

"What's a River Worth?"

A Valuation Survey of the Ohio River Corridor

A project jointly sponsored by:

The Ohio River Valley Water Sanitation Commission
The National Park Service, Rivers, Trails, and
Conservation Assistance Program
and
The Ohio River Basin Commission

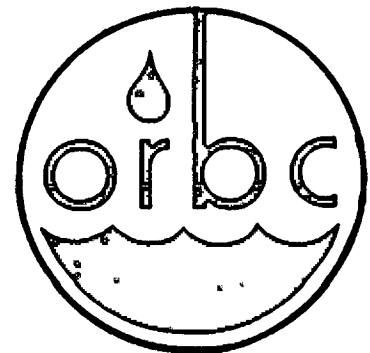


"What's a River Worth?"

A Valuation Survey of the Ohio River Corridor

A project jointly sponsored by:

The Ohio River Valley Water Sanitation Commission
The National Park Service, Rivers, Trails, and
Conservation Assistance Program
and
The Ohio River Basin Commission



June 1994

This project was funded through a cooperative agreement between the National Park Service, Rivers, Trails, and Conservation Assistance Program, and the Ohio River Valley Water Sanitation Commission, with additional funding provided by the Ohio River Basin Commission. Research for the project was carried out from May through November, 1993 by Dr. Richard V. Smith and graduate students Steve Graves, Glynne Fichtner, and Judi Hart of Miami University, Oxford, Ohio.

TABLE OF CONTENTS

Executive Summary	1
Introduction	5
Demographic Profile	6
The Economy	8
Primary River Economy	9
Ohio River Dischargers	10
Secondary River Economy	10
Riverfront Enhancement	13
Ashland, Kentucky	13
East Liverpool, Ohio	13
Louisville, Kentucky	13
Maysville, Kentucky	14
Newport, Kentucky	14
New Richmond, Ohio	14
Wheeling, West Virginia	14
Tourism and Recreation	15
Riverboat Cruises	16
Riverboat Casinos	16
Special Events	16
Evansville Freedom Festival	17
Portsmouth River Days Festival	17
Tall Stacks	17
Tristate Fair and Regatta	17
Historic and Cultural Attractions	18
Outdoor Pursuits	18
The Environment	21
Water Quality	21
Land Uses	22
Ecosystems	22
Fish and Wildlife	23
Natural Areas	25
Ohio River Islands National Wildlife Refuge	25
Falls of the Ohio State Park and National Wildlife Conservation Area	26
Green Bottom	26
Ohio River Wetlands	26

History	28
Native Cultures	28
Colonial Activities	29
Settlement	29
Land of Diversity	30
Economic, Political and Cultural Growth	31
Conclusions	32
Information Deficits	32
Study Limitations	32

Maps and Figures

Map 1: Ohio River Corridor Counties	34
Map 2: People Living in Poverty 1990	35
Map 3: Primary Sector Employment	36
Map 4: Secondary Sector Employment	37
Map 5: Percent Unemployment 1990	38
Map 6: Percent Change in Poverty 1980-90	39
Map 7: Selected Tourism and Recreation Employment	40
Map 8: Historic Districts	41
Map 9: State Parks and Recreation Areas	42
Map 10: Public Access Sites	43
Map 11: Marinas	44
Map 12: Woodall's Campgrounds	45
Map 13: Scenic Highways	46
Table 1. Standard Industrial Classification Codes Used in Corridor Analysis	47
Table 2: Ohio River Navigation Dams	48

Table 3: Power Generating Facilities on the Ohio River	49
Table 4: Ohio River Corridor Camping Facilities	51
Table 5: State Parks and Recreation Areas in Corridor Counties	53
Table 6: Ohio River Islands	55
Table 7: Embayments and Wetlands on the Ohio River	58
Graph 1: Persons Living Below Poverty Level 1990	62
Graph 2: Median Household Income 1990	63
Graph 3: Median Home Value 1990	64
Selected Bibliography.	65
Sources Cited.	67

EXECUTIVE SUMMARY

Many public agencies have direct or indirect interest in the Ohio River Corridor. Three of these -- the Ohio River Valley Water Sanitation Commission (ORSANCO), the National Park Service Rivers, Trails and Conservation Assistance Program (NPS), and the Ohio River Basin Commission (ORBC) -- sponsored the survey upon which this report is based. Their goal was to assess readily available information on the quantitative and qualitative values of the Ohio River Corridor (defined here as the 72 counties bordering the river), with the intent of illustrating and drawing attention to the local, regional, and national importance of the Ohio River. This information should, in turn, enhance efforts to manage the Corridor in the interest of environmental protection and interpretation of its cultural values. An additional purpose of the survey was to identify significant gaps in data which need to be addressed.

Water quality improvements are having ramifications throughout the Corridor. While there is no way to quantify the value of this resource, the river supports a variety of activities that have an economic impact. Boating, waterskiing, and fishing have increased significantly in recent years. Riverfronts are becoming the focal point of communities bordering the Ohio, with uses ranging from passive enhancement to innovative development. Clearly, water quality and quality of life along the river are closely linked and interdependent. Maintaining and improving the quality of the Ohio River requires a cooperative effort among all concerned, and a vision of the Corridor as a cohesive whole.

This report provides an overview of the role and impact of the river in its economic, cultural, and environmental/natural resource dimensions. Even from such a limited study, some "bottom-line" figures are apparent: based on readily available information, it is estimated that the industries associated with the river, either directly or indirectly, provide over \$6 billion in payroll annually; the value of products shipped annually on the Ohio River System (including major tributaries) is at least \$43 billion; and special events and festivals held along the river bring their communities an estimated \$100 million annually. River-related activities for which this study was unable to obtain substantial figures include river-based recreation, tourism, and additional economic information. Highlights of the findings are outlined below.

The Corridor is the site of important economic activity, largely centered either in the towns and cities, or in the use of the river as a transportation artery. Considerable economic activity directly depends on the river, while an even greater percent of local and regional economies are indirectly linked to the river.

- ▶ Over 235 million tons of commodities are transported by barge annually on the Ohio River, compared with 30 million tons on the entire Great Lakes System.
- ▶ Approximately 600 businesses employing 35,000 people with an annual payroll of nearly \$1 billion are *directly* dependent on the Ohio River.
- ▶ In some counties as much as 75% of the workforce is employed in river-dependent industry

- ▶ Over 150,000 people work for approximately 4,000 businesses with an annual payroll of nearly \$5 billion in industries relying on river transport, or otherwise *indirectly* dependent on the River. Other estimates, which include major tributaries, are as many as 358,000 jobs.
- ▶ Nearly 200 marinas along the Ohio River employ over 1,450 people.
- ▶ Industries indirectly dependent on the Ohio River account for approximately 17% of the Corridor's total employment. The resulting payrolls and needs of these industries support additional employment in the region.

The Corridor enjoys a considerable tourism industry and has the potential for further development of this high-growth sector. The combination of the river as a scenic and recreational resource, and communities with an array of natural, historic, social, and cultural attractions provides a significant tourism resource base.

- ▶ Special events that celebrate local river heritage or use riverfront resources as a venue for other celebrations take place in virtually every community along the Ohio. An estimated 500 such events occur each year, generating perhaps as much as \$100 million throughout the Corridor.
- ▶ Approximately 10,000 businesses employing over 150,000 people rely on the patronage of visitors. Many more benefit from the influx of tourist money.

The Corridor is anchored by three major metropolitan areas: Pittsburgh, Cincinnati and Louisville. Each of these cities draws much of its civic pride and identity from the Ohio River. By actively promoting this identity through multi-million dollar riverfront enhancements, communities have made the river an invaluable and accessible local amenity.

- ▶ Nearly all the 200 riverfront communities in the Corridor are engaged in some form of riverfront enhancement, ranging from active development projects to more passive floodplain uses and festival areas.

The Ohio River is accessible to many people. Nearly six million reside within the 72 counties fronting the river, while about 25 million live within the total drainage basin. In addition, the Corridor is centrally located between the North and South of the Eastern United States and is crossed and paralleled by several major interstate highways. The Corridor's centrality and ease of access offers potential for increased tourism and recreation. In addition to those living in the Corridor:

- ▶ an estimated 56 million live within a 4-hour drive of some part of the Corridor;
- ▶ an estimated 130 million live within an 8-hour drive of some part of the Corridor.

The Corridor has many attractions to lure the recreationist. Boating and fishing are the principle recreational activities on the river, while the neighboring hills and plains provide many opportunities for camping, hiking, and pleasure driving. Further improvements in water quality are certain to bolster the level of participation in recreational pursuits on and near the river.

- ▶ There are 450 public and private boating facilities and launch ramps, including 190 marinas, along the Ohio River and the lower reaches of its tributaries.
- ▶ Although the recreational boating industry on the river is large and continues to grow, figures on its economic magnitude were unavailable. This is a significant information gap for an industry that generates considerable economic benefits throughout the Corridor.

- ▶ Within the Corridor, 41 state parks and two national forests provide nearly 300,000 acres of recreational lands and waters.

