%	6.25%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9940	0.9995	0.9433	-0.13%	0.01%	6.25%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9980	0.9998	0.9471	0.27%	0.04%	6.67%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9981	0.9998	0.9473	0.28%	0.04%	6.70%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9981	0.9998	0.9473	0.28%	0.04%	6.70%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9937	0.9995	0.9509	-0.16%	0.01%	7.10%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9984	0.9998	0.9639	0.31%	0.04%	8.57%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9984	0.9998	0.9639	0.31%	0.04%	8.57%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9984	0.9998	0.9639	0.31%	0.04%	8.57%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9977	0.9998	0.9697	0.24%	0.04%	9.22%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9977	0.9998	0.9697	0.24%	0.04%	9.22%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9972	0.9997	0.9712	0.19%	0.03%	9.39%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9972	0.9997	0.9716	0.19%	0.03%	9.43%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9972	0.9997	0.9716	0.19%	0.03%	9.43%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9977	0.9998	0.9721	0.24%	0.04%	9.49%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9974	0.9998	0.9734	0.21%	0.04%	9.64%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9974	0.9998	0.9734	0.21%	0.04%	9.64%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9974	0.9998	0.9734	0.21%	0.04%	9.64%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9979	0.9998	0.9742	0.26%	0.04%	9.73%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9979	0.9998	0.9742	0.26%	0.04%	9.73%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9979	0.9998	0.9742	0.26%	0.04%	9.73%

Table 5-139

					Percent From Baseline	
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9885	0.9974	0.8410	0.04%	0.02%	-1.59%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9881	0.9972	0.8545	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9928	0.9982	0.8578	0.47%	0.10%	0.38%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9937	0.9990	0.8608	0.56%	0.18%	0.74%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9939	0.9989	0.8647	0.58%	0.17%	1.19%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9939	0.9989	0.8647	0.58%	0.17%	1.19%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9927	0.9987	0.8825	0.46%	0.15%	3.28%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9927	0.9987	0.8843	0.47%	0.15%	3.49%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9927	0.9987	0.8843	0.47%	0.15%	3.49%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9808	0.9976	0.8928	-0.74%	0.04%	4.48%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9892	0.9984	0.8967	0.11%	0.12%	4.94%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9826	0.9973	0.9023	-0.56%	0.01%	5.59%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9903	0.9986	0.9082	0.22%	0.14%	6.27%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9903	0.9986	0.9082	0.22%	0.14%	6.27%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9904	0.9985	0.9131	0.23%	0.13%	6.85%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9894	0.9983	0.9172	0.13%	0.11%	7.34%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9894	0.9983	0.9172	0.12%	0.11%	7.34%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9894	0.9983	0.9172	0.12%	0.11%	7.34%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9853	0.9981	0.9233	-0.29%	0.09%	8.05%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9869	0.9980	0.9266	-0.13%	0.08%	8.43%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9868	0.9980	0.9266	-0.13%	0.08%	8.43%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9868	0.9980	0.9266	-0.13%	0.08%	8.43%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9864	0.9986	0.9275	-0.18%	0.14%	8.54%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9922	0.9988	0.9388	0.41%	0.16%	9.86%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9922	0.9988	0.9388	0.41%	0.16%	9.86%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9922	0.9988	0.9434	0.42%	0.16%	10.40%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9916	0.9988	0.9497	0.35%	0.16%	11.13%

Table 5-140

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9947	0.9994	0.8842	-0.05%	0.00%	-0.26%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9951	0.9994	0.8865	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9951	0.9994	0.8865	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9924	0.9994	0.9300	-0.28%	0.00%	4.91%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9924	0.9994	0.9300	-0.28%	0.00%	4.91%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9922	0.9994	0.9351	-0.29%	0.00%	5.49%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9938	0.9995	0.9410	-0.13%	0.01%	6.15%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9938	0.9995	0.9410	-0.13%	0.01%	6.15%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9980	0.9998	0.9462	0.28%	0.04%	6.75%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9980	0.9998	0.9467	0.29%	0.04%	6.79%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9980	0.9998	0.9467	0.29%	0.04%	6.79%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9936	0.9995	0.9499	-0.15%	0.01%	7.16%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9983	0.9998	0.9634	0.32%	0.04%	8.68%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9983	0.9998	0.9635	0.32%	0.04%	8.70%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9983	0.9998	0.9635	0.32%	0.04%	8.70%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9976	0.9998	0.9685	0.25%	0.04%	9.25%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9976	0.9998	0.9685	0.25%	0.04%	9.25%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9976	0.9998	0.9709	0.25%	0.04%	9.53%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9971	0.9997	0.9711	0.20%	0.03%	9.55%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9971	0.9997	0.9711	0.20%	0.03%	9.55%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9971	0.9997	0.9721	0.20%	0.03%	9.66%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9973	0.9998	0.9731	0.22%	0.04%	9.77%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9973	0.9998	0.9731	0.22%	0.04%	9.77%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9973	0.9998	0.9731	0.22%	0.04%	9.77%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9978	0.9998	0.9733	0.27%	0.04%	9.79%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9978	0.9998	0.9733	0.27%	0.04%	9.79%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9978	0.9998	0.9733	0.27%	0.04%	9.79%

Table 5-141

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.987165689	0.996889286	0.876701161	-0.09%	-0.01%	-0.57%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.988079002	0.997024464	0.881704464	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.988079647	0.997024911	0.881741429	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.979901574	0.996809732	0.889879732	-0.83%	-0.02%	0.93%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.979902603	0.996810268	0.88988375	-0.83%	-0.02%	0.93%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.975499901	0.996676786	0.890808661	-1.27%	-0.03%	1.03%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.975501138	0.996676786	0.890814554	-1.27%	-0.03%	1.03%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.975154157	0.996118929	0.893921339	-1.31%	-0.09%	1.39%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.979435112	0.996760536	0.8997075	-0.87%	-0.03%	2.04%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.995622794	0.999349464	0.922662589	0.76%	0.23%	4.65%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.995782739	0.999335357	0.923676875	0.78%	0.23%	4.76%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.995782862	0.999335357	0.923686339	0.78%	0.23%	4.76%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.996483957	0.999458214	0.947533036	0.85%	0.24%	7.47%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.992557935	0.999196875	0.947761339	0.45%	0.22%	7.49%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.99255814	0.999196875	0.947762768	0.45%	0.22%	7.49%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9964938	0.999458214	0.947943839	0.85%	0.24%	7.51%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.996493856	0.999458214	0.947949375	0.85%	0.24%	7.51%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.992578356	0.999228571	0.948822232	0.46%	0.22%	7.61%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.993889895	0.999317946	0.949977143	0.59%	0.23%	7.74%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.993890069	0.999317946	0.949977857	0.59%	0.23%	7.74%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.993880922	0.999332946	0.952280982	0.59%	0.23%	8.00%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.993260953	0.999255893	0.953025	0.52%	0.22%	8.09%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.993250414	0.999255893	0.953025982	0.52%	0.22%	8.09%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.993250521	0.999255893	0.953026607	0.52%	0.22%	8.09%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.994479112	0.999364554	0.958336161	0.65%	0.23%	8.69%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.994466499	0.999353661	0.958336696	0.65%	0.23%	8.69%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.994466569	0.999353661	0.958336964	0.65%	0.23%	8.69%

Table 5-142

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9975	0.9998	0.9223	-0.03%	0.00%	-0.22%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9978	0.9997	0.9244	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9978	0.9997	0.9244	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9986	0.9998	0.9482	0.07%	0.01%	2.58%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9987	0.9998	0.9489	0.08%	0.01%	2.65%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9987	0.9998	0.9489	0.08%	0.01%	2.65%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9970	0.9997	0.9584	-0.08%	0.00%	3.69%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9970	0.9997	0.9584	-0.08%	0.00%	3.69%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9968	0.9997	0.9593	-0.10%	0.00%	3.78%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9988	0.9998	0.9647	0.10%	0.01%	4.36%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9989	0.9999	0.9650	0.10%	0.01%	4.39%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9989	0.9999	0.9650	0.10%	0.01%	4.39%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9976	0.9998	0.9690	-0.03%	0.01%	4.83%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9976	0.9998	0.9690	-0.03%	0.01%	4.83%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9973	0.9998	0.9730	-0.05%	0.00%	5.26%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9983	0.9998	0.9751	0.05%	0.01%	5.49%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9984	0.9998	0.9753	0.06%	0.01%	5.51%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9984	0.9998	0.9753	0.06%	0.01%	5.51%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9986	0.9998	0.9829	0.08%	0.01%	6.33%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9986	0.9998	0.9829	0.08%	0.01%	6.33%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9985	0.9998	0.9836	0.07%	0.01%	6.41%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9985	0.9998	0.9836	0.07%	0.01%	6.41%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9985	0.9998	0.9836	0.07%	0.01%	6.41%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9985	0.9998	0.9840	0.07%	0.01%	6.45%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9987	0.9998	0.9848	0.09%	0.01%	6.54%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9987	0.9998	0.9848	0.09%	0.01%	6.54%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9987	0.9998	0.9848	0.09%	0.01%	6.54%

Table 5-143

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9907	0.9982	0.8524	0.04%	0.03%	-1.00%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9902	0.9978	0.8611	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9944	0.9989	0.8643	0.42%	0.11%	0.38%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9953	0.9994	0.8842	0.51%	0.16%	2.68%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9955	0.9994	0.8867	0.53%	0.16%	2.97%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9955	0.9994	0.8867	0.53%	0.16%	2.98%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9829	0.9979	0.9069	-0.74%	0.01%	5.33%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9954	0.9994	0.9088	0.52%	0.15%	5.54%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9954	0.9994	0.9101	0.52%	0.15%	5.69%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9954	0.9994	0.9101	0.52%	0.15%	5.69%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9913	0.9988	0.9108	0.10%	0.09%	5.77%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9848	0.9976	0.9135	-0.55%	-0.02%	6.09%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9862	0.9981	0.9139	-0.41%	0.02%	6.14%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9875	0.9987	0.9254	-0.28%	0.09%	7.47%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9931	0.9994	0.9319	0.29%	0.16%	8.23%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9931	0.9994	0.9319	0.29%	0.16%	8.23%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9931	0.9994	0.9350	0.29%	0.16%	8.59%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9937	0.9994	0.9436	0.35%	0.16%	9.58%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9937	0.9994	0.9436	0.35%	0.16%	9.58%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9937	0.9994	0.9436	0.35%	0.16%	9.58%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9929	0.9989	0.9446	0.27%	0.10%	9.70%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9923	0.9993	0.9455	0.21%	0.15%	9.80%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9923	0.9993	0.9455	0.21%	0.15%	9.80%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9923	0.9993	0.9455	0.21%	0.15%	9.80%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9944	0.9995	0.9462	0.42%	0.17%	9.89%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9944	0.9995	0.9462	0.42%	0.17%	9.89%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9943	0.9995	0.9499	0.41%	0.17%	10.31%