The Ohio River Corridor has played a central role in the past and present evolution of the United States -- in its settlement pattern, history, economy and cultural development. Much of the history of the 19th and 20th centuries is preserved in the Corridor's communities, architecture, institutions and cultural and social events. The abundance of designated historical sites and districts bears witness to the rich heritage of the Corridor. Specifically, the Corridor contains:

- ▶ 1,885 buildings, structures and sites listed in the National Registry of Historic Places;
- ▶ 32 National Historic Landmarks;
- ▶ 142 designated Historic Districts.

The Ohio River Corridor has abundant natural resources of ecological and economic value. The water quality of the Ohio River has improved significantly over the past 50 years, which in turn has enhanced natural resources, recreational opportunities, and quality of life in much of the Corridor.

- ▶ The Ohio River supports over 100 species of fish, 70 species of mussels, and many species of aquatic and terrestrial birds and mammals, including a number of threatened and endangered species.
- ▶ The Corridor contains over 300,000 acres of park land.
- ▶ The Corridor has a number of unique and nationally significant ecosystems, including Ohio River islands, wetlands, and the Falls of the Ohio.
- ▶ While it is possible to quantify certain aspects of the natural resources of the Corridor, such as revenues from commercial fishing and musseling, recreational fishing, hunting, and trapping, these figures were not available. However, the natural resources of the Corridor also have a far greater inherent value that is impossible to quantify.

The Ohio River is many things to many people. While it has inherent value as a natural resource that cannot be conveyed in economic terms, it is important to achieve some sense of the value of the many uses to which the river is put. Public attention is drawn and concern raised when people are made to realize the importance of the resource at their doorstep. Attention was focused on the Great Lakes and the Chesapeake Bay when people realized how economically and environmentally vital these water resources are. In order for attention to be focused on the Ohio River as one of the country's great river systems, its economic, environmental, and cultural values must be demonstrated as well. This study was an attempt to begin that process. While modest in scale, its results should show that the Ohio River is a regionally and nationally significant resource deserving national attention.

This was a broad-based survey focused on readily available information. Such an effort requires the full cooperation of government agencies, communities, and private interests. Unfortunately, many requests for information did not receive a response. Specific examples of significant information deficits include:

- ▶ Current data on the full economic impact of all river-related economic activities;
- ▶ More information on the economic consequences of river-related events and festivals;

- Riverfront enhancement plans and impact studies from each community along the Ohio River;
- Current and verifiable information on the size, quantity, ownership, and precise location of wetlands, islands and preserves in the Corridor;
- Information regarding the number of recreationists using the Ohio River and the Corridor's park and recreation facilities for fishing, boating, camping and other outdoor pursuits.

The primary limitation of this study, besides its limited scale, is that it was conducted on a county-wide basis. While this was important to give an overall picture of the Ohio River Corridor, it also prevented the study from achieving the level of detail necessary to accurately determine the value of the Ohio River itself. While the figures described here provide some indication of the importance of the Ohio River, the true numbers are in all probability considerably higher. Specifically, more information is needed about the industries directly related to the river. For example, a future study should strive to determine the full value and worth of the barge industry and recreational boating industry on the Ohio River. Such a study should also try to ascertain the economic impacts of major industries located on the river that provide the economic base for many communities.

INTRODUCTION

Many public agencies have direct or indirect interest in the Ohio River Corridor. Three of these -- the Ohio River Valley Water Sanitation Commission (ORSANCO), the National Park Service Rivers, Trails and Conservation Assistance Program (NPS), and the Ohio River Basin Commission (ORBC) -- sponsored the survey upon which this report is based. Their goal was to assess readily available information on the quantitative and qualitative values of the Ohio River Corridor (defined here as the 72 counties bordering the river). This report provides an overview of the local, regional, and national role and impact of the river in its economic, cultural, and environmental/natural resource dimensions. This information should, in turn, enhance efforts to manage the Corridor in the interest of environmental protection and interpretation of its cultural values. An additional purpose of the survey was to identify significant gaps in data which need to be addressed.

The survey on which this report is based was conducted between May and November, 1993. Information collection took place during the three summer months, with the autumn used for preparing data files, maps and tables, and compiling the report. Three graduate students working under the supervision of a faculty member at Miami University in Oxford, Ohio conducted the survey. Limited financial resources required that the search for information to be focused on standard information sources found in libraries and obtained from public agencies. Data were also collected during a one-week field survey, and through telephone calls and correspondence with numerous individuals, organizations and businesses.

The 72 counties bordering the Ohio River between Pittsburgh, Pennsylvania and Cairo, Illinois form the study area and are referred to in this report as the Ohio River Corridor (see Map 1). Easily accessible information has been collected for those features and activities immediately linked to the river, while other data has been collected for county units. One priority in a more exhaustive study would be to further develop the data base at several geographic and community scales.

In economic terms, those activities directly dependent on the river are identified as "primary," while those activities indirectly connected to the river are termed "secondary." Data were collected from conventional published and unpublished sources (e.g., census reports, directories, state and federal agency reports and files), library materials, calls and visits to agencies, institutions, and individuals knowledgeable about the Corridor, and a limited amount of field surveying. Developing a comprehensive data base demands full cooperation from many local, state, and federal agencies, industries, and a budget and research staff far larger than available for this initial probing.

DEMOGRAPHIC PROFILE

Key Points:

- Over 5.7 million people live in the Ohio River Corridor, representing about 2.5% of the total population of the United States.
 - Socio-economic conditions in much of the Corridor are generally below the national average.
 - Because poverty rate is based on the national average and does not account for regional variations in the cost-of-living, the low cost-of-living in the Corridor may artificially inflate poverty levels in much of the region.
-

The Ohio River flows for a short distance to the north and west of Pittsburgh from its source at the confluence of the Monongahela and Allegheny Rivers. It then winds its way in a generally southwesterly direction 981 miles to the Mississippi River. Its normal flow of approximately two miles per hour is regulated by a series of 20 locks and dams operated and maintained by the U.S. Army Corps of Engineers. In the upper valley, the river travels through the western Alleghenies and past many industrial towns and cities. In the lower part of the valley, the river broadens out to several times its upstream width and flows through an expansive floodplain. The river supplies drinking water to over three million people, provides water for industrial processing and power production, serves as a great transportation artery, has remarkable scenic and recreational values and potential, possesses diverse environmental values deserving protection, and has played a major role in the settlement and economic development of the United States.

In 1990, there were 5,776,740 people living in the 72 Corridor counties.¹ This is approximately 200,000 fewer than in 1980, but still represents about 2.5% of the total population of the United States. Of the six states, West Virginia has experienced the worst depopulation during the 1980s, with 8% statewide and an average of 10% in Ohio River counties. Only Indiana experienced general growth in its river counties during the 1980s, although only a 1% increase. In the six Corridor states, the river counties comprise 12.7% of their respective populace. While Ohio has the greatest population living in river counties (1.67 million), Kentucky, with 1.51 million, has the highest percent of its total population (41.1%) in river counties. West Virginia has one-quarter of its population in river counties.

Socio-economic conditions in the Ohio River Corridor are generally below the national average. Many Corridor counties, particularly in Appalachia, are quite isolated. Those areas not traditionally isolated, especially those near the river, have more recently fallen victim to changing trends in transportation services and the global economy. However, metropolitan hubs like Pittsburgh, Cincinnati, and Louisville are thriving due to more diversified economies.

A good indicator of the falling socio-economic condition of the region is the poverty rate. For the Corridor counties as a whole, 16.9% of the people were living below the national poverty level of \$12,674 for a family of four in 1990 (see Graph 1). The national average was 13.1% in the same year. Illinois counties were the most affected, with 25.4% of their citizens living in poverty, double the national average (see Map 2). While the average household income for all Americans was just over \$30,000 in 1990, it was only \$23,419 for the Corridor counties. Again Illinois counties were lowest, with a yearly household income of \$17,279, about half the national average (see Graph 2). Except for Illinois, the median income in river counties is comparable to the rest of the respective state. While these income and poverty statistics may portray the socio-economic situation as bleak, it should be noted that the poverty rate is based on a national average. It does not account for regional variations in the cost-of-living, therefore skewing the poverty statistics higher in areas where the cost-of-living is lower.

Alternatively, the Ohio River Corridor could be viewed as an inexpensive place to live. The median house value, an indicator of the cost-of-living, was \$46,240 in the Corridor. This is \$32,250 less than the national average of \$78,500. In southernmost Illinois, where poverty appears most acute, the median house value was \$28,150; just *one-third* of the state and national averages (see Graph 3). Fortunately for the residents of the Corridor in Illinois, their income is approximately *half* the average for the state of Illinois and the nation. This is a net bonus of 20%, if houses were the only cost-of-living items considered. Similar situations exist in other areas as well. For example, in the Corridor counties of Kentucky and West Virginia, where the average incomes are higher than the rest of the state, median home values nevertheless remain below the state averages.

Although a full cost-of-living analysis was beyond the scope of this study, an informal sampling of goods and services suggests that housing costs may be indicative of other living expenses. For example, during the summer of 1993, gasoline prices averaged \$1.10 a gallon, but were often as low as \$.94 in the lower Ohio River counties. This discrepancy between national poverty levels and regional cost-of-living may artificially inflate the poverty levels in much of the Corridor.

THE ECONOMY

Key Points:

- ▶ Over 235 million tons of commodities are transported by barge annually on the Ohio River, compared with 30 million tons on the entire Great Lakes System.
 - ▶ The value of products shipped annually on the Ohio River System (including major tributaries) is at least \$43 billion.
 - ▶ Approximately 600 businesses employing 35,000 people with an annual payroll of nearly \$1 billion are directly dependent on the Ohio River.
 - ▶ Over 150,000 people work for approximately 4,000 businesses with an annual payroll of nearly \$5 billion in industries relying on river transport, or otherwise indirectly dependent on the River. Other estimates, which include major tributaries, are as high as 358,000 jobs.
 - ▶ In some counties as much as 75% of the workforce is employed in river dependent industry.
 - ▶ A major component that was beyond the scope of this study is information on the overall economic worth of river-related industries. This information would include not only payroll, but such things as the value of goods produced or revenues generated for major categories of river-related businesses and industries.
-

An abundant supply of water for industrial processing and power, inexpensive river transportation, and plentiful raw materials make the Ohio Valley a desirable location for many industries. Companies dealing in bulk commodities like coal, grain and petroleum, although not necessarily located on the riverbank, still rely on river transportation for goods and supplies. Besides the obvious river-bound industries, many non-traditional river businesses and property developers find the riverfront increasingly attractive because of its scenic and recreational attributes. In short, the Ohio River supports a large and diverse economic base that in turn supports much of the population of the Corridor and significantly influences the nation's economic health.

For the purposes of this study, the river-related economy has been divided into two main categories: *Primary*, those industries directly connected with or located along the river; and *secondary*, those industries indirectly affected by, but certainly also dependent upon the river. Although the distinction is somewhat subjective, it should serve to highlight the river's role in local and regional economies. Available information was obtained from the Standard Industrial Classification (SIC) data base. This information was derived on a county-wide basis, so while an attempt was made to include only river-related industries, in some cases the data may include others. For example, when the data base was searched for marinas in each Corridor county, the assumption was made that most marinas are located on the Ohio River, although some may be on lakes or other rivers within the county. (See Table 1 for a complete listing of industrial categories.)

In addition, the economic information available through the SIC data base pertains mainly to employment figures. A major component that was beyond the scope of this study is information on the overall economic worth of river-related industries. This information would include not only payroll, but such things as the value of goods produced or revenues generated for major categories of river-related businesses and industries. For this reason, the economic figures discussed here should be viewed as merely scratching the surface of the overall river-related economy of the Corridor.

The river plays other important economic roles even more difficult to categorize or quantify. For example, the river is an indirect source of income because it attracts various development projects, recreation, and tourism, and often acts as both place and reason for civic festivals. Each role the Ohio River plays in the economy is discussed below.

Primary River Economy

This survey estimates that there are over 35,000 people employed in more than 600 businesses whose jobs and companies directly depend on the Ohio River. People in the primary category find employment as riverboat and barge operators, work in marinas and power generating facilities, load and unload cargo on docks or transport sightseers. Employees in primary industries have a combined estimated payroll of nearly \$1 billion annually. Some counties rely more heavily on the river than others, especially if they are less diversified economically. In some instances a county's major employer is river dependent, such as Trimble County, Kentucky, where nearly 75% of the workforce is employed at a large electric generating facility (see Map 3). The Ohio River also provides employment not officially counted by the census, such as the Coast Guard, the Army Corps of Engineers, and several local and regional organizations concerned with a variety of river issues.

The heart of the river-based economy is barge transportation. Water is the cheapest and most energy-efficient mode of transport, saving American consumers millions of dollars each year while helping to conserve energy resources.² Barge transport is approximately one-fourth the cost of rail and one-eighth the cost of overland truck freight. A standard tow of 15 barges can move as much freight as 225 rail cars or 900 semi trucks. Barge traffic on the Ohio has increased 50% over the last decade. In 1993, 235 million tons of commodities were transported on the Ohio River, including petroleum, sand gravel, grains, chemicals, iron, steel, coke and coal. Coal and other energy products make up about 70% of the commerce traveling by barge. In contrast, 30 million tons of commodities were transported on the entire Great Lakes System.

Today 20 locks and dams on the Ohio River help maintain 981 miles of waterway navigable by barge. The construction and maintenance of the navigation system are a source of employment for some. Congress authorized \$188 million for locks and dam improvements in the Ohio Valley for 1993; 1994's proposed budget calls for \$225 million. Table 2 lists all the locks and dams on the Ohio River.

There are 49 power generating facilities operating along the Ohio River with a combined capacity of 44,600 megawatts, over 6% of the total U.S. generating capacity (see Table 3). The many power generating facilities on the river take advantage of large quantities of water for cooling purposes and

inexpensive access to coal via barge. For example, Cincinnati Gas & Electric uses 319.7 million gallons of river water daily to run four coal-fired power plants. Older facilities have once-through cooling in which the water is returned to the river at an elevated temperature. In order to prevent thermal pollution, newer plants now employ off-stream cooling, in which the water is recirculated through cooling towers.

The waters of the Ohio River are also used to generate electricity through the use of hydropower. The energy contained in the water impounded by navigation dams is currently used to generate electricity at six Ohio River locks and dams. Development of hydropower facilities is proposed at twelve of the remaining Ohio River dams. Operational agreements between the U.S. Army Corps of Engineers and the hydropower operators maximize the use of this energy as it flows through the dam. While electric generation through hydropower technology may be one of the cleanest forms of power production, concerns have been raised regarding its potential to adversely affect Ohio River dissolved oxygen levels and fish populations.

Marinas are another example of primary river economic activity. Census data regarding marinas suggests that approximately 190 marinas on the Ohio River employ 1,450 persons, with a total annual payroll of over \$3 million.

Ohio River Dischargers

There are more than 400 industries permitted to discharge waste water into the Ohio River. While these industries do not fall neatly into the primary or secondary categories, they are dependent upon the river in that they discharge materials into it. These businesses must comply with environmental regulations, and thus have a vested interest in the water quality of the Ohio River. They highlight the fact that when the proper balance is struck between economic and environmental concerns, both can thrive.

While it was beyond the scope of this study to determine the total economic impact of these industries, it is obviously significant. One need only look at the community of Ashland, Kentucky to realize that the town itself, as well as many of its cultural and educational opportunities, exist in large part because of Ashland Oil, Inc. The same is true in many such "company towns" along the Ohio River.

Secondary River Economy

Secondary river economy refers to those industries and establishments not completely dependent on the river, or necessarily found near the river. Instead these are industries made more profitable by their access to the river. Most of the economic activity in this category involves bulk products shipped via barge. Because many products shipped by barge are subject to intense overseas competition, the demand elasticity for these products is very high. Therefore, coal, metals, petroleum and grain industries in the Ohio Valley rely on cost-efficient river transportation to maintain their profitability and are included in the secondary category. These industries are an important source of basic income and are as important to the regional economy as those businesses located on the river.

Nationally, shippers and consumers save over \$2 billion annually by using waterway traffic instead of more costly overland transportation. Some studies claim that freight shipped by barge can be moved from \$.25 to \$.35 cheaper per mile than other modes, depending on the distance and type of commodity hauled. Although there is competition between the various modes of transportation, it should be noted that there is a close interdependence between rail, freight and water transportation.

Coal mining may be the most important industry in the secondary category and effectively demonstrates the Ohio River's central role in the regional economy. For example, the Appalachian region contains almost 90% of the nation's low sulfur, high BTU coal. In 1988, 200 million tons of cargo were moved on the Ohio River, 81.7 million tons of which were coal from West Virginia and Kentucky. The coal from West Virginia and Kentucky alone had a mine value of over \$2 billion. Without the river system, the viability of mining this resource could be in jeopardy. The U.S. Department of Energy estimates that a 1% increase in the cost of transportation for steam coal could reduce overseas demand by 7%. In early 1993, one ton of Ohio Valley coal could be shipped to the Gulf of Mexico for about \$40 per ton. The American Waterways Operators of America estimates that a two-dollar per ton increase in coal shipping could cost 13,000 coal mining jobs in the Ohio Valley due to reduced export business alone. This economic devastation would extend far beyond the coal mining communities, since estimates claim that every coal mining job supports two additional non-coal industry jobs in the area.

The dependence of the Ohio Valley on the river, and the interdependence of seemingly unrelated industries, is highlighted in the relationship between the coal industry (secondary) and the electricity industry (primary). There are over 70 coal-powered electric power plants on the Ohio River and its tributaries (including the Tennessee and Cumberland Rivers), which generate one-tenth of the nation's energy needs. These plants use 78% of all the coal transported on the Ohio River System, and benefit from the relatively low cost of river transportation. In 1987, the riverside plants generated over 286 billion kilowatt-hours, and saved about \$1.17 billion as compared with the national average. Much of the savings took the form of low rates to major industries, commercial establishments, and farms, thereby serving as a stimulus to production, employment, and incomes.

In the riverfront counties alone, nearly 4,000 companies deal with various bulk commodities and depend on the river for inexpensive transport, either to ship their product or to obtain raw materials necessary for manufacturing it. Often companies have both shipping and receiving facilities on the river, as with refineries and steel mills. Over 150,000 people work in these industries in the 72 Corridor counties. Other estimates, which include major tributaries, are as many as 358,000 jobs associated with waterborne commerce.