Table 5-149

BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	Percent From Baseline ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998821835	0.999929018	0.915362857	-0.03%	0.00%	-0.49%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.999105886	0.999944107	0.9198575	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.999105904	0.999944107	0.919862679	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.99875469	0.999834196	0.941900089	-0.04%	-0.01%	2.40%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998909904	0.999847589	0.943012946	-0.02%	-0.01%	2.52%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.999111989	0.999942679	0.951717321	0.00%	0.00%	3.46%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.99911201	0.999942679	0.951717589	0.00%	0.00%	3.46%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998861966	0.999931607	0.952252679	-0.02%	0.00%	3.52%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.999071042	0.999847679	0.966306964	0.00%	-0.01%	5.05%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998973481	0.999853036	0.96672625	-0.01%	-0.01%	5.10%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.999083914	0.999853036	0.966726429	0.00%	-0.01%	5.10%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.99908393	0.999853036	0.966729196	0.00%	-0.01%	5.10%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998744116	0.999813393	0.971848482	-0.04%	-0.01%	5.65%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.998889011	0.999826339	0.972038036	-0.02%	-0.01%	5.67%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.998972182	0.999818661	0.985510089	-0.01%	-0.01%	7.14%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.998906437	0.999830357	0.985614554	-0.02%	-0.01%	7.15%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998990546	0.999830357	0.985614554	-0.01%	-0.01%	7.15%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.998990531	0.999830357	0.985614554	-0.01%	-0.01%	7.15%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.998997806	0.999841339	0.991118929	-0.01%	-0.01%	7.75%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998982207	0.999854643	0.991118929	-0.01%	-0.01%	7.75%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998853878	0.99984375	0.991669375	-0.03%	-0.01%	7.81%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.999200025	0.999951875	0.992090893	0.01%	0.00%	7.85%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.99920004	0.999951875	0.992090893	0.01%	0.00%	7.85%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.999070176	0.999837857	0.992130357	0.00%	-0.01%	7.86%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.999087428	0.999841339	0.992130357	0.00%	-0.01%	7.86%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.999087419	0.999841339	0.992130357	0.00%	-0.01%	7.86%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998973514	0.999942768	0.992940446	-0.01%	0.00%	7.95%

Table 6-6				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9466	0.9972	0.6562	-0.83%	-0.06%	-7.73%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9510	0.9970	0.7081	-0.37%	-0.08%	-0.42%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9546	0.9977	0.7111	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9584	0.9975	0.7596	0.41%	-0.02%	6.82%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9677	0.9978	0.7611	1.37%	0.01%	7.03%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9627	0.9974	0.7684	0.86%	-0.03%	8.05%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9695	0.9977	0.7986	1.56%	0.00%	12.30%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9683	0.9979	0.8115	1.44%	0.02%	14.12%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9754	0.9998	0.8264	2.18%	0.21%	16.21%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9754	0.9998	0.8265	2.18%	0.21%	16.22%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9761	0.9980	0.8408	2.25%	0.03%	18.24%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9792	0.9998	0.8417	2.58%	0.21%	18.36%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9770	0.9996	0.8541	2.35%	0.19%	20.10%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9770	0.9996	0.8542	2.35%	0.19%	20.12%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9804	0.9998	0.8659	2.71%	0.21%	21.76%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9822	0.9998	0.8839	2.89%	0.21%	24.29%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9822	0.9998	0.8840	2.89%	0.21%	24.30%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9846	0.9998	0.8913	3.14%	0.21%	25.34%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9891	1.0000	0.9141	3.62%	0.22%	28.54%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9887	1.0000	0.9141	3.58%	0.22%	28.54%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9887	1.0000	0.9141	3.58%	0.22%	28.55%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9895	1.0000	0.9288	3.66%	0.22%	30.61%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9895	1.0000	0.9288	3.66%	0.22%	30.61%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9898	1.0000	0.9289	3.70%	0.22%	30.62%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9916	1.0000	0.9435	3.88%	0.22%	32.68%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9916	1.0000	0.9435	3.88%	0.22%	32.68%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9919	1.0000	0.9479	3.91%	0.22%	33.29%

Table 6-8

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9852	0.9999	0.9052	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9852	0.9999	0.9052	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9864	0.9999	0.9244	0.12%	0.00%	2.13%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9864	0.9999	0.9244	0.12%	0.00%	2.13%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9903	1.0000	0.9269	0.52%	0.00%	2.40%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9903	1.0000	0.9269	0.52%	0.00%	2.40%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9908	1.0000	0.9319	0.57%	0.00%	2.95%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9920	1.0000	0.9354	0.69%	0.00%	3.34%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9910	1.0000	0.9399	0.59%	0.00%	3.84%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9910	1.0000	0.9399	0.59%	0.00%	3.84%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9894	0.9999	0.9405	0.43%	0.00%	3.91%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9894	0.9999	0.9406	0.43%	0.00%	3.91%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9913	1.0000	0.9420	0.62%	0.00%	4.07%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9925	1.0000	0.9449	0.74%	0.00%	4.39%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9928	1.0000	0.9523	0.77%	0.00%	5.21%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9928	1.0000	0.9523	0.77%	0.00%	5.21%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9932	1.0000	0.9537	0.82%	0.00%	5.36%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9940	1.0000	0.9557	0.89%	0.00%	5.58%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9955	1.0000	0.9626	1.04%	0.01%	6.34%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9953	1.0000	0.9626	1.02%	0.01%	6.34%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9953	1.0000	0.9626	1.02%	0.01%	6.34%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9956	1.0000	0.9696	1.06%	0.01%	7.12%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9956	1.0000	0.9696	1.06%	0.01%	7.12%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9958	1.0000	0.9697	1.08%	0.01%	7.13%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9965	1.0000	0.9758	1.15%	0.01%	7.81%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9965	1.0000	0.9758	1.15%	0.01%	7.81%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9966	1.0000	0.9771	1.16%	0.01%	7.95%

Table 6-13				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9877	1.0000	0.9181	-0.27%	0.00%	-2.48%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9877	1.0000	0.9181	-0.27%	0.00%	-2.48%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9895	1.0000	0.9263	-0.08%	0.00%	-1.61%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9887	1.0000	0.9323	-0.16%	0.00%	-0.97%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9887	1.0000	0.9323	-0.16%	0.00%	-0.97%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9903	1.0000	0.9371	0.00%	0.00%	-0.45%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9903	1.0000	0.9414	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9903	1.0000	0.9414	0.00%	0.00%	0.00%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9921	1.0000	0.9440	0.18%	0.00%	0.27%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9918	1.0000	0.9440	0.16%	0.00%	0.27%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9918	1.0000	0.9440	0.16%	0.00%	0.27%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9910	1.0000	0.9460	0.07%	0.00%	0.48%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9910	1.0000	0.9460	0.07%	0.00%	0.48%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9922	1.0000	0.9492	0.19%	0.00%	0.83%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9913	1.0000	0.9540	0.10%	0.00%	1.33%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9913	1.0000	0.9540	0.10%	0.00%	1.33%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9925	1.0000	0.9540	0.22%	0.00%	1.34%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9925	1.0000	0.9540	0.22%	0.00%	1.34%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9927	1.0000	0.9546	0.24%	0.00%	1.40%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9941	1.0000	0.9594	0.38%	0.00%	1.91%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9940	1.0000	0.9633	0.37%	0.00%	2.32%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9940	1.0000	0.9633	0.37%	0.00%	2.32%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9930	1.0000	0.9637	0.27%	0.00%	2.37%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9930	1.0000	0.9637	0.27%	0.00%	2.37%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9941	1.0000	0.9658	0.39%	0.00%	2.59%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9945	1.0000	0.9664	0.43%	0.00%	2.65%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9956	1.0000	0.9724	0.53%	0.00%	3.29%

Table 6-18

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9448	0.9962	0.6629	-1.22%	-0.08%	-9.97%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9495	0.9960	0.7205	-0.72%	-0.09%	-2.14%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9564	0.9970	0.7362	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9685	0.9975	0.7710	1.27%	0.05%	4.73%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9613	0.9965	0.7769	0.51%	-0.05%	5.53%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9602	0.9969	0.7879	0.40%	-0.01%	7.02%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9707	0.9990	0.8121	1.50%	0.20%	10.30%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9707	0.9990	0.8121	1.50%	0.20%	10.30%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9705	0.9975	0.8175	1.47%	0.05%	11.04%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9749	0.9990	0.8290	1.94%	0.21%	12.60%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9693	0.9972	0.8331	1.35%	0.02%	13.16%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9729	0.9990	0.8453	1.72%	0.20%	14.81%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9729	0.9990	0.8453	1.72%	0.20%	14.82%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9765	0.9990	0.8556	2.10%	0.20%	16.21%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9767	0.9977	0.8618	2.12%	0.08%	17.05%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9785	0.9991	0.8759	2.31%	0.21%	18.97%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9785	0.9991	0.8759	2.31%	0.21%	18.97%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9813	0.9991	0.8824	2.60%	0.22%	19.85%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9860	0.9997	0.9040	3.09%	0.28%	22.78%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9855	0.9997	0.9040	3.05%	0.28%	22.78%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9855	0.9997	0.9040	3.05%	0.28%	22.78%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9866	0.9997	0.9219	3.16%	0.28%	25.22%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9866	0.9997	0.9219	3.16%	0.28%	25.22%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9870	0.9997	0.9223	3.20%	0.28%	25.27%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9895	1.0000	0.9376	3.46%	0.30%	27.35%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9895	1.0000	0.9376	3.46%	0.30%	27.35%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9897	1.0000	0.9416	3.49%	0.30%	27.90%

Table 6-20

					Percent From Baseline	
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.908140932	0.987208482	0.482928482	-1.14%	-0.12%	-10.65%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.918606444	0.988352143	0.540480268	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.916407803	0.987079018	0.554500446	-0.24%	-0.13%	2.59%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.937155576	0.988568571	0.60392125	2.02%	0.02%	11.74%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.925940417	0.988111161	0.612528125	0.80%	-0.02%	13.33%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.934098624	0.993443929	0.625483661	1.69%	0.52%	15.73%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.934101315	0.993443929	0.625502054	1.69%	0.52%	15.73%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.936813091	0.988837143	0.643308125	1.98%	0.05%	19.03%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.941355562	0.99357	0.646802589	2.48%	0.53%	19.67%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.941004871	0.988312321	0.657154018	2.44%	0.00%	21.59%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.938451738	0.993189821	0.680858304	2.16%	0.49%	25.97%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.938454993	0.993189821	0.680899911	2.16%	0.49%	25.98%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.943659371	0.989751071	0.693840268	2.73%	0.14%	28.37%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.944602975	0.993356339	0.698218839	2.83%	0.51%	29.18%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.953950259	0.991248393	0.728148304	3.85%	0.29%	34.72%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.956469342	0.996796875	0.741399911	4.12%	0.85%	37.17%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.955402074	0.996796875	0.741412232	4.01%	0.85%	37.18%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.955403853	0.996796875	0.741427411	4.01%	0.85%	37.18%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.951379678	0.993973125	0.743899018	3.57%	0.57%	37.64%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.951381775	0.993973214	0.743938482	3.57%	0.57%	37.64%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.95591122	0.994126071	0.754384821	4.06%	0.58%	39.58%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.959212316	0.996710179	0.783149911	4.42%	0.85%	44.90%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.95831757	0.996710179	0.783181071	4.32%	0.85%	44.90%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.95831936	0.996710179	0.783224554	4.32%	0.85%	44.91%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.966534042	0.997106429	0.825931875	5.22%	0.89%	52.81%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.966535145	0.997106429	0.825969554	5.22%	0.89%	52.82%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.967201178	0.997106429	0.833570893	5.29%	0.89%	54.23%

Table 6-21

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9407	0.9957	0.6291	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9407	0.9957	0.6291	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9458	0.9956	0.6901	0.54%	-0.02%	9.69%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9458	0.9956	0.6901	0.54%	-0.02%	9.69%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9579	0.9959	0.6906	1.83%	0.02%	9.77%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9603	0.9958	0.7317	2.08%	0.01%	16.31%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9634	0.9987	0.7532	2.41%	0.30%	19.72%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9634	0.9987	0.7532	2.41%	0.30%	19.72%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9587	0.9961	0.7556	1.92%	0.04%	20.10%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9587	0.9961	0.7556	1.92%	0.04%	20.10%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9685	0.9987	0.7719	2.96%	0.30%	22.69%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9689	0.9963	0.7870	3.00%	0.05%	25.09%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9658	0.9987	0.7925	2.67%	0.29%	25.97%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9658	0.9987	0.7925	2.67%	0.29%	25.98%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9702	0.9987	0.8068	3.14%	0.30%	28.24%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9731	0.9988	0.8342	3.44%	0.31%	32.60%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9731	0.9988	0.8343	3.44%	0.31%	32.61%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9763	0.9989	0.8430	3.79%	0.31%	34.00%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9819	0.9999	0.8624	4.38%	0.42%	37.07%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9811	0.9999	0.8624	4.30%	0.42%	37.07%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9811	0.9999	0.8624	4.30%	0.42%	37.07%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9830	0.9999	0.8862	4.50%	0.42%	40.86%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9825	0.9999	0.8862	4.45%	0.42%	40.86%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9825	0.9999	0.8862	4.45%	0.42%	40.86%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9861	0.9999	0.9092	4.83%	0.42%	44.52%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9861	0.9999	0.9092	4.83%	0.42%	44.52%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9865	0.9999	0.9149	4.87%	0.42%	45.42%

Table 6-23

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.8956	0.9916	0.4752	-0.24%	-0.02%	-3.70%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.8977	0.9917	0.4935	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9026	0.9912	0.5373	0.54%	-0.05%	8.88%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9182	0.9917	0.5465	2.28%	0.00%	10.74%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9044	0.9914	0.5557	0.75%	-0.03%	12.60%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9218	0.9915	0.5941	2.68%	-0.03%	20.38%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9259	0.9923	0.6160	3.13%	0.06%	24.83%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9246	0.9922	0.6220	2.99%	0.04%	26.05%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9380	0.9926	0.6686	4.49%	0.08%	35.48%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9493	0.9986	0.7264	5.75%	0.69%	47.20%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9493	0.9986	0.7264	5.75%	0.69%	47.20%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9555	0.9986	0.7453	6.43%	0.69%	51.03%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9518	0.9985	0.7639	6.02%	0.68%	54.79%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9518	0.9985	0.7639	6.02%	0.68%	54.79%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9573	0.9985	0.7788	6.63%	0.69%	57.82%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9614	0.9987	0.8079	7.09%	0.70%	63.72%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9614	0.9987	0.8079	7.09%	0.70%	63.72%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9655	0.9988	0.8160	7.55%	0.71%	65.37%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9756	0.9999	0.8572	8.67%	0.83%	73.71%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9749	0.9999	0.8572	8.59%	0.83%	73.71%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9749	0.9999	0.8572	8.59%	0.83%	73.71%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9762	0.9999	0.8777	8.74%	0.83%	77.86%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9762	0.9999	0.8777	8.74%	0.83%	77.86%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9769	0.9999	0.8786	8.82%	0.83%	78.05%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9808	0.9999	0.9014	9.26%	0.83%	82.66%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9808	0.9999	0.9014	9.26%	0.83%	82.66%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9813	0.9999	0.9065	9.31%	0.83%	83.70%

Table 6-29

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9898	1.0000	0.9384	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9898	1.0000	0.9384	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9918	1.0000	0.9424	0.21%	0.00%	0.43%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9918	1.0000	0.9424	0.21%	0.00%	0.43%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9933	1.0000	0.9498	0.36%	0.00%	1.22%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9907	1.0000	0.9510	0.09%	0.00%	1.35%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9907	1.0000	0.9510	0.09%	0.00%	1.35%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9924	1.0000	0.9526	0.27%	0.00%	1.52%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9924	1.0000	0.9526	0.27%	0.00%	1.52%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9937	1.0000	0.9571	0.40%	0.00%	2.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9941	1.0000	0.9592	0.44%	0.00%	2.22%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9926	1.0000	0.9618	0.28%	0.00%	2.49%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9926	1.0000	0.9618	0.28%	0.00%	2.50%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9939	1.0000	0.9625	0.42%	0.00%	2.57%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9939	1.0000	0.9625	0.42%	0.00%	2.57%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9949	1.0000	0.9656	0.52%	0.00%	2.91%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9945	1.0000	0.9658	0.47%	0.00%	2.92%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9964	1.0000	0.9716	0.67%	0.00%	3.54%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9962	1.0000	0.9716	0.65%	0.00%	3.54%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9962	1.0000	0.9716	0.65%	0.00%	3.54%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9955	1.0000	0.9720	0.57%	0.00%	3.58%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9967	1.0000	0.9769	0.70%	0.00%	4.10%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9966	1.0000	0.9769	0.68%	0.00%	4.10%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9966	1.0000	0.9769	0.68%	0.00%	4.10%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9972	1.0000	0.9817	0.75%	0.00%	4.62%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9972	1.0000	0.9817	0.75%	0.00%	4.62%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9973	1.0000	0.9824	0.76%	0.00%	4.69%

Table 6-30

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9868	0.9999	0.9260	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9868	0.9999	0.9260	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9895	1.0000	0.9308	0.27%	0.01%	0.52%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9895	1.0000	0.9308	0.27%	0.01%	0.52%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9912	1.0000	0.9391	0.45%	0.01%	1.41%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9880	0.9999	0.9410	0.12%	0.00%	1.62%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9880	0.9999	0.9410	0.12%	0.00%	1.62%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9902	1.0000	0.9421	0.35%	0.01%	1.74%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9902	1.0000	0.9421	0.35%	0.01%	1.74%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9917	1.0000	0.9470	0.50%	0.01%	2.26%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9920	0.9999	0.9493	0.53%	0.00%	2.52%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9904	0.9999	0.9532	0.37%	0.00%	2.94%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9904	0.9999	0.9532	0.37%	0.00%	2.94%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9921	1.0000	0.9539	0.54%	0.01%	3.01%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9921	1.0000	0.9539	0.54%	0.01%	3.01%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9925	0.9999	0.9567	0.58%	0.00%	3.32%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9933	1.0000	0.9572	0.67%	0.01%	3.37%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9939	1.0000	0.9646	0.72%	0.00%	4.17%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9951	1.0000	0.9651	0.84%	0.01%	4.22%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9949	1.0000	0.9651	0.82%	0.01%	4.22%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9949	1.0000	0.9651	0.82%	0.01%	4.22%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9954	1.0000	0.9710	0.88%	0.01%	4.86%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9953	1.0000	0.9710	0.86%	0.01%	4.86%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9953	1.0000	0.9710	0.86%	0.01%	4.86%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9962	1.0000	0.9769	0.96%	0.01%	5.50%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9962	1.0000	0.9769	0.96%	0.01%	5.50%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9963	1.0000	0.9781	0.97%	0.01%	5.63%

Table 6-33

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.969935038	0.998974018	0.800729821	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.969935609	0.998974018	0.800734464	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.967686315	0.999794375	0.815193036	-0.23%	0.08%	1.81%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.967686558	0.999794375	0.815195536	-0.23%	0.08%	1.81%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.97182253	0.999799554	0.830046607	0.19%	0.08%	3.66%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.971906282	0.998933036	0.833292411	0.20%	0.00%	4.07%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.971907029	0.998933036	0.833302411	0.20%	0.00%	4.07%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.978998367	0.998994464	0.837552768	0.93%	0.00%	4.60%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.96942183	0.999786429	0.842908125	-0.05%	0.08%	5.27%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.969422177	0.999786429	0.842913929	-0.05%	0.08%	5.27%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.973085385	0.999793304	0.853337946	0.32%	0.08%	6.57%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.979959023	0.998971518	0.857653393	1.03%	0.00%	7.11%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.977385987	0.9999125	0.861695446	0.77%	0.09%	7.61%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.976726915	0.9999125	0.861696964	0.70%	0.09%	7.61%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.976727075	0.9999125	0.861697321	0.70%	0.09%	7.61%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.977839713	0.999055804	0.867185089	0.81%	0.01%	8.30%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.977840252	0.999055804	0.867195536	0.82%	0.01%	8.30%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.975756444	0.999811161	0.873818929	0.60%	0.08%	9.13%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.975756676	0.999811161	0.873824554	0.60%	0.08%	9.13%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.978669493	0.999832411	0.880026875	0.90%	0.09%	9.90%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.978603604	0.999909464	0.883108393	0.89%	0.09%	10.29%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.978038703	0.999909464	0.883112143	0.84%	0.09%	10.29%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.978038821	0.999909464	0.883113214	0.84%	0.09%	10.29%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.983932171	0.999088839	0.886109911	1.44%	0.01%	10.66%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.982362713	0.99992	0.906170893	1.28%	0.09%	13.17%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.982362775	0.99992	0.906171696	1.28%	0.09%	13.17%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.982793844	0.99992	0.911185714	1.33%	0.09%	13.79%