In 1986, the Ohio River System (which includes the major tributaries) carried approximately 108 million barrels of petroleum products with a wholesale value of about \$40 billion. In 1987, the Ohio River System transported 325.2 million bushels of grains and soybeans, in addition to 3.7 million bushels of processed animal feeds and grain mill products. The total value of these waterway shipments was about \$1.3 billion. In 1988, 9.9 million tons of chemicals were shipped and received

on the Ohio River (including the Allegheny and Monongahela Rivers); the total chemical industry payroll in metropolitan areas along the Ohio River System was over \$1.6 billion.³

In addition to its role as a supplier of industrial materials, the chemicals industry generates direct income in Ohio River communities. These payrolls represent a relatively high standard of community life and culture. In 1987, the average payroll per employee in all U.S. manufacturing was \$25,039; in the U.S. chemicals industry, \$30,702; in the Ohio Valley chemicals industry, \$32,791. The higher income implies a higher standard of living, a higher level of education, and a greater constructive involvement in community affairs.⁴

On average, river-dependent industry directly accounts for 17% of the employment in each county in the Ohio River Corridor. However, many counties and communities rely almost completely on these secondary industries. In thirteen counties, over 40% of all non-farm employees work in secondary establishments. In Meigs County, Ohio, three-fourth of the laborers work for industries in the secondary category, while 95% of Pulaski County, Illinois' jobs depend indirectly on the river (see Map 4). Employees in secondary industries average over \$30,000 per year, with a combined payroll of over \$5 billion. Given the multiplier effect of such lucrative employment, these industries may account directly and indirectly for over half of the total employment in the Ohio River Corridor.

Some areas' dependence on the river can be put into sharper focus by examining conditions in Southern Ohio during the 1980s. Many secondary industries, such as coal mining and steel production, were driven out by foreign competition and increasing costs. Conditions produced by shut-downs in these communities have been harsh. On average from 1979 to 1989 the unemployment rate decreased almost 2% in the Ohio River Corridor. But for many counties in the upper Ohio Valley and Southern Illinois, the 1980s brought long-term unemployment into already depressed areas (see Map 5). Some counties, particularly in Ohio and West Virginia, were better off than their non-riverfront neighbors in 1979, but slipped during the 1980s toward the kind of poverty more characteristic of Appalachia in general (see Map 6). By 1989 Athens, Meigs, Adams and Scioto counties in Ohio, and Lewis and Crittenden counties in Kentucky, had from one-quarter to one-third of their citizens living below the poverty level of \$12,674 for a family of four. The percentage is generally even higher for children. Other counties such as Alexander and Pulaski in Illinois also have suffered during the recent decades and now report over 30% of their population living in poverty. Downtown Cairo, Illinois in Alexander County is a virtual ghost town, with boarded-up windows and empty lots where thriving businesses once existed. But unlike many depressed downtowns, no substantial suburban retail activity is to blame, only the loss of a river-bound economy.

In summary, the Ohio River's impact on the lives of people living near it is not widely recognized but is nevertheless important. Besides providing electricity and public water supply, the river contributes to many jobs in the region. In the broader context, nearly three-fourths of the Corridor's economy may be at least marginally dependent on the river.

Riverfront Enhancement

Along with the river's contributions to the economic livelihood of the Corridor communities, the riverfront itself provides opportunities for recreation, housing and business. In riverfront areas, Corridor communities can exercise local stewardship of the river environment. On a small scale, most communities have recognized the recreational opportunities of flood-prone riverside areas. Many river towns have ball fields, playgrounds, picnic areas and boat ramps at riverside parks, especially if a flood wall exists. Larger cities have devoted considerable planning efforts to their riverfront areas, building river walks, festival areas, grandstands and sporting arenas. The benefit of river views and nearby attractions brings upscale housing to these areas, which helps curtail shrinking tax bases in budget-burdened cities like Cincinnati and Pittsburgh. Businesses, especially restaurants and nightspots, use the drawing power of the riverfront as well. Several cities in the Corridor are trying to further capitalize on their existing resources by planning riverfront enhancements to attract more people. Impressive riverfront projects already exist in most of the larger communities and many more are in the planning stages. The following is a sample of planned riverfront enhancement projects as of December 1993.

Ashland, Kentucky

In 1988, Ashland carried out a \$100,000 riverbank stabilization and landscaping project. At that time the city owned very little of the riverfront area; the majority was owned by CSX rail company and Armco Steel. The city has since acquired 15 to 20 acres from the railroad and now has riverfront land extending from 10th to 16th streets. Included on this land is the old railroad depot that is listed on the National Register of Historic Sites. Ashland is seeking funding to refurbish the railroad depot. The city hopes to make it not only the centerpiece of a revitalized riverfront, but to return the depot to its former role as the transportation hub of the city.⁵

East Liverpool, Ohio

East Liverpool has already built the Broadway Wharf and plans further riverfront development projects, including docks, a boardwalk, and restaurants. Civic leaders view the Ohio River both as a source of civic history and a focal point for the community's future. Recently the Pavilion structure at the Broadway Wharf was constructed with amenities to orient it to the river. East Liverpool planners hope to acquire a tank farm located next to the Broadway Wharf, which will make another 3.5 acres available for riverfront development.⁶

Louisville, Kentucky

River Fields, a Louisville-based river conservation organization, along with Jefferson County and the Metropolitan Sewer District, have joined forces to develop an Ohio River Corridor Master Plan. This plan will guide future public and private economic development, investment, and preservation of the river in Jefferson County. Once the Master Plan is in place, development decisions along the river corridor would be made in accordance with the plan's guidelines. These guidelines would protect the unique natural, scenic, historical and recreational quality of the 37-mile local river corridor. River Fields hopes that the involvement of the County, the Metropolitan Sewer District, and a significant number of stakeholding citizens in the process will provide a plan that will be embraced and enforced.

The Ohio River Corridor Master Plan is estimated to cost \$200,000 and will take up to one year to develop. The planning effort, headed by the county's Department of Planning and Environmental Management, will coordinate with other planning efforts in the county, including MSD's Greenways plan. After completion, the plan will be submitted to the Planning Commission and local officials, and on approval will become part of the county's new Comprehensive Land Use Plan.⁷

Maysville, Kentucky

Maysville has recently begun to open parts of its flood wall and has established a fountain at Limestone Landing overlooking the Ohio River. Maysville River Park has also been developed to offer access to the river once again. A barge currently docked at the landing offers theatrical presentations on Maysville's historical links with the river. The Delta Queen and Mississippi Queen make periodic stops at the public landing. Future riverfront development and revitalization plans include building a serpentine wall and river walk.⁸

Newport, Kentucky

Construction of a \$50 million multi-use project along the Ohio River has begun on the last piece of city-owned land on Riverboat Row. The planned development, dubbed Channel Crossing, includes two restaurants, a 130-room hotel, a 120-unit apartment complex and office tower, and a 120-slip marina. The Channel Crossing project could add nearly 700 new jobs upon completion in 1998, and could generate additional tax revenues of up to \$500,000 annually for Newport, nearly \$100,000 of which would come from the two new restaurants.⁹

New Richmond, Ohio

New Richmond has recently established the Festival Park on the Ohio River with approximately 53 acres, almost one mile of river frontage, and parking for 5,000 cars. Work has been completed on a natural grass amphitheater close to the river that will be used for festivals and concerts. The city plans to schedule an event at the park every weekend in 1994. Three autumn festivals are held at the waterfront, including a Corn Festival, Pumpkin Festival, and Haunted Woods. The city also plans to develop softball fields, volleyball courts, and a boat dock within the next two years. New Richmond expects the Festival Park to have a positive effect on the entire city, bringing more business to the downtown area.¹⁰

Wheeling, West Virginia

Wheeling "envision[s] its future in its past," and is currently planning a major riverfront development to meet that vision. The Wheeling Heritage Project is a major effort co-sponsored by the city and the National Park Service to preserve, restore, and interpret Wheeling's historic past. Plans include obtaining Congressional designation as a National Heritage Area and spending \$50-60 million to improve the downtown's infrastructure and riverfront area. The city expects these improvements to generate over \$100 million in private investment. The plan also calls for developing a downtown Artisan Center in 1994, removing the wharf parking lot, constructing a new transportation center and parking lot near the Civic Center, and developing a Heritage Port. Included within the Heritage Port will be a water-taxi landing and Water View Restaurant. Civic leaders hope to reestablish Wheeling as a river port for the national cruise industry.¹¹

TOURISM AND RECREATION

Key Points:

- ▶ Special events that celebrate local river heritage or use riverfront resources as a venue take place in virtually every community along the Ohio. An estimated 500 such events occur each year, generating perhaps \$100 million throughout the Corridor. Although some figures were available, more information is needed on this subject.
 - ▶ Approximately 10,000 businesses employing over 150,000 persons rely on the patronage of visitors. Many more benefit from the influx of tourist money.
 - ▶ Because many areas of the Corridor do not actively promote tourism, few estimates of its impact are available.
 - ▶ Approximately 56 million people live within a four-hour drive of the Corridor, and more than 130 million live within eight hours.
 - ▶ Although the recreational boating industry on the river is large and continues to grow, figures on its economic magnitude were unavailable. This is a significant information gap for an industry that generates considerable economic benefits throughout the Corridor.
-

Ideally located for tourism, the Ohio River Corridor historically has been a place for summertime recreation, with the river itself an excellent draw for area visitors. Approximately 56 million people live within a four-hour drive of the Corridor, and more than 130 million live within eight hours. The many opportunities for tourists and recreationists provide not only entertainment but an important source of income for riverfront communities, including seasonal and full-time employment. In the Ohio River Corridor, approximately 10,000 businesses with 150,000 full- and part-time employees cater to out-of-town customers, or offer services that appeal to out-of-town visitors. Professional sports, amusement parks, campgrounds, and other attractions also contribute to the local economy. This contribution will probably rise as communities become increasingly aware of the potential for tourism in their areas.