Table 6-38					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.980234187	0.999355804	0.865609643	-0.08%	0.02%	-1.75%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.980234297	0.999355804	0.865610804	-0.08%	0.02%	-1.75%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.983301886	0.999365357	0.878225625	0.24%	0.02%	-0.32%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.980990615	0.999161964	0.881065089	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.980990853	0.999161964	0.881067589	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.981595198	0.999330714	0.889053661	0.06%	0.02%	0.91%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.981595391	0.999330714	0.889056696	0.06%	0.02%	0.91%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.98426932	0.999344732	0.897806518	0.33%	0.02%	1.90%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.986321514	0.999628393	0.902018036	0.54%	0.05%	2.38%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.985859314	0.999628393	0.902019107	0.50%	0.05%	2.38%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.985859379	0.999628393	0.902019464	0.50%	0.05%	2.38%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.982499034	0.999135179	0.905524732	0.15%	0.00%	2.78%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.982499499	0.999135268	0.905529554	0.15%	0.00%	2.78%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.987919694	0.999336429	0.911846429	0.71%	0.02%	3.49%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.985323277	0.999407143	0.912013304	0.44%	0.02%	3.51%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.98532341	0.999407143	0.912015804	0.44%	0.02%	3.51%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9873627	0.99942	0.917054732	0.65%	0.03%	4.08%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.987246576	0.999615536	0.919736607	0.64%	0.05%	4.39%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.986859623	0.999615536	0.919739286	0.60%	0.05%	4.39%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.98685974	0.999615536	0.919739821	0.60%	0.05%	4.39%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.988567749	0.999325089	0.925386964	0.77%	0.02%	5.03%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.986042043	0.999233304	0.926455714	0.51%	0.01%	5.15%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.986042409	0.999233304	0.926459911	0.51%	0.01%	5.15%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.989457908	0.999659643	0.936384464	0.86%	0.05%	6.28%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.989457971	0.999659643	0.936384911	0.86%	0.05%	6.28%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.989750172	0.999659643	0.940379821	0.89%	0.05%	6.73%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.990701209	0.999400982	0.941253839	0.99%	0.02%	6.83%

Table 6-39

					Percent From Baseline	
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.947977224	0.997177054	0.655550536	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.947980617	0.997177054	0.655562232	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.952148618	0.997064196	0.709321964	0.44%	-0.01%	8.20%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.952150883	0.997064196	0.709341875	0.44%	-0.01%	8.21%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.963036136	0.997198125	0.711868393	1.59%	0.00%	8.59%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.965068299	0.997141696	0.747224464	1.80%	0.00%	13.98%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.963290504	0.997395268	0.767850268	1.62%	0.02%	17.13%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.96329191	0.997395357	0.767872054	1.62%	0.02%	17.13%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.972553386	0.997442679	0.797245893	2.59%	0.03%	21.61%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.967321197	0.999319375	0.807731607	2.04%	0.21%	23.21%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.967322665	0.999319375	0.807739286	2.04%	0.21%	23.22%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.971606087	0.999336875	0.824016607	2.49%	0.22%	25.70%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.969146853	0.999291786	0.8373875	2.23%	0.21%	27.74%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.969148564	0.999291786	0.837404554	2.23%	0.21%	27.74%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.972923688	0.999315179	0.848614464	2.63%	0.21%	29.45%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.975293023	0.999369375	0.869154911	2.88%	0.22%	32.58%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.975294062	0.999369375	0.869170625	2.88%	0.22%	32.59%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.978172063	0.999390804	0.876054643	3.19%	0.22%	33.64%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.985573139	0.999976518	0.90555375	3.97%	0.28%	38.14%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.985114952	0.999976518	0.905556964	3.92%	0.28%	38.14%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.985115815	0.999976518	0.905561429	3.92%	0.28%	38.14%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.985998327	0.999975714	0.920579018	4.01%	0.28%	40.43%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.985999175	0.999975714	0.920594911	4.01%	0.28%	40.43%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.986391995	0.999975714	0.921088661	4.05%	0.28%	40.51%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.988668268	0.999978482	0.936558214	4.29%	0.28%	42.87%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9886688	0.999978482	0.936566696	4.29%	0.28%	42.87%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.988970347	0.999978482	0.940682857	4.32%	0.28%	43.50%

Table 6-41

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9360	0.9949	0.5958	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9360	0.9949	0.5958	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9535	0.9949	0.6514	1.87%	0.01%	9.34%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9415	0.9948	0.6543	0.58%	0.00%	9.82%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9415	0.9948	0.6543	0.58%	0.00%	9.83%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9561	0.9948	0.6927	2.15%	0.00%	16.27%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9555	0.9955	0.7239	2.08%	0.07%	21.50%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9555	0.9955	0.7239	2.08%	0.07%	21.50%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9562	0.9983	0.7506	2.15%	0.35%	25.99%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9562	0.9983	0.7506	2.15%	0.35%	25.99%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9658	0.9955	0.7536	3.18%	0.06%	26.48%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9616	0.9983	0.7686	2.73%	0.35%	29.02%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9586	0.9983	0.7875	2.41%	0.34%	32.18%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9586	0.9983	0.7875	2.41%	0.34%	32.18%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9633	0.9983	0.8007	2.91%	0.34%	34.39%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9670	0.9985	0.8296	3.31%	0.36%	39.24%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9670	0.9985	0.8296	3.31%	0.36%	39.25%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9705	0.9985	0.8377	3.68%	0.36%	40.61%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9770	0.9995	0.8615	4.38%	0.46%	44.61%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9764	0.9995	0.8615	4.31%	0.46%	44.61%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9764	0.9995	0.8616	4.31%	0.46%	44.61%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9782	0.9995	0.8836	4.51%	0.46%	48.31%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9777	0.9995	0.8836	4.45%	0.46%	48.31%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9777	0.9995	0.8836	4.45%	0.46%	48.31%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9819	0.9995	0.9068	4.90%	0.47%	52.21%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9819	0.9995	0.9068	4.90%	0.47%	52.21%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9824	0.9995	0.9121	4.95%	0.47%	53.09%

Table 6-42

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9314	0.9969	0.6100	-1.85%	-0.08%	-6.84%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9489	0.9977	0.6548	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9362	0.9968	0.6647	-1.34%	-0.09%	1.51%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9530	0.9977	0.7066	0.42%	-0.01%	7.91%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9613	0.9977	0.7088	1.31%	0.00%	8.25%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9507	0.9972	0.7300	0.19%	-0.05%	11.49%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9633	0.9977	0.7442	1.51%	0.00%	13.66%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9641	0.9980	0.7656	1.59%	0.02%	16.91%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9712	0.9980	0.7953	2.34%	0.02%	21.46%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9699	0.9999	0.8143	2.21%	0.22%	24.36%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9699	0.9999	0.8143	2.21%	0.22%	24.36%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9742	0.9999	0.8301	2.66%	0.22%	26.77%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9717	0.9999	0.8423	2.39%	0.22%	28.63%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9717	0.9999	0.8423	2.39%	0.22%	28.63%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9754	0.9999	0.8527	2.79%	0.22%	30.22%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9776	0.9999	0.8732	3.02%	0.22%	33.35%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9776	0.9999	0.8732	3.02%	0.22%	33.36%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9804	0.9999	0.8804	3.32%	0.22%	34.45%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9867	1.0000	0.9094	3.98%	0.23%	38.88%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9863	1.0000	0.9094	3.93%	0.23%	38.88%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9863	1.0000	0.9094	3.93%	0.23%	38.88%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9870	1.0000	0.9229	4.01%	0.23%	40.94%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9870	1.0000	0.9229	4.01%	0.23%	40.94%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9874	1.0000	0.9239	4.05%	0.23%	41.10%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9895	1.0000	0.9389	4.27%	0.23%	43.38%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9895	1.0000	0.9389	4.27%	0.23%	43.38%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9898	1.0000	0.9431	4.31%	0.23%	44.02%

Table 6-43

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9466	0.9972	0.6562	-0.83%	-0.06%	-7.73%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9510	0.9970	0.7081	-0.37%	-0.08%	-0.42%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9546	0.9977	0.7111	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9584	0.9975	0.7596	0.41%	-0.02%	6.82%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9677	0.9978	0.7611	1.37%	0.01%	7.03%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9627	0.9974	0.7684	0.86%	-0.03%	8.05%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9695	0.9977	0.7986	1.56%	0.00%	12.30%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9683	0.9979	0.8115	1.44%	0.02%	14.12%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9754	0.9998	0.8264	2.18%	0.21%	16.21%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9754	0.9998	0.8265	2.18%	0.21%	16.22%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9761	0.9980	0.8408	2.25%	0.03%	18.24%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9792	0.9998	0.8417	2.58%	0.21%	18.36%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9770	0.9996	0.8541	2.35%	0.19%	20.10%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9770	0.9996	0.8542	2.35%	0.19%	20.12%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9804	0.9998	0.8659	2.71%	0.21%	21.76%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9822	0.9998	0.8839	2.89%	0.21%	24.29%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9822	0.9998	0.8840	2.89%	0.21%	24.30%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9846	0.9998	0.8913	3.14%	0.21%	25.34%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9891	1.0000	0.9141	3.62%	0.22%	28.54%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9887	1.0000	0.9141	3.58%	0.22%	28.54%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9887	1.0000	0.9141	3.58%	0.22%	28.55%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9895	1.0000	0.9288	3.66%	0.22%	30.61%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9895	1.0000	0.9288	3.66%	0.22%	30.61%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9898	1.0000	0.9289	3.70%	0.22%	30.62%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9916	1.0000	0.9435	3.88%	0.22%	32.68%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9916	1.0000	0.9435	3.88%	0.22%	32.68%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9919	1.0000	0.9479	3.91%	0.22%	33.29%

Table 6-57

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.97324366	0.998850179	0.839108036	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.973243977	0.998850179	0.839110982	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.975285365	0.998820089	0.873447768	0.21%	0.00%	4.09%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.975285992	0.998820089	0.873454375	0.21%	0.00%	4.09%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.982460811	0.998872679	0.878328125	0.95%	0.00%	4.67%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.985057643	0.999955179	0.896141607	1.21%	0.11%	6.80%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.985057735	0.999955179	0.896143036	1.21%	0.11%	6.80%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.983435288	0.998855893	0.898661071	1.05%	0.00%	7.10%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.980366914	0.998959107	0.90237375	0.73%	0.01%	7.54%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.980367404	0.998959107	0.902379375	0.73%	0.01%	7.54%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.987471604	0.999955536	0.906935357	1.46%	0.11%	8.08%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.986094412	0.999954196	0.916158304	1.32%	0.11%	9.18%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.986094626	0.999954196	0.91616125	1.32%	0.11%	9.18%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.986627653	0.998989375	0.92121375	1.38%	0.01%	9.78%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.988336173	0.999954821	0.923012679	1.55%	0.11%	10.00%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.989013507	0.999959911	0.933860536	1.62%	0.11%	11.29%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.989013657	0.999959911	0.933862946	1.62%	0.11%	11.29%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.990666653	0.999960804	0.937979375	1.79%	0.11%	11.78%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.993914254	0.999991161	0.951601696	2.12%	0.11%	13.41%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.993684298	0.999991161	0.951602232	2.10%	0.11%	13.41%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.993684323	0.999991161	0.951602411	2.10%	0.11%	13.41%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.994378189	0.999991161	0.961416875	2.17%	0.11%	14.58%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.994182272	0.999991161	0.961418036	2.15%	0.11%	14.58%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.994182324	0.999991161	0.961418304	2.15%	0.11%	14.58%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.995300624	0.999992411	0.969493304	2.27%	0.11%	15.54%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.995300651	0.999992411	0.969493571	2.27%	0.11%	15.54%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.995453581	0.999992411	0.970942589	2.28%	0.11%	15.71%

Table 6-61				Percent From Baseline		
BMP	ER (Mean-based)	ER (Max-based)	ER (Min-based)	ER (Mean-based)	ER (Max-based)	ER (Min-based)
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9727	0.9992	0.8339	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9727	0.9992	0.8339	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9769	0.9996	0.8464	0.43%	0.03%	1.50%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9769	0.9996	0.8464	0.43%	0.03%	1.50%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9802	0.9996	0.8599	0.77%	0.03%	3.11%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9745	0.9992	0.8636	0.18%	0.00%	3.56%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9745	0.9992	0.8636	0.18%	0.00%	3.56%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9811	0.9992	0.8689	0.86%	0.00%	4.19%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9783	0.9995	0.8710	0.57%	0.03%	4.45%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9783	0.9995	0.8710	0.57%	0.03%	4.45%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9812	0.9995	0.8800	0.87%	0.03%	5.52%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9820	0.9992	0.8864	0.95%	0.00%	6.30%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9797	0.9993	0.8908	0.72%	0.01%	6.82%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9797	0.9993	0.8908	0.72%	0.01%	6.82%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9849	1.0000	0.8914	1.25%	0.07%	6.90%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9844	1.0000	0.8914	1.20%	0.07%	6.90%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9844	1.0000	0.8914	1.20%	0.07%	6.90%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9826	0.9996	0.8962	1.02%	0.04%	7.47%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9826	0.9996	0.8962	1.02%	0.04%	7.47%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9849	0.9996	0.9023	1.25%	0.04%	8.20%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9854	0.9993	0.9086	1.30%	0.01%	8.95%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9855	1.0000	0.9089	1.31%	0.07%	8.99%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9855	1.0000	0.9089	1.31%	0.07%	8.99%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9859	1.0000	0.9098	1.36%	0.07%	9.10%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9885	1.0000	0.9272	1.62%	0.07%	11.19%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9885	1.0000	0.9272	1.62%	0.07%	11.19%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9888	1.0000	0.9319	1.65%	0.07%	11.76%

Table 6-72

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9464	0.9999	0.5641	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9359	0.9957	0.5641	-1.11%	-0.42%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9469	0.9959	0.6217	0.06%	-0.40%	10.22%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9373	0.9955	0.6256	-0.96%	-0.44%	10.92%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9373	0.9955	0.6256	-0.96%	-0.44%	10.92%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9534	0.9989	0.6445	0.74%	-0.10%	14.27%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9527	0.9958	0.6659	0.67%	-0.41%	18.06%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9599	0.9999	0.7010	1.43%	0.00%	24.28%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9550	0.9961	0.7010	0.91%	-0.39%	24.28%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9613	0.9963	0.7328	1.57%	-0.36%	29.92%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9586	0.9989	0.7519	1.29%	-0.10%	33.30%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9619	0.9990	0.7705	1.64%	-0.10%	36.60%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9609	0.9989	0.7884	1.53%	-0.10%	39.77%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9608	0.9989	0.7884	1.52%	-0.10%	39.77%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9765	0.9999	0.7980	3.18%	0.00%	41.48%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9636	0.9989	0.8018	1.82%	-0.10%	42.15%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9655	0.9990	0.8309	2.02%	-0.09%	47.30%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9689	0.9990	0.8309	2.38%	-0.09%	47.30%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9776	0.9999	0.8369	3.30%	0.00%	48.37%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9710	0.9991	0.8388	2.60%	-0.09%	48.70%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9789	0.9999	0.8689	3.44%	0.00%	54.04%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9789	0.9999	0.8689	3.44%	0.00%	54.04%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9800	0.9999	0.8893	3.55%	0.00%	57.67%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9800	0.9999	0.8893	3.55%	0.00%	57.67%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9822	1.0000	0.8944	3.78%	0.00%	58.57%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9841	1.0000	0.9118	3.98%	0.00%	61.66%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9841	1.0000	0.9118	3.98%	0.00%	61.66%

Table 6-73

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9510	0.9978	0.6738	-0.79%	-0.04%	-7.46%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9550	0.9977	0.7250	-0.38%	-0.05%	-0.41%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9586	0.9982	0.7281	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9620	0.9981	0.7752	0.36%	-0.01%	6.47%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9709	0.9983	0.7762	1.29%	0.01%	6.62%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9656	0.9980	0.7811	0.73%	-0.02%	7.29%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9725	0.9982	0.8133	1.46%	0.00%	11.71%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9709	0.9984	0.8233	1.28%	0.01%	13.08%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9793	0.9999	0.8457	2.17%	0.17%	16.16%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9793	0.9999	0.8457	2.17%	0.17%	16.16%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9784	0.9984	0.8520	2.06%	0.02%	17.03%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9827	0.9999	0.8602	2.51%	0.17%	18.16%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9808	0.9999	0.8714	2.32%	0.17%	19.69%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9808	0.9999	0.8714	2.32%	0.17%	19.70%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9837	0.9999	0.8814	2.63%	0.17%	21.07%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9849	0.9999	0.8975	2.74%	0.17%	23.27%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9849	0.9999	0.8975	2.74%	0.17%	23.27%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9871	0.9999	0.9044	2.98%	0.17%	24.22%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9916	1.0000	0.9285	3.45%	0.18%	27.53%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9913	1.0000	0.9285	3.41%	0.18%	27.53%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9913	1.0000	0.9285	3.41%	0.18%	27.53%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9919	1.0000	0.9408	3.48%	0.18%	29.22%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9919	1.0000	0.9408	3.48%	0.18%	29.22%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9922	1.0000	0.9413	3.51%	0.18%	29.29%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9935	1.0000	0.9533	3.65%	0.18%	30.93%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9935	1.0000	0.9533	3.65%	0.18%	30.93%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9937	1.0000	0.9571	3.67%	0.18%	31.46%

Table 6-76

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9981	1.0000	0.9849	-0.07%	0.00%	-0.56%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9983	1.0000	0.9876	-0.05%	0.00%	-0.29%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9986	1.0000	0.9903	-0.02%	0.00%	-0.01%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9988	1.0000	0.9905	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9993	1.0000	0.9906	0.05%	0.00%	0.01%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9993	1.0000	0.9918	0.05%	0.00%	0.14%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9989	1.0000	0.9920	0.01%	0.00%	0.16%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9995	1.0000	0.9934	0.06%	0.00%	0.30%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9991	1.0000	0.9936	0.03%	0.00%	0.31%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9994	1.0000	0.9943	0.06%	0.00%	0.39%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9994	1.0000	0.9943	0.06%	0.00%	0.39%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9995	1.0000	0.9952	0.07%	0.00%	0.48%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9994	1.0000	0.9952	0.06%	0.00%	0.48%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9994	1.0000	0.9952	0.06%	0.00%	0.48%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9995	1.0000	0.9959	0.07%	0.00%	0.55%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9998	1.0000	0.9961	0.10%	0.00%	0.57%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9998	1.0000	0.9961	0.10%	0.00%	0.57%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9999	1.0000	0.9967	0.11%	0.00%	0.63%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9980	0.12%	0.00%	0.76%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9980	0.12%	0.00%	0.76%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9980	0.12%	0.00%	0.76%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.0000	1.0000	0.9991	0.12%	0.00%	0.87%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.0000	1.0000	0.9991	0.12%	0.00%	0.87%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.0000	1.0000	0.9991	0.12%	0.00%	0.87%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.0000	1.0000	0.9992	0.12%	0.00%	0.88%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.0000	1.0000	0.9992	0.12%	0.00%	0.88%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.0000	1.0000	0.9992	0.12%	0.00%	0.88%

Table 6-85

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9353	0.9947	0.5958	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9353	0.9947	0.5958	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9528	0.9947	0.6510	1.87%	0.01%	9.27%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9407	0.9946	0.6542	0.57%	-0.01%	9.79%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9407	0.9946	0.6542	0.57%	-0.01%	9.80%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9554	0.9946	0.6920	2.14%	0.00%	16.15%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9548	0.9953	0.7231	2.08%	0.06%	21.37%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9548	0.9953	0.7232	2.08%	0.06%	21.38%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9554	0.9982	0.7488	2.15%	0.36%	25.68%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9554	0.9982	0.7488	2.15%	0.36%	25.68%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9651	0.9954	0.7528	3.18%	0.07%	26.35%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9608	0.9983	0.7666	2.73%	0.36%	28.67%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9578	0.9982	0.7859	2.41%	0.35%	31.90%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9578	0.9982	0.7859	2.41%	0.35%	31.91%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9626	0.9982	0.7990	2.92%	0.35%	34.10%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9663	0.9984	0.8279	3.31%	0.37%	38.95%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9663	0.9984	0.8280	3.31%	0.37%	38.96%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9699	0.9984	0.8359	3.69%	0.38%	40.30%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9765	0.9994	0.8595	4.40%	0.48%	44.26%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9758	0.9994	0.8596	4.33%	0.48%	44.26%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9758	0.9994	0.8596	4.33%	0.48%	44.27%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9777	0.9994	0.8819	4.53%	0.48%	48.01%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9771	0.9994	0.8819	4.47%	0.48%	48.02%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9771	0.9994	0.8819	4.47%	0.48%	48.02%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9814	0.9995	0.9053	4.93%	0.48%	51.94%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9814	0.9995	0.9053	4.93%	0.48%	51.94%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9819	0.9995	0.9105	4.98%	0.48%	52.82%

Table 6-92

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9976	1.0000	0.9838	-0.09%	0.00%	-0.42%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9976	1.0000	0.9838	-0.09%	0.00%	-0.42%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9980	1.0000	0.9858	-0.05%	0.00%	-0.21%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9978	1.0000	0.9862	-0.07%	0.00%	-0.18%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9978	1.0000	0.9862	-0.07%	0.00%	-0.18%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9983	1.0000	0.9876	-0.02%	0.00%	-0.03%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9982	1.0000	0.9876	-0.03%	0.00%	-0.03%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9982	1.0000	0.9876	-0.03%	0.00%	-0.03%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9981	1.0000	0.9876	-0.03%	0.00%	-0.03%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9985	1.0000	0.9879	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9985	1.0000	0.9879	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9982	1.0000	0.9890	-0.03%	0.00%	0.11%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9982	1.0000	0.9890	-0.03%	0.00%	0.11%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9984	1.0000	0.9893	-0.01%	0.00%	0.14%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9984	1.0000	0.9893	-0.01%	0.00%	0.14%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9984	1.0000	0.9893	-0.01%	0.00%	0.14%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9986	1.0000	0.9899	0.01%	0.00%	0.20%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9986	1.0000	0.9899	0.01%	0.00%	0.20%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9985	1.0000	0.9900	0.00%	0.00%	0.21%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9987	1.0000	0.9915	0.02%	0.00%	0.36%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9987	1.0000	0.9915	0.02%	0.00%	0.36%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9988	1.0000	0.9915	0.03%	0.00%	0.36%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9991	1.0000	0.9917	0.06%	0.00%	0.38%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9989	1.0000	0.9921	0.04%	0.00%	0.42%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9989	1.0000	0.9921	0.04%	0.00%	0.42%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9991	1.0000	0.9929	0.06%	0.00%	0.50%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9993	1.0000	0.9942	0.08%	0.00%	0.64%