On average, 7 to 8% of all employees and businesses in the Ohio River Corridor are involved in the tourism and recreation industries selected for this survey (see Map 7). However, an appreciation for the impact of tourism is hard to gain by employment figures alone. Tourism can be important to other sectors of the local economy as well. Randomly selected retailers in Southern Indiana counties estimated that 25 to 50% of their clients are from out of town.

Because many areas of the Corridor do not actively promote tourism, few estimates of its impact are available. The state of Indiana has estimated the wider impact of tourism for its counties. Other states are not known to have undertaken similar projects on a county-by-county basis. Below is a sampling of the historic, cultural and recreational opportunities for residents and tourists alike that contribute to the economy of the region.

Riverboat Cruises

Riverboat cruising is increasingly popular on the Ohio River, and several communities now have cruise companies in operation. It is estimated that over one million passengers travel the river every year. Owners of the *West Virginia Belle* operate a variety of cruises in both Huntington, West Virginia and Portsmouth, Ohio. Approximately 120,000 people annually buy tickets to ride the *West Virginia Belle*. Owners of the *Gateway Clipper Fleet* of Pittsburgh estimate that they sell between 500,000 and 750,000 tickets a year, which are evenly divided between sightseeing and dinner cruises. Approximately 140,000 people cruised on the *Belle of Louisville* in 1992, according to the owner's statistics. B&B Riverboats in Covington, Kentucky estimated that they sold 263,000 during their 1992 season.

Riverboat Casinos

While some communities rely on their rustic character, others have embraced a more overt style of tourism. Metropolis, Illinois provides an example of a successful tourist town on the Ohio River. A declining economy during the 1970s and 1980s forced Metropolis to capitalize on the town's name and its relationship to the comic strip character Superman. However, Metropolis needed a more concrete source of revenue. When Illinois followed Iowa's example by allowing gambling on water in 1992, a riverboat casino operation opened in Metropolis. Instantly the casino became the county's largest employer, producing a payroll of more than \$12 million annually. Every day the casino generates more than \$13,000 in revenue for the city of Metropolis, a considerable sum for a town of only 8,000. In January 1994, \$38 million was paid out in slot machines alone, giving an indication of the amount of money taken in by the casino. Besides the 800 jobs directly produced by the casino, other businesses have begun to thrive. In 1993, 23 new businesses opened in Metropolis, including three hotels. Across the river Paducah, Kentucky is also benefiting from the casino. Once vacant buildings downtown are being renovated, there are four new hotels and seven new restaurants, and the police department has added 15 full-time patrolmen to its pre-casino staff of three. The state of Illinois benefits as well, getting an even larger share of the revenue: almost \$1 million annually from the casino in Metropolis and more than \$7 million from riverboat casinos on the Mississippi.¹¹

Seeing the revenue potential of gambling, Indiana has joined Illinois in passing legislation to bring riverboat casinos to the Ohio River. The state of Indiana estimates that revenues from gambling could reach \$40 million a year by 1995, creating 10,000 new jobs. Of the seven Indiana towns on the Ohio River considering casinos, only Lawrenceburg, Rising Sun and Vevay passed referenda in the 1993 elections to allow riverboat gambling. It is possible that all three of these towns will get a license, but less likely that all would survive the long-term competition. However, the short-term economic boost for smaller towns is impressive. Most casino proposals promise 500 to 1,000 new jobs, over \$10 million in annual payroll, and several million in tax revenues for the local community. For each of these areas the local economy will again be anchored just offshore on the Ohio River.

Special Events

One of the most common methods of drawing tourists to an area is through special events and festivals. Nearly one thousand festivals and community events are held every year in the Ohio River Corridor, about half of which are river-related thematically or conducted at riverside venues. Special

events and festivals can have a significant impact on a local economy. The nature of that impact depends on the size of the event and the community sponsoring it. Special events can range in size from a local heritage festival to nationally significant multi-media events such as Tall Stacks held in Cincinnati, Ohio. Nearly every river community has a festival event of some sort; those described below provide examples of the impact of such events on local economies.

Evansville Freedom Festival

Evansville, Indiana holds its annual Freedom Festival from mid-June to the Fourth of July. The event itself is 25 years old, while its main attraction, the "Thunder on the Ohio" hydroplane races, has been taking place for 15 years. Other major events during the festival include fireworks, waterskiing demonstrations, and a parade. Event organizers estimate that the Freedom Festival generates \$3 million for the local economy.¹²

Portsmouth River Days Festival

The Portsmouth River Days Festival has been held in Portsmouth, Ohio each summer for 32 years. The 150,000 to 200,000 people who attend the event provide approximately \$1 million for the city's economy. Major events during the festival include an arts and crafts show, children's events, tractor pulls, a grand parade, and the Miss River Days Pageant.¹³

Tall Stacks

Cincinnati, Ohio played host to the Tall Stacks celebration in both 1988 and 1992. Tall Stacks is a large-scale event celebrating the American steamboating era. The 1988 Tall Stacks event celebrated Cincinnati's Bicentennial year, featuring 14 boats and attracting 960,000 people, including 135,000 out-of-town visitors. Those attending the event spent an estimated \$18.7 million, with a total economic impact of \$30 million for Cincinnati. Promotional activities and media coverage of Tall Stacks '88 exposed the Greater Cincinnati area to 73 million people.

The 1992 Tall Stacks was considerably larger. This was due in large part to greater promotional activities and the carry-over effect of the 1988 event. Tall Stacks '92 attracted 1.1 to 1.5 million people, including 186,000 out-of-town tourists. Visitors spent \$26 million, resulting in a total economic boost of \$40 million for the Cincinnati area. The heightened promotional activity exposed the Greater Cincinnati area to 150 million people. Media coverage of the event ranged from *CBS News Sunday Morning* and *NBC's Today Show* to the *New York Times* and *London Sunday Mirror*. Tall Stacks '92 was even broadcast on Japanese television and British radio stations. Plans are underway in Cincinnati for a third Tall Stacks event.¹⁴

Tristate Fair and Regatta

The Tristate Fair & Regatta is a special event shared by Ashland, Kentucky, Huntington, West Virginia and Ironton, Ohio. Each of the three cities hosts a different portion of the event. People have a variety of activities from which to choose, including musical presentations and boat races on the Ohio River. Event organizers estimate that 1993's Tristate Fair & Regatta generated nearly \$30 million for the area's economy.

In 1993, approximately 150,000 people attended the Ashland portion of the Regatta, spending about \$55 each. Based on these figures, approximately \$8.2 million was generated in the Ashland area alone. The Huntington portion of the festival, called "The 10 days of Summerfest," contributed approximately \$18.7 million to local businesses and individuals in 1993. It was estimated that individuals attending Huntington's portion of the special event spent about \$75 daily. While the figures for Ironton were unavailable, it is estimated that 70,000 people attended the event in Ironton and spent an estimated \$10 daily, putting the total economic impact in Ironton at about \$700,000.¹⁵

While economic information was not available for many of the river-based events and festivals, and it was not possible to obtain a comprehensive figure for the amount of money generated by them, it is obvious that they have a significant impact on local economies. From these few examples it could be estimated that river-based special events generate perhaps as much as \$100 million annually throughout the Corridor.

Historic and Cultural Attractions

Since many towns along the river have had little or no growth in the last several decades, their downtown areas have not been subject to the architecturally debilitating effects of growth. Quaint turn-of-the-century architecture in more remote areas has evolved from a sign of economic backwardness into a potential tourism boon. In areas serviced by interstate highways or those that experienced continued growth and retail suburbanization, little of this older architecture remains. Awareness of this dynamic may be partly responsible for the reluctance in some communities to embrace overt tourism. Recent failed referendums on riverboat gambling in several southern Indiana counties underline this desire to maintain traditional ways of life.

Recognizing the potential of historical tourism, many towns now actively protect their architecture and their more interesting neighborhoods through brochures and tours. There are approximately 150 designated historic districts in the Ohio River Corridor (see Map 8). These may be residential, commercial or thematic, such as the Round and Polygon Barns of West Virginia Historical District. In the Corridor 1,885 buildings and sites are listed in the National Register of Historic Places. These include structures of distinct architectural value, sites associated with the lives of famous people or important events, and even 120 sites with prehistoric significance. Thirty-two sites in the Corridor have been singled out for their unique place in American history and have been designated as National Historic Landmarks. There are hundreds of museums, both official and unofficial, in Ohio River communities. They range from the Union Terminal Station in Cincinnati to preserved private dwellings opened on weekends and shown by the resident. The special subject matter covered by individual museums ranges from standard historical fare, such as the childhood home of Abraham Lincoln or Indian Mounds, to the more unusual, such as Marietta, Ohio's collection of Coca-Cola memorabilia or Paducah, Kentucky's quilting museum.