Table 6-98

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9960	1.0000	0.9694	-0.13%	0.00%	-1.04%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9964	1.0000	0.9755	-0.10%	0.00%	-0.42%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9973	1.0000	0.9796	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9971	1.0000	0.9815	-0.02%	0.00%	0.19%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9986	1.0000	0.9819	0.13%	0.00%	0.23%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9976	1.0000	0.9835	0.03%	0.00%	0.39%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9987	1.0000	0.9845	0.14%	0.00%	0.50%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9981	1.0000	0.9871	0.08%	0.00%	0.76%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9990	1.0000	0.9877	0.16%	0.00%	0.82%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9990	1.0000	0.9902	0.17%	0.00%	1.08%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9990	1.0000	0.9902	0.17%	0.00%	1.08%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9991	1.0000	0.9919	0.18%	0.00%	1.25%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9991	1.0000	0.9919	0.18%	0.00%	1.25%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9992	1.0000	0.9919	0.19%	0.00%	1.25%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9993	1.0000	0.9932	0.20%	0.00%	1.39%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9992	1.0000	0.9936	0.19%	0.00%	1.42%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9992	1.0000	0.9936	0.19%	0.00%	1.42%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9994	1.0000	0.9945	0.21%	0.00%	1.52%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9973	0.27%	0.00%	1.80%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9973	0.27%	0.00%	1.80%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9973	0.27%	0.00%	1.80%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.0000	1.0000	0.9977	0.27%	0.00%	1.85%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.0000	1.0000	0.9977	0.27%	0.00%	1.85%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.0000	1.0000	0.9977	0.27%	0.00%	1.85%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.0000	1.0000	0.9981	0.27%	0.00%	1.89%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.0000	1.0000	0.9981	0.27%	0.00%	1.89%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.0000	1.0000	0.9981	0.27%	0.00%	1.89%

Table 6-101

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9710	0.9987	0.8131	-0.51%	-0.02%	-4.31%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9730	0.9987	0.8458	-0.30%	-0.03%	-0.46%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9759	0.9989	0.8497	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9832	0.9990	0.8732	0.75%	0.00%	2.77%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9786	0.9988	0.8780	0.27%	-0.01%	3.32%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9777	0.9989	0.8789	0.18%	0.00%	3.43%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9831	0.9995	0.8837	0.74%	0.06%	4.00%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9831	0.9995	0.8837	0.74%	0.06%	4.00%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9858	0.9996	0.8947	1.01%	0.06%	5.30%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9840	0.9989	0.8978	0.84%	0.00%	5.65%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9843	0.9995	0.9043	0.86%	0.06%	6.42%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9843	0.9995	0.9043	0.86%	0.06%	6.42%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9822	0.9990	0.9052	0.65%	0.01%	6.52%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9866	0.9995	0.9123	1.09%	0.06%	7.36%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9871	0.9990	0.9220	1.15%	0.01%	8.50%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9874	0.9996	0.9239	1.18%	0.07%	8.73%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9874	0.9996	0.9239	1.18%	0.07%	8.73%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9892	0.9996	0.9289	1.36%	0.07%	9.32%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9911	1.0000	0.9330	1.55%	0.11%	9.81%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9907	1.0000	0.9330	1.52%	0.11%	9.81%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9907	1.0000	0.9330	1.52%	0.11%	9.81%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9918	1.0000	0.9456	1.63%	0.11%	11.28%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9915	1.0000	0.9456	1.60%	0.11%	11.28%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9915	1.0000	0.9456	1.60%	0.11%	11.28%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9934	1.0000	0.9568	1.80%	0.11%	12.60%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9934	1.0000	0.9568	1.80%	0.11%	12.60%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9936	1.0000	0.9601	1.82%	0.11%	12.99%

Table 6-105

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9333	0.9975	0.6093	-1.65%	-0.06%	-5.50%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9489	0.9981	0.6448	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9381	0.9974	0.6637	-1.14%	-0.07%	2.93%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9530	0.9980	0.6971	0.43%	-0.01%	8.11%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9615	0.9982	0.7001	1.32%	0.01%	8.58%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9526	0.9977	0.7302	0.38%	-0.04%	13.24%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9635	0.9982	0.7359	1.54%	0.01%	14.14%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9644	0.9983	0.7583	1.63%	0.02%	17.60%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9716	0.9984	0.7889	2.39%	0.03%	22.35%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9731	0.9999	0.8285	2.55%	0.18%	28.50%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9731	0.9999	0.8285	2.55%	0.18%	28.50%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9772	0.9999	0.8439	2.98%	0.18%	30.89%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9748	0.9999	0.8541	2.72%	0.18%	32.46%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9748	0.9999	0.8541	2.72%	0.18%	32.47%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9783	0.9999	0.8641	3.09%	0.18%	34.02%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9802	0.9999	0.8839	3.29%	0.18%	37.08%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9802	0.9999	0.8839	3.29%	0.18%	37.08%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9828	0.9999	0.8907	3.56%	0.18%	38.14%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9888	1.0000	0.9205	4.20%	0.19%	42.76%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9884	1.0000	0.9205	4.16%	0.19%	42.76%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9884	1.0000	0.9205	4.16%	0.19%	42.76%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9890	1.0000	0.9323	4.22%	0.19%	44.58%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9890	1.0000	0.9323	4.22%	0.19%	44.58%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9894	1.0000	0.9333	4.26%	0.19%	44.75%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9912	1.0000	0.9468	4.45%	0.19%	46.84%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9912	1.0000	0.9468	4.45%	0.19%	46.84%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9915	1.0000	0.9506	4.48%	0.19%	47.43%

Table 6-107

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9212	0.9957	0.5609	-2.00%	-0.12%	-7.42%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9399	0.9969	0.6058	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9267	0.9956	0.6218	-1.41%	-0.13%	2.64%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9536	0.9969	0.6642	1.45%	0.00%	9.64%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9447	0.9968	0.6644	0.50%	-0.01%	9.68%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9435	0.9961	0.6960	0.38%	-0.08%	14.89%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9560	0.9969	0.7047	1.71%	0.00%	16.32%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9578	0.9971	0.7322	1.90%	0.02%	20.87%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9656	0.9972	0.7640	2.73%	0.03%	26.12%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9615	0.9996	0.7726	2.30%	0.28%	27.54%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9615	0.9996	0.7726	2.30%	0.28%	27.54%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9666	0.9997	0.7906	2.83%	0.28%	30.50%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9637	0.9996	0.8067	2.53%	0.27%	33.17%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9637	0.9996	0.8067	2.53%	0.27%	33.17%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9681	0.9996	0.8195	3.00%	0.28%	35.28%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9713	0.9997	0.8449	3.34%	0.28%	39.47%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9713	0.9997	0.8449	3.34%	0.28%	39.47%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9746	0.9997	0.8525	3.69%	0.29%	40.72%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9818	1.0000	0.8822	4.45%	0.31%	45.62%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9812	1.0000	0.8822	4.39%	0.31%	45.62%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9812	1.0000	0.8822	4.39%	0.31%	45.63%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9824	1.0000	0.9005	4.52%	0.31%	48.66%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9824	1.0000	0.9005	4.52%	0.31%	48.66%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9829	1.0000	0.9010	4.57%	0.31%	48.74%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9860	1.0000	0.9207	4.90%	0.31%	51.98%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9860	1.0000	0.9207	4.90%	0.31%	51.98%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9863	1.0000	0.9254	4.94%	0.31%	52.76%

Table 6-111

					Percent From Baseline	
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9940	1.0000	0.9594	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9940	1.0000	0.9594	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9944	1.0000	0.9665	0.04%	0.00%	0.74%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9944	1.0000	0.9665	0.04%	0.00%	0.74%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9960	1.0000	0.9703	0.20%	0.00%	1.14%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9955	1.0000	0.9733	0.15%	0.00%	1.45%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9955	1.0000	0.9733	0.15%	0.00%	1.45%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9963	1.0000	0.9743	0.23%	0.00%	1.56%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9970	1.0000	0.9791	0.30%	0.00%	2.06%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9993	1.0000	0.9947	0.53%	0.00%	3.68%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9993	1.0000	0.9947	0.53%	0.00%	3.68%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9994	1.0000	0.9954	0.54%	0.00%	3.75%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9994	1.0000	0.9954	0.54%	0.00%	3.75%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9994	1.0000	0.9954	0.54%	0.00%	3.76%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9995	1.0000	0.9960	0.55%	0.00%	3.82%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9995	1.0000	0.9962	0.55%	0.00%	3.84%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9995	1.0000	0.9962	0.55%	0.00%	3.84%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9998	1.0000	0.9967	0.59%	0.00%	3.89%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9999	0.60%	0.00%	4.22%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9999	0.60%	0.00%	4.22%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9999	0.60%	0.00%	4.22%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.0000	1.0000	0.9999	0.60%	0.00%	4.22%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.0000	1.0000	0.9999	0.60%	0.00%	4.22%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.0000	1.0000	0.9999	0.60%	0.00%	4.22%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.0000	1.0000	0.9999	0.60%	0.00%	4.23%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.0000	1.0000	0.9999	0.60%	0.00%	4.23%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.0000	1.0000	0.9999	0.60%	0.00%	4.23%

Table 6-113

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9975	1.0000	0.9846	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9975	1.0000	0.9846	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9978	1.0000	0.9874	0.03%	0.00%	0.28%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9978	1.0000	0.9874	0.03%	0.00%	0.28%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9982	1.0000	0.9897	0.07%	0.00%	0.51%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9982	1.0000	0.9897	0.07%	0.00%	0.51%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9987	1.0000	0.9909	0.12%	0.00%	0.64%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9988	1.0000	0.9923	0.13%	0.00%	0.78%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9991	1.0000	0.9937	0.15%	0.00%	0.92%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9993	1.0000	0.9945	0.18%	0.00%	1.00%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9993	1.0000	0.9945	0.18%	0.00%	1.00%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9994	1.0000	0.9954	0.19%	0.00%	1.09%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9994	1.0000	0.9954	0.19%	0.00%	1.09%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9994	1.0000	0.9954	0.19%	0.00%	1.09%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9995	1.0000	0.9961	0.20%	0.00%	1.16%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9995	1.0000	0.9962	0.20%	0.00%	1.18%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9995	1.0000	0.9962	0.20%	0.00%	1.18%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9996	1.0000	0.9968	0.21%	0.00%	1.24%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9993	0.25%	0.00%	1.49%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9993	0.25%	0.00%	1.49%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	1.0000	1.0000	0.9993	0.25%	0.00%	1.49%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	1.0000	1.0000	0.9999	0.25%	0.00%	1.55%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	1.0000	1.0000	0.9999	0.25%	0.00%	1.55%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	1.0000	1.0000	0.9999	0.25%	0.00%	1.55%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	1.0000	1.0000	0.9999	0.25%	0.00%	1.55%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	1.0000	1.0000	0.9999	0.25%	0.00%	1.55%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	1.0000	1.0000	0.9999	0.25%	0.00%	1.55%