Outdoor Pursuits

There are hundreds of places to take advantage of the natural beauty of the Ohio River Valley. According to the *Omn Gazetteer of the USA* there are 41 state parks, recreation and resort areas in the Corridor, and two National Forests -- Hoosier and Wayne (see Map 9 and Table 4). Park land

covers more than 150,000 acres and the lakes and streams within these parks cover nearly an equal area. Kentucky and Indiana have the greatest amount of acreage in their parks, with 142,594 acres of land and 94,484 acres of water (see Table 5). These figures do not include the Ohio River itself, nor the many small parks and boat ramps built by the U.S. Army Corps of Engineers. Additionally, nearly every town and city on the river has municipal recreation areas located along the water, since flood-prone areas are better suited for conservation than development.

The Corps of Engineer's flood control and river navigation systems in the Ohio Valley created many recreation areas. Many of the Ohio's tributaries were dammed to control floods. The reservoirs created by these dams make excellent recreation areas, providing fishing, boating and swimming opportunities. Boating access on the Ohio River itself is widely available, with over 450 public and private facilities and boat ramps, including 190 marinas, along the Ohio River and the lower reaches of its tributaries (see Maps 10 and 11). Boating activity on the river can be estimated by looking at the total recreational lockage in each of the Corridor states. According to Corps of Engineer statistics, approximately 17,567 recreational lockages take place on the Ohio River annually. Although the recreational boating industry on the river is large and continues to grow, figures on its economic magnitude were unavailable. This is a significant information gap for an industry that generates considerable economic benefits throughout the Corridor.

Boating is by far the most popular recreational activity on the Ohio River. Other water activities include fishing, water skiing, and jet skiing. However, it is important to note that several Ohio River communities have issued advisories against coming in contact with the river. Bacteria levels around certain metropolitan areas exceed established criteria for the Ohio River, and can cause gastrointestinal illness. In addition, all the Ohio River states except Illinois have issued advisories against eating certain Ohio River fish -- particularly carp and catfish -- due to the presence of contaminants. However, sport fish are not included in these advisories, and the Ohio River supports a large recreational fishing industry (although figures were unavailable), highlighted by many bass tournaments each year.

Camping near the river is widely available. *Woodall's 1993 Campground Directory* lists 75 camping areas with 8,100 campsites in the Ohio River Corridor (see Map 12). The actual number is undoubtedly higher, but many campgrounds do not conform to *Woodall's* stringent qualitative criteria or are not open to the public.

More rigorous physical recreation is available in the Corridor as well. Hikers can follow several interstate trails. The North Country Scenic National Trail and Trail of Tears National Historic Trail wind through several states and link many of the Corridor's parks and recreation areas. There are opportunities for spelunking, horse back riding, mountain biking, canoeing, snow and water skiing in many state park and recreation areas.

Nearly 1000 miles of highway within Corridor have been labeled scenic or historic by state governments or organizations such as the American Automobile Association and Rand McNally (see Map 13). Route 52, which follows the river on the southern border of Ohio, and the Lincoln National

Trail and George Rogers Clark Trail (Routes 60 & 62), which wind through Southern Indiana and Illinois, are the most well known. Large portions of these roads are newly paved and relatively uncongested. Several historic railroads in the area provide yet another means to enjoy the natural beauty of the Ohio River Corridor.

THE ENVIRONMENT

Key Points:

- ▶ The water quality of the Ohio River has improved significantly over the past 50 years, which in turn has enhanced natural resources, recreational opportunities, and quality of life in much of the Corridor.
 - ▶ The Ohio River supports over 100 species of fish, 70 species of mussels, and many species of aquatic and terrestrial birds and mammals, including a number of threatened and endangered species.
 - ▶ The Corridor contains over 300,000 acres of park land.
 - ▶ The Corridor has a number of unique and nationally significant ecosystems, including Ohio River islands, wetlands, and the Falls of the Ohio.
 - ▶ While it is possible to quantify certain aspects of the natural resources of the Corridor, such as revenues from commercial fishing and musseling, recreational fishing, hunting, and trapping, these figures were not available. However, the natural resources of the Corridor also have a far greater inherent value that is impossible to quantify.
-

The economic well-being of most of the Corridor is heavily dependent upon the river's environmental health. Industry has been asked to increase its sensitivity to environmental issues precisely during a period of increasing overseas competitiveness and economic restructuring. Meanwhile, a society more demanding of recreational opportunities and an economy more dependent upon tourism have pushed the limits of the Ohio River as a multifaceted resource. The partnership forged among the varied interests involved with the Ohio River must continue to create and implement an informed and enlightened program of usage to ensure that the demands on the river are met for all.

Water Quality

In the early 20th century, lack of sewage treatment and an attitude regarding the river as a dumping ground led to poor water quality and epidemics of water-borne illnesses. The public, including civic and business leaders, recognized that the river must be cleaned up to improve public health and economic development. ORSANCO was created in 1948 in response to these concerns, implementing an interstate compact to abate water pollution in the Ohio River Valley.

The construction of sewage treatment facilities and the regulation of industrial dischargers greatly improved the quality of life in the Corridor, making it a better place to live and do business. The focus is now turning to the control of other sources of pollution, such as runoff from agricultural and urban areas, and combined sewer overflows

Water quality improvements are having ramifications throughout the Corridor. While there is no way to quantify the value of water quality per se, the river supports a variety of activities that have an economic impact. Boating, jetskiing, and fishing have increased significantly in recent years. Riverfronts are becoming the focal point of communities bordering the Ohio, with uses ranging from passive enhancement to innovative development. Clearly, water quality and quality of life along the river are closely linked and interdependent. Maintaining and improving the quality of the Ohio River requires a cooperative effort among all concerned, and a vision of the Corridor as a cohesive whole.

Land Uses

The land in the Ohio River Corridor ranges from rugged uplands to undulating or relatively level plains. Much of the Ohio River floodplain is classified as prime farmland by the U.S. Soil Conservation Service. Major urban centers dot the river as regional centers for employment and services. Small residential communities provide basic supportive commercial services for local townspeople and residents of nearby agricultural areas.

The alluvial soils in the lower Ohio River Valley typically are subject to extreme wetness, and drainage problems are usually caused by high surface water conditions. Primary uses of alluvial bottomlands are agriculture or woodland, depending on the relative wetness of the soil during the growing season. Areas that have standing water or saturated soil conditions are typically wooded. Areas that drain at least marginally well have typically been cleared and are farmed as frequently as soil moisture conditions allow. However, those areas that are farmed do not consistently produce high crop yields due to flooding that frequently limits the growing season.

Ecosystems

Plant succession in the Ohio River Corridor proceeds in the classical manner: agricultural or disturbed land, when left alone, reverts to early old field, late old field, immature bottomland hardwoods, and finally mature bottomland hardwoods. Mature bottomland hardwoods constitute the oldest stand of vegetation type. This is the climax in the floodplain plant community. Dominant overstory vegetation consists mainly of silver maple, sycamore, cottonwood, box elder, and black willow. Subdominant species include hackberry, black locust, slippery elm, pawpaw, black walnut, and sweet buckeye. Major shrub species include spicebush, Virginia creeper, and winter riverbank grape.

These mature bottomland communities provide food, protection, and resting and nesting sites for many wildlife species. Cavity-nesting birds and mammals, such as the wood duck, American kestrel, eastern bluebird, pileated woodpecker, acadian flycatcher, fox, squirrel, and raccoon are typical inhabitants of this plant community. The canopy structure provides the feeding, nesting, and resting areas of numerous resident and migratory songbirds, such as the warbling vireo, yellow-throated warbler, and yellow-billed cuckoo. Osprey commonly roost in the mature riparian habitat, and bald eagles are known to winter in the area.

Immature bottomland hardwood overstory and understory vegetation often include the same species as the mature bottomland habitat type. This area offers minimal value to cavity-nesting birds

and mammals; however, resident and migratory insectivorous birds feed heavily on the abundant food supply, and find cover for nesting or resting in the lush canopy. Wood warblers and vireos, such as the Tennessee warbler, yellow warbler, red-eyed vireo, and warbling vireo use these habitats heavily. These areas also provide valuable brood range and food and cover for waterfowl.

Early old field is comprised of over 100 annual and perennial plants, including grasses, forbs, creepers, climbers, parasites, and composites. Food, cover, nesting and resting habitat for at least a portion of the life cycle of migratory or resident wildlife is found here. Lush vegetation, insects, fruits and seeds provide important food items for wildlife throughout the year. Migratory and resident songbirds heavily use these areas during late summer and fall.

Late old field probably has the greatest species diversity of the plant communities and is used by almost all floodplain wildlife. Woody plants characteristic of this community include black locust, blackberry, staghorn sumac, black elderberry, and Japanese honeysuckle. This habitat type also contains species of the surrounding forest. Many wildlife species flourish with the rich diversity of food and cover found in this habitat. Species such as the woodchuck, cottontail rabbit, and white-tailed deer are suited to this community. Migratory breeding songbirds found in this habitat include the common yellow-throated warbler, white-eyed vireo, willow flycatcher, and yellow-breasted chat.