Table 6-114

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9957	1.0000	0.9705	-0.01%	0.00%	-0.39%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9957	1.0000	0.9705	-0.01%	0.00%	-0.39%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9964	1.0000	0.9741	0.06%	0.00%	-0.02%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9959	1.0000	0.9743	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9959	1.0000	0.9743	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9961	1.0000	0.9759	0.02%	0.00%	0.16%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9961	1.0000	0.9759	0.02%	0.00%	0.16%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9967	1.0000	0.9780	0.08%	0.00%	0.38%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9963	1.0000	0.9793	0.04%	0.00%	0.52%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9963	1.0000	0.9793	0.04%	0.00%	0.52%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9969	1.0000	0.9806	0.10%	0.00%	0.65%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9969	1.0000	0.9806	0.10%	0.00%	0.65%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9974	1.0000	0.9821	0.15%	0.00%	0.81%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9975	1.0000	0.9831	0.17%	0.00%	0.90%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9970	1.0000	0.9837	0.11%	0.00%	0.97%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9970	1.0000	0.9837	0.11%	0.00%	0.97%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9979	1.0000	0.9840	0.20%	0.00%	0.99%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9978	1.0000	0.9840	0.19%	0.00%	0.99%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9978	1.0000	0.9840	0.19%	0.00%	0.99%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9977	1.0000	0.9859	0.19%	0.00%	1.19%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9981	1.0000	0.9869	0.22%	0.00%	1.29%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9981	1.0000	0.9869	0.22%	0.00%	1.29%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9981	1.0000	0.9869	0.22%	0.00%	1.29%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9981	1.0000	0.9884	0.23%	0.00%	1.45%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9984	1.0000	0.9895	0.26%	0.00%	1.56%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9984	1.0000	0.9895	0.26%	0.00%	1.56%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9985	1.0000	0.9897	0.26%	0.00%	1.58%

Table 6-131

					Percent From Baseline	
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9837	0.9999	0.8891	-0.48%	0.00%	-3.65%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9848	0.9998	0.9098	-0.37%	-0.01%	-1.40%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9884	1.0000	0.9228	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9927	1.0000	0.9287	0.43%	0.00%	0.64%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9881	0.9999	0.9291	-0.03%	0.00%	0.68%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9919	1.0000	0.9363	0.35%	0.00%	1.46%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9919	1.0000	0.9363	0.35%	0.00%	1.46%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9894	0.9999	0.9389	0.10%	0.00%	1.75%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9931	1.0000	0.9413	0.48%	0.00%	2.01%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9933	1.0000	0.9439	0.50%	0.00%	2.29%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9925	1.0000	0.9480	0.41%	0.00%	2.74%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9925	1.0000	0.9480	0.41%	0.00%	2.74%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9916	1.0000	0.9525	0.32%	0.00%	3.23%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9938	1.0000	0.9527	0.54%	0.00%	3.25%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9944	1.0000	0.9576	0.61%	0.00%	3.78%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9939	1.0000	0.9587	0.56%	0.00%	3.90%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9939	1.0000	0.9587	0.56%	0.00%	3.90%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9950	1.0000	0.9618	0.66%	0.00%	4.23%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9963	1.0000	0.9681	0.80%	0.00%	4.92%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9961	1.0000	0.9681	0.78%	0.00%	4.92%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9961	1.0000	0.9681	0.78%	0.00%	4.92%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9966	1.0000	0.9742	0.83%	0.00%	5.58%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9964	1.0000	0.9742	0.81%	0.00%	5.58%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9964	1.0000	0.9742	0.81%	0.00%	5.58%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9971	1.0000	0.9796	0.88%	0.00%	6.16%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9971	1.0000	0.9796	0.88%	0.00%	6.16%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9972	1.0000	0.9804	0.89%	0.00%	6.24%

Table 6-132

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9882	1.0000	0.9156	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9882	1.0000	0.9156	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9892	1.0000	0.9320	0.10%	0.00%	1.80%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9892	1.0000	0.9320	0.10%	0.00%	1.80%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9929	1.0000	0.9391	0.47%	0.00%	2.58%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9915	1.0000	0.9469	0.33%	0.00%	3.42%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9915	1.0000	0.9469	0.33%	0.00%	3.42%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9932	1.0000	0.9477	0.51%	0.00%	3.51%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9946	1.0000	0.9587	0.64%	0.00%	4.71%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9956	1.0000	0.9615	0.74%	0.00%	5.01%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9956	1.0000	0.9615	0.74%	0.00%	5.01%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9964	1.0000	0.9666	0.83%	0.00%	5.57%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9959	1.0000	0.9684	0.77%	0.00%	5.77%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9959	1.0000	0.9684	0.77%	0.00%	5.77%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9967	1.0000	0.9717	0.85%	0.00%	6.13%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9968	1.0000	0.9751	0.86%	0.00%	6.50%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9968	1.0000	0.9751	0.86%	0.00%	6.50%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9974	1.0000	0.9774	0.93%	0.00%	6.75%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9986	1.0000	0.9859	1.05%	0.00%	7.68%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9986	1.0000	0.9859	1.04%	0.00%	7.68%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9986	1.0000	0.9859	1.04%	0.00%	7.68%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9987	1.0000	0.9884	1.06%	0.00%	7.95%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9987	1.0000	0.9884	1.06%	0.00%	7.95%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9987	1.0000	0.9884	1.06%	0.00%	7.95%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9990	1.0000	0.9909	1.09%	0.00%	8.23%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9989	1.0000	0.9909	1.08%	0.00%	8.23%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9989	1.0000	0.9909	1.08%	0.00%	8.23%

Table 6-133

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9549	0.9983	0.6883	-0.38%	0.01%	-6.63%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9610	0.9986	0.7349	0.25%	0.03%	-0.32%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9586	0.9983	0.7372	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9643	0.9985	0.7801	0.59%	0.02%	5.82%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9728	0.9986	0.7877	1.49%	0.03%	6.84%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9684	0.9985	0.7911	1.03%	0.02%	7.30%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9743	0.9986	0.8168	1.64%	0.03%	10.79%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9727	0.9987	0.8268	1.48%	0.04%	12.14%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9799	0.9987	0.8547	2.23%	0.05%	15.94%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9834	1.0000	0.8681	2.59%	0.17%	17.75%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9834	1.0000	0.8681	2.59%	0.17%	17.75%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9862	1.0000	0.8814	2.89%	0.17%	19.55%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9847	1.0000	0.8897	2.72%	0.17%	20.68%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9847	1.0000	0.8897	2.72%	0.17%	20.68%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9871	1.0000	0.8988	2.98%	0.17%	21.91%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9880	1.0000	0.9128	3.07%	0.17%	23.81%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9880	1.0000	0.9128	3.07%	0.17%	23.81%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9898	1.0000	0.9190	3.26%	0.17%	24.66%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9937	1.0000	0.9434	3.67%	0.17%	27.96%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9935	1.0000	0.9434	3.64%	0.17%	27.96%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9935	1.0000	0.9434	3.64%	0.17%	27.96%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9939	1.0000	0.9530	3.69%	0.17%	29.27%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9939	1.0000	0.9530	3.69%	0.17%	29.27%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9941	1.0000	0.9536	3.71%	0.17%	29.34%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9951	1.0000	0.9632	3.82%	0.17%	30.65%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9951	1.0000	0.9632	3.82%	0.17%	30.65%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9953	1.0000	0.9663	3.83%	0.17%	31.07%

Table 6-137

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9901	1.0000	0.9257	-0.07%	0.00%	-1.38%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9901	1.0000	0.9257	-0.07%	0.00%	-1.38%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9908	1.0000	0.9386	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9908	1.0000	0.9386	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9934	1.0000	0.9423	0.26%	0.00%	0.40%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9937	1.0000	0.9503	0.29%	0.00%	1.25%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9927	1.0000	0.9514	0.18%	0.00%	1.37%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9927	1.0000	0.9514	0.18%	0.00%	1.37%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9937	1.0000	0.9576	0.29%	0.00%	2.02%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9937	1.0000	0.9576	0.29%	0.00%	2.02%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9949	1.0000	0.9601	0.41%	0.00%	2.29%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9947	1.0000	0.9622	0.39%	0.00%	2.51%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9942	1.0000	0.9643	0.34%	0.00%	2.73%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9942	1.0000	0.9643	0.34%	0.00%	2.73%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9951	1.0000	0.9670	0.43%	0.00%	3.03%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9953	1.0000	0.9717	0.45%	0.00%	3.53%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9953	1.0000	0.9717	0.45%	0.00%	3.53%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9960	1.0000	0.9736	0.52%	0.00%	3.73%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9974	1.0000	0.9801	0.66%	0.00%	4.42%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9973	1.0000	0.9801	0.65%	0.00%	4.42%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9973	1.0000	0.9801	0.65%	0.00%	4.42%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9976	1.0000	0.9834	0.68%	0.00%	4.77%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9975	1.0000	0.9834	0.67%	0.00%	4.77%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9975	1.0000	0.9834	0.67%	0.00%	4.77%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9980	1.0000	0.9868	0.73%	0.00%	5.13%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9980	1.0000	0.9868	0.72%	0.00%	5.13%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9980	1.0000	0.9868	0.72%	0.00%	5.13%

Table 6-139

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9470	0.9942	0.6982	-1.09%	-0.13%	-8.31%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9515	0.9941	0.7524	-0.62%	-0.15%	-1.19%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9574	0.9956	0.7615	0.00%	0.00%	0.00%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9640	0.9976	0.7867	0.68%	0.20%	3.32%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9640	0.9976	0.7867	0.68%	0.20%	3.32%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9705	0.9964	0.7910	1.36%	0.09%	3.88%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9689	0.9976	0.8034	1.19%	0.20%	5.50%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9625	0.9947	0.8060	0.53%	-0.09%	5.85%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9612	0.9955	0.8105	0.39%	-0.01%	6.44%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9664	0.9975	0.8229	0.94%	0.19%	8.06%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9664	0.9975	0.8229	0.94%	0.19%	8.06%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9721	0.9964	0.8325	1.53%	0.08%	9.33%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9706	0.9975	0.8355	1.38%	0.19%	9.72%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9698	0.9959	0.8520	1.29%	0.04%	11.89%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9733	0.9977	0.8591	1.65%	0.22%	12.82%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9733	0.9977	0.8591	1.65%	0.22%	12.82%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9764	0.9978	0.8658	1.98%	0.22%	13.70%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9803	0.9991	0.8765	2.39%	0.35%	15.11%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9797	0.9991	0.8765	2.33%	0.35%	15.11%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9797	0.9991	0.8765	2.33%	0.35%	15.11%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9777	0.9968	0.8786	2.11%	0.12%	15.39%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9817	0.9990	0.8993	2.53%	0.35%	18.09%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9812	0.9990	0.8993	2.48%	0.35%	18.09%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9812	0.9990	0.8993	2.48%	0.35%	18.10%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9848	0.9991	0.9198	2.86%	0.36%	20.80%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9848	0.9991	0.9198	2.86%	0.36%	20.80%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9852	0.9991	0.9243	2.90%	0.36%	21.38%