Forested land throughout the area is composed of distinct community groupings whose species reflect soil moisture content. Bald cypress trees are usually found in areas of constant standing water, while gum and red maple trees occur in areas of prolonged high water levels. Willow, cottonwood and silver maple are found in areas of frequent flooding. Green ash, American and slippery elm and hickory trees occur on hillsides with drier soils. Other vegetation communities include mowed, shrubland, cultivated agricultural land and agricultural pastureland.

Fish and Wildlife

The interplay of aquatic and terrestrial habitats along the Ohio River supports many mammals that can move freely between islands and mainland. Although numerous animals once common to the area, like bobcat and bear, are rare, the clearing of some forests has created more suitable habitats for a wider variety of species than ever before. Commonly observed mammals include white-tailed deer, opossum, woodchuck, cottontail rabbit, raccoon, mink, muskrat, squirrel, skunk, beaver, and various species of shrew, mouse and rat. The Ohio River Corridor is also home to a number of endangered or threatened animals, including the bald eagle, osprey, least weasel, green salamander, and bowfin fish.

Riparian furbearers are abundant in and along the back channels and wetlands. The islands, often a complex interspersed of bottomland and riparian habitats and deep and shallow aquatic habitats, provide a suitable environment for small mammals and numerous fish species. Game and non-game birds and mammals, fish and benthic organisms, including freshwater mussels, find these habitats invaluable for nesting, feeding, and spawning. The islands also support a wide variety of amphibians and reptiles, including many species of frog, salamander, turtle, lizard and snake.

While these islands provide fish cover in the form of submerged stumps and logs, overhanging vegetation, and large rocks, the protected back channels afford even better cover. These back channels are important nursery areas for a variety of fish, such as freshwater drum, channel catfish, bluegill, sauger, black crappie, paddlefish, shad, carp, river carpsucker, skipjack herring, emerald shiner, and spotted bass. There are currently 119 species of Ohio River fish listed in ORSANCO's database. While this number can never reach the historical number of 160 species, it does indicate that Ohio River water quality has improved to the point that fish species are beginning to return to their previous ranges.

More than 70 species of mussels have been found in the Ohio River, another indication that Ohio River water quality is improving. The deep and shallow water habitats associated with the islands are major mussel producing areas of the river. These aquatic habitats with substrate mixtures of silt, sand and gravel are swept by steady currents, providing well-oxygenated and nutrient-rich water. The best mussel populations have been located in the Belleville and Greenup Navigation Pools; the pink pearly mucket, federally listed as an endangered species, was discovered there in 1987. However, dredging, over-harvesting, and competition from introduced species are having a serious impact on native Ohio River mussel populations.

The zebra mussel is now found throughout the Ohio River. This non-native mussel was accidentally transported from Europe to the Great Lakes in the 1980s, and has since spread through much of the inland waterway system. Zebra mussels rapidly colonize any submerged surface, including native mussels. Some experts predict that zebra mussels could completely replace the native mussel species of the Ohio River by the turn of the century. In addition, they could have a potentially serious impact on any industry and public utility that draws water from the river by clogging intake pipes. The full environmental and economic impacts of the zebra mussel remain to be seen.

Birds of the Ohio River Corridor are diverse primarily because of the varied terrestrial, wetland, and open water habitats. Many areas serve as isolated refuges for the more secretive species, and important feeding and resting areas for many migratory species. Waterfowl are conspicuous along the river, especially from fall through spring. The majority of these birds are migratory, using the river and island habitats as feeding and resting areas. Black ducks and mallards are abundant throughout the winter. Wood ducks and Canada geese are the most frequently observed waterfowl species and the most common nesters. The mature forested wetlands and bottomland hardwoods are important nesting habitats, and the inland and fringe wetlands are important brood areas.

Several species of shorebirds, such as the spotted sandpiper and killdeer, are year-round residents of the river valley. Typically, large flocks of semipalmated sandpiper and semipalmated plover use the riverine wetlands. The American woodcock, a common spring and fall migrant, nests along the river. Wading birds such as the great blue and green-backed heron are commonly seen feeding and roosting in the shallow water zones, fringe wetlands and interior wetlands along the islands. Eleven species of raptor are associated with the islands. The most common are osprey, red-tailed hawk, and American kestrel. The osprey population on the river appears to be increasing, due largely to increased food supply and improved water quality. More common birds include the cardinal, indigo

bunting, acadian flycatcher, yellow-billed cuckoo, common grackle, tufted titmouse, red-winged blackbird, mourning dove, and robin.

Natural Areas

In addition to the over 300,000 acres of park land open to the public, several areas in the Corridor have been set aside as wildlife refuges with varying degree of public access. These areas include some of the finest remnants of the Ohio River Valley's natural heritage, preserving rare plants and animals. Wetlands, islands and back channels have been recognized for years as having high quality fish and wildlife, recreation, scientific and natural heritage values. They provide some of the region's best riverine, wetland and bottomland habitats. These natural areas are important, not only for the preservation of wildlife, but also to educate the public and communicate the significance of these environments.

Ohio River Islands National Wildlife Refuge

The Ohio River Islands National Wildlife Refuge, established in 1990, encompasses 38 islands from Shippingport, Pennsylvania to Manchester, Ohio. Located along 362 miles of river, it comprises 3,500 acres of fish and wildlife habitat. There are 33 islands bordering West Virginia, two bordering Pennsylvania, and three bordering Kentucky. The mission of the Refuge is to concentrate on preserving, restoring and enhancing diversity and abundance of fish and wildlife populations characteristic of the Ohio River. Table 6 shows the islands that make up the National Wildlife Refuge, as well as the other islands along the length of the river.

More than 130 species of birds can be found in the Refuge, including 35 species of waterbirds, 11 species of raptors, and 87 species of songbirds. The islands provide a chain of stopover points within the Corridor along the fringes of the Mississippi and Atlantic flyways, supplying resting cover and food during migration. Over 50 species of fish have been found in waters surrounding the islands. In addition, many species of plants and animals considered endangered, rare, or of special interest inhabit the Refuge.

In the early 1900's, 49 islands existed within the West Virginia portion of the Ohio River. With industrialization and navigation "improvements," 14 of those islands were destroyed. Permit applications for mooring and fleeting facilities and residential developments, and unauthorized fills for recreational developments, threaten the continued existence of several island habitats. Major island landowners have proposed to remove several islands. Current land use of islands includes farming, water wells, oil and gas wells, dredge soil disposal, commercial sand and gravel dredging, and mooring. Recreational uses include camping, fishing, hunting, swimming, picnicking, pleasure boating and water skiing.

As islands are acquired by the Fish & Wildlife Service, all recreational activities will be evaluated to determine their compatibility with Refuge purposes. Generally, wildlife-oriented activities such as fishing, hiking, photography and wildlife observation will be encouraged. The Fish & Wildlife Service will work to develop public use programs to include interpretive trails, wildlife exhibits and educational workshops. The success of long-term wildlife habitat protection for these islands depends

on the strength of local, state and federal laws and regulations; the economy of surrounding areas as it relates to residential, commercial and recreational development; the conservation ethic of current island owners; and the degree of involvement by conservation-oriented land preservation groups. The refuge system has become an outstanding example of stewardship by the American people to protect and manage their irreplaceable natural resources. Hopefully, this stewardship will expand to more of the 83 islands located within the Corridor.¹⁷

Falls of the Ohio State Park and National Wildlife Conservation Area

The Falls of the Ohio State Park in Clarksville, Indiana is a unique and nationally significant area. The park contains approximately 68 acres of land, but lies within the Falls of the Ohio National Wildlife Conservation Area, which includes 1,404 acres of Federally protected land and water. The 375 million-year-old fossil beds are the largest in the world; 200 acres of bedrock are exposed when the river is at its lowest. More than 600 species of fossils have been identified at the Falls, two-thirds of which are new discoveries. In addition, more than 265 species of birds have been recorded at the Falls, which serves as a stop-off during seasonal migrations. The Conservation Area was created to protect fish and wildlife populations and habitats; ensure water quality, protect the fossilized coral reef, and provide opportunities for scientific research, interpretation and recreation. The State Park, which was established in 1990, specializes in natural interpretation and education. A 16,000 square foot interpretive center has been built to educate the public and serve as a research center.¹⁸

Green Bottom

Another wildlife management area of significance is the Green Bottom area in West Virginia, owned by the Department of Natural Resources and developed in 1989. Located in Cabell and Wayne counties, it is managed as a multiple-use area to include fishing, hiking, hunting, trapping, and wildlife observation. This area was used by prehistoric Indians as a hunting site. Today, this it supports agricultural, forest land, wetland, and open water resources. Green Bottom supports 30 indigenous mammal species and 105 bird species.

Ohio River Wetlands

The wetlands bordering the Ohio River are of particular environmental importance. Wetlands are now recognized as some of the most productive natural areas in the world, providing habitat for waterfowl, wildlife, fish and shellfish. They work as natural filtration systems, helping to purify the water by processing nutrients, suspended materials, and other pollutants. They serve as natural sponges to help control flood waters by absorbing water during heavy rainfalls, and then releasing the water slowly downstream. Wetlands also act as buffers along shorelines to control erosion.