Table 6-140

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9766	0.9989	0.8529	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9766	0.9989	0.8529	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9782	0.9989	0.8777	0.16%	0.00%	2.91%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9782	0.9989	0.8777	0.16%	0.00%	2.91%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9836	0.9990	0.8802	0.71%	0.00%	3.19%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9843	0.9989	0.8953	0.79%	0.00%	4.97%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9825	0.9999	0.8998	0.60%	0.10%	5.49%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9825	0.9999	0.8998	0.60%	0.10%	5.49%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9824	0.9990	0.9020	0.60%	0.01%	5.76%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9824	0.9990	0.9020	0.60%	0.01%	5.76%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9848	0.9999	0.9084	0.84%	0.10%	6.50%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9872	0.9991	0.9156	1.09%	0.01%	7.34%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9837	0.9999	0.9159	0.73%	0.10%	7.38%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9837	0.9999	0.9159	0.73%	0.10%	7.38%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9857	0.9999	0.9216	0.93%	0.10%	8.06%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9867	0.9999	0.9320	1.03%	0.10%	9.27%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9867	0.9999	0.9320	1.03%	0.10%	9.27%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9883	0.9999	0.9356	1.20%	0.10%	9.70%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9907	1.0000	0.9421	1.44%	0.10%	10.45%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9904	1.0000	0.9421	1.42%	0.10%	10.45%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9904	1.0000	0.9421	1.42%	0.10%	10.45%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9913	1.0000	0.9521	1.51%	0.10%	11.63%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9911	1.0000	0.9521	1.48%	0.10%	11.63%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9911	1.0000	0.9521	1.48%	0.10%	11.63%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9927	1.0000	0.9613	1.65%	0.10%	12.70%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9927	1.0000	0.9613	1.65%	0.10%	12.70%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9929	1.0000	0.9636	1.67%	0.10%	12.98%

Table 6-141

					Percent From Baseline	
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.996252679	0.999999196	0.970472589	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.996252749	0.999999196	0.970473304	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.996605635	0.999999196	0.976120446	0.04%	0.00%	0.58%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.996605797	0.999999196	0.976121875	0.04%	0.00%	0.58%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998024404	0.999999286	0.981042679	0.18%	0.00%	1.09%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.998035092	0.999999821	0.981369107	0.18%	0.00%	1.12%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.998035107	0.999999821	0.981369375	0.18%	0.00%	1.12%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.997337064	0.999999286	0.982089821	0.11%	0.00%	1.20%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.997337186	0.999999286	0.982091071	0.11%	0.00%	1.20%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998151401	0.999999196	0.983900625	0.19%	0.00%	1.38%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.998464235	0.999999821	0.984242589	0.22%	0.00%	1.42%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.998189693	0.999999821	0.984680982	0.19%	0.00%	1.46%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.998189725	0.999999821	0.984681339	0.19%	0.00%	1.46%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.998567308	0.999999821	0.986720536	0.23%	0.00%	1.67%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998523821	0.999999286	0.987461161	0.23%	0.00%	1.75%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.99855304	0.999999821	0.988196786	0.23%	0.00%	1.83%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.998553067	0.999999821	0.988197232	0.23%	0.00%	1.83%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.998847514	0.999999821	0.989443393	0.26%	0.00%	1.95%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.999700659	1	0.992396786	0.35%	0.00%	2.26%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.999685707	1	0.992396875	0.34%	0.00%	2.26%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.999685705	1	0.992396875	0.34%	0.00%	2.26%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.999885546	1	0.9936125	0.36%	0.00%	2.38%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.999880195	1	0.993612679	0.36%	0.00%	2.38%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.999880196	1	0.993612768	0.36%	0.00%	2.38%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9999841	1	0.994979911	0.37%	0.00%	2.53%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.999983269	1	0.994980179	0.37%	0.00%	2.53%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.999983269	1	0.994980179	0.37%	0.00%	2.53%

Table 6-142

				Percent From Baseline		
BMP	**Mean ER**	**Max ER**	**Min ER**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9887	1.0000	0.9266	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9887	1.0000	0.9266	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9894	1.0000	0.9375	0.07%	0.00%	1.18%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9894	1.0000	0.9375	0.07%	0.00%	1.18%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9925	1.0000	0.9439	0.38%	0.00%	1.87%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9928	1.0000	0.9508	0.41%	0.00%	2.61%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9915	1.0000	0.9511	0.28%	0.00%	2.65%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9915	1.0000	0.9511	0.28%	0.00%	2.65%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9942	1.0000	0.9606	0.55%	0.00%	3.68%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9958	1.0000	0.9677	0.72%	0.00%	4.44%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9958	1.0000	0.9677	0.72%	0.00%	4.44%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9966	1.0000	0.9719	0.80%	0.00%	4.89%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9960	1.0000	0.9725	0.74%	0.00%	4.96%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9960	1.0000	0.9725	0.74%	0.00%	4.96%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9968	1.0000	0.9753	0.82%	0.00%	5.26%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9968	1.0000	0.9785	0.82%	0.00%	5.61%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9968	1.0000	0.9785	0.82%	0.00%	5.61%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9974	1.0000	0.9804	0.88%	0.00%	5.81%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9984	1.0000	0.9857	0.98%	0.00%	6.39%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9983	1.0000	0.9857	0.97%	0.00%	6.39%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9983	1.0000	0.9857	0.97%	0.00%	6.39%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9985	1.0000	0.9878	0.99%	0.00%	6.61%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9984	1.0000	0.9878	0.98%	0.00%	6.61%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9984	1.0000	0.9878	0.98%	0.00%	6.61%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9988	1.0000	0.9903	1.02%	0.00%	6.88%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9987	1.0000	0.9903	1.01%	0.00%	6.88%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9987	1.0000	0.9903	1.01%	0.00%	6.88%

Table 6-143

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9752	0.9998	0.8423	-0.53%	0.00%	-4.22%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9771	0.9998	0.8684	-0.34%	-0.01%	-1.24%
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9804	0.9999	0.8793	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9864	0.9999	0.8945	0.61%	0.00%	1.73%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9818	0.9999	0.8948	0.14%	0.00%	1.76%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9819	0.9999	0.9024	0.15%	0.00%	2.62%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9872	1.0000	0.9094	0.69%	0.01%	3.42%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9872	1.0000	0.9094	0.69%	0.01%	3.42%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9871	0.9999	0.9145	0.68%	0.00%	4.00%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9893	1.0000	0.9192	0.90%	0.01%	4.53%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9855	0.9999	0.9222	0.52%	0.00%	4.88%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9881	1.0000	0.9234	0.79%	0.01%	5.01%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9881	1.0000	0.9234	0.79%	0.01%	5.01%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9899	1.0000	0.9298	0.97%	0.01%	5.74%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9896	0.9999	0.9377	0.93%	0.00%	6.63%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9906	1.0000	0.9392	1.03%	0.01%	6.81%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9906	1.0000	0.9392	1.03%	0.01%	6.81%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9920	1.0000	0.9436	1.18%	0.01%	7.30%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.9940	1.0000	0.9525	1.38%	0.01%	8.32%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.9937	1.0000	0.9525	1.36%	0.01%	8.32%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.9937	1.0000	0.9525	1.36%	0.01%	8.32%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.9942	1.0000	0.9602	1.41%	0.01%	9.19%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.9942	1.0000	0.9602	1.41%	0.01%	9.19%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.9944	1.0000	0.9610	1.43%	0.01%	9.28%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.9953	1.0000	0.9684	1.52%	0.01%	10.13%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.9953	1.0000	0.9684	1.52%	0.01%	10.13%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.9955	1.0000	0.9710	1.54%	0.01%	10.43%

Table 6-149

				Percent From Baseline		
BMP	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**	**ER (Mean-based)**	**ER (Max-based)**	**ER (Min-based)**
Conventional Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.944669974	0.998473482	0.705471786	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.944670118	0.998473482	0.705472232	0.00%	0.00%	0.00%
Conventional Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.958270608	0.998731964	0.745306161	1.44%	0.03%	5.65%
Conventional Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.947455313	0.998403929	0.745450893	0.29%	-0.01%	5.67%
Conventional Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.947455395	0.998403929	0.745452411	0.29%	-0.01%	5.67%
Conventional Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.959526891	0.998667232	0.771392411	1.57%	0.02%	9.34%
Conventional Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.958327425	0.998606518	0.795046339	1.45%	0.01%	12.70%
Conventional Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.958327477	0.998606518	0.795046875	1.45%	0.01%	12.70%
Conventional Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.967361799	0.998815982	0.815215536	2.40%	0.03%	15.56%
Conservation Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.987654765	0.999997768	0.907125714	4.55%	0.15%	28.58%
Conservation Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.984621318	0.999977946	0.907125804	4.23%	0.15%	28.58%
Conservation Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.987168954	0.999983661	0.916225089	4.50%	0.15%	29.87%
Conservation Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.985421286	0.999977143	0.919968661	4.31%	0.15%	30.40%
Conservation Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.988304179	0.999998304	0.921324464	4.62%	0.15%	30.60%
Conservation Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.98771665	0.999983304	0.925867589	4.56%	0.15%	31.24%
Conservation Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.988204955	0.999980536	0.936725536	4.61%	0.15%	32.78%
Conservation Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.990030598	0.999986964	0.940668661	4.80%	0.15%	33.34%
Conservation Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.990538411	0.999999018	0.943364464	4.86%	0.15%	33.72%
No Tillage/ Corn after Corn/ Pre-Plant Soil Incorporation	0.995057303	0.999999107	0.965304821	5.33%	0.15%	36.83%
No Tillage/ Corn after Small Grain/ Pre-Plant Soil Incorporation	0.994851878	0.999999107	0.965304911	5.31%	0.15%	36.83%
No Tillage/ Corn after Beans/ Pre-Plant Soil Incorporation	0.994851886	0.999999107	0.965305	5.31%	0.15%	36.83%
No Tillage/ Corn after Small Grain/ Pre-Emergence Surface Application	0.995172572	0.999999107	0.970363571	5.35%	0.15%	37.55%
No Tillage/ Corn after Beans/ Pre-Emergence Surface Application	0.99517259	0.999999107	0.970364018	5.35%	0.15%	37.55%
No Tillage/ Corn after Corn/ Pre-Emergence Surface Application	0.995355999	0.999999107	0.970960268	5.37%	0.15%	37.63%
No Tillage/ Corn after Small Grain/ Post-Emergence Surface Application	0.996081009	0.999999286	0.976596607	5.44%	0.15%	38.43%
No Tillage/ Corn after Beans/ Post-Emergence Surface Application	0.99608102	0.999999286	0.976596875	5.44%	0.15%	38.43%
No Tillage/ Corn after Corn/ Post-Emergence Surface Application	0.996226268	0.999999286	0.977266071	5.46%	0.15%	38.53%