The two major wetland systems occurring along the Ohio River and its islands are palustrine and riverine. These wetlands typically occur in narrow bands around island perimeters, in shallow submerged beds, in pockets of new land formed by sedimentation, and in sloughs, overflow channels, and abandoned riverbeds. Table 7 lists the embayments and wetlands in Ohio River Corridor

Palustrine wetlands include wooded swamp, bog, marsh, wet meadow, and shallow pond. Common types occurring along the islands are open water, emergent, scrub/shrub, and forested.

These areas are used by nearly all fish and wildlife, waterfowl, shore and wading birds, amphibians, and reptiles inhabiting these areas.

Riverine wetlands include shallow water areas that support floating or rooted aquatic vegetation, and seasonally exposed vegetated flats. This habitat comprises approximately 50 to 75 acres around the islands. These riverine wetlands are extremely important to fish and waterfowl. They are nursery areas for many juvenile game fish, such as spotted and largemouth bass, freshwater drum, and channel catfish. They provide food and cover for most minnows and shiners. In turn, these areas attract predatory fish. Migratory waterfowl, such as the Canada goose, mallard, black duck, wood duck, and blue-winged teal also feed on these submerged beds. During late winter and early spring, these wetlands are unvegetated flats, heavily used by migrating shore and wading birds.¹⁹

HISTORY

Key Points:

- ▶ While it is impossible to place an economic value on history, the Ohio River Corridor has played a central role in the settlement patterns, history, economy and cultural development of the United States.
 - ▶ The Corridor contains 1,885 buildings, structures and sites listed in the National Registry of Historic Places; 32 National Historic Landmarks; and 142 designated Historic Districts, as well as numerous museums.
-

Parts of the Ohio River were formed by Ice-Age glaciers approximately 1.2 million years ago. The north flowing Teays River, which formerly drained much of the Ohio Valley, was blocked by a glacier and formed a huge lake. These waters overflowed to the west and established a new drainage pattern. During this epoch the Teays flowed northward in the valley now occupied by the Miami River. Then about 400,000 years ago, another ice sheet blocked the river's north-flowing waters again just south of Hamilton, Ohio. A large lake formed and its waters spilled over toward what is now Anderson Ferry, setting the Ohio River's approximate present-day course.

Native Cultures

Little is known about the earliest human inhabitants of the Ohio River Valley. They probably roamed into the valley in search of game. After thousands of years of nomadic existence, these peoples either developed a settled lifestyle or were supplanted by other cultures. The first true civilization to inhabit the Ohio River Valley was the Mound Builders, known chiefly by their earthwork remains. Attracted by the plentiful game, fish and mussels, and aided by the ease of river transportation, mound building cultures thrived for many centuries in the valley. Included among the better known mound building cultures are the Adena, Hopewells, Fort Ancient peoples, and the Mississippian culture.

The Adenas, one of the older mound building cultures of the area, lived along the middle reaches of the Ohio River. Responsible for hundreds of conic mounds dotting the regional landscape, the Adenas are best known for the gigantic Serpent Mound in Adams County, Ohio. The Adenas were followed by the Hopewell culture, considered the most advanced of the mound builders because of the highly stylized artifacts found in the mounds, the technology they displayed, and the extensive trade network they created with peoples across North America. The Fort Ancient culture, whose name comes from earthworks in Warren County Ohio, followed the Hopewells and were not as advanced as their predecessors. The Mississippian culture also lived in the Ohio River Valley from 900 to 1500 a.d. and built mounds from near Evansville, Indiana downstream to Cairo, Illinois and beyond.

There is no general agreement about what happened to the mound building cultures. Perhaps they simply stopped engaging in readily identifying cultural practices, or were invaded and experienced a cultural dilution, or were wiped out by disease. One argument is that these people slowly evolved into some of the historic Native American tribes in the region, like the Shawnees, Ottawas, and Miamis. The historic tribes of the Midwest tended not to live on the same ground as the Mound builders. Described variously as "a land of ghosts," or "of the ancient ones," much of the Ohio Valley was apparently sacred ground, suitable mainly for hunting and warfare. Historic tribes inhabited the Ohio River Valley only after pressure from Europeans pushed large numbers of Shawnees and others into the region.

Colonial Activities

Exactly which European "discovered" the Ohio River is controversial as well. One legend claims that Spaniard Hernando De Soto established an outpost near Metropolis, Illinois in the late 16th century. A Frenchman named LaSalle, however, is generally credited by historians as the first European to explore the Ohio River. English fur traders were likely to have visited the Ohio at this time as well, yet were unable or unconcerned with reporting the news. Because of competing claims of discovery, the French and English both had laid claim to the region by 1670.

News of the Ohio Valley's agricultural fertility, abundant game and unlimited timber supplies brought pioneers and land speculators from Europe and colonial areas alike. More than one hundred years passed before the issue of ownership was settled. The 18th century was filled with warfare between the French, the British, the Colonists and the native populations for control of the Ohio River Valley. Much of the early fighting was over trading rights with the native populations, but later conflict centered on rights to the land and river itself. A key point in the struggle occurred at Fort Pitt, where the British and French fought to control the strategic headwaters of the Ohio. The fort finally reverted to British control in 1758. Five years later, the Treaty of Paris officially ended the Seven Years War in Europe and continental French interest in the Ohio River Valley.

Before full-scale European settlement could occur, the Native American populations still inhabiting much of the area had to be dislocated. This task fell to the United States immediately after the War for Independence. Twenty years later, after hundreds of battles and dozens of broken treaties, the Treaty of Greenville opened the area to European settlers. Although several towns had been established along the river before this, including Pittsburgh, Marietta, Gallipolis, and Cincinnati, the constant fear of attack by Native Americans kept the area sparsely settled.

Settlement

The *raison d'être* for almost every city, town and village along the Ohio River is the river itself. The three largest cities on the Ohio -- Pittsburgh, Cincinnati and Louisville -- are indebted to the river for their present size and importance. Pittsburgh, for example, was founded in approximately 1750 at the confluence of the Monongahela and the Allegheny Rivers. Originally known as Logstown, it was valued by entrepreneurs, traders, settlers, and military strategists. Pittsburgh was the original "Gateway to the West." In the 19th century, Pittsburgh's river location and proximity to coal made it the steel-producing capital of the world.

Located across from the Licking River at the northernmost point of a great bend in the Ohio, Cincinnati was a logical disembarking point for settlers, a convenient shipping and receiving destination and, like Pittsburgh, was the site of an early military outpost. By the 1850s, 8,000 steamboats passed through Cincinnati each year, and the town became a major shipper of whiskey, flour, and pork. Indeed, Cincinnati became known as "Porkopolis" because meat-packing was such an important part of its economy.

Louisville may have been no more important than any other river town if not for the navigational obstacle known as the Falls of the Ohio. They made this location a portage area and a necessary stopping point for freight and passengers. Other cities, including Huntington, Evansville, Portsmouth and Paducah, have also found their destinies tied to the river. Even many smaller towns like Newburgh, Indiana were once "boom towns" because of their river locale.

Land of Diversity

The pattern of settlement that emerged in the 1800s is unique in American history and critical to the development of the United States. Until the Ohio River Valley was settled, people in New England, the Middle Atlantic, and the South existed without much regard for each other's traditions and culture. With the opening of the Ohio Valley, settlers from the three colonial areas found themselves living together under new circumstances. The Puritans of New England inhabited towns in the upper Ohio Valley, such as Marietta, Ohio, while Southerners moved along the river below Cincinnati. Germans, Swiss and Scandinavians also settled along the river, especially after the canals were built in the 1830s. Even the French had settlements along the river, most notably at Gallipolis, Ohio. But for the most part, immigrants settled without strict regard to the dominant culture of the town they chose.

The Ohio River Valley may be the only area of the country that ever really became a "melting pot." Unlike other places that had or have had greater diversity, the Ohio River Valley was settled *simultaneously* by many cultures. In most places, the primary settlement group establishes a cultural system that later settlers largely adopt as their own. The great diversity of architectural styles in many Ohio River towns testifies to the original diversity of cultures in the region. Large symmetrical brick homes and cape cods from New England are often found next to Greek Revival style homes more reminiscent of Virginia. Shotgun houses brought north by former slaves and the log cabins of Swedes may stand across the road from each other. Massive Pennsylvania Dutch forebay barns stand in contrast to the smaller array of barns built on Scots-Irish farms.

This mixing of cultures and ideas may be partly responsible for the progressive constitutions of Ohio and Indiana that eventually forced lawmakers in Washington to amend the Constitution and construct the Bill of Rights. It was along the Ohio River that practical and enlightened solutions to the fledgling nation's problems were hammered out. For example, the issue of slavery was first confronted in realistic terms along the Ohio. Years later, the river itself demarcated North and South, Slave states and Free states. Today the cultural and religious diversity is still impressive. Heritage festivals celebrate ethnic ancestry of Germans, French, Swiss, Scot-Irish, and Africans.

Economic, Political and Cultural Growth

In the 19th century, innovations in river transportation and the completion of extensive canal systems turned the Ohio River Valley into the industrial and agricultural backbone of the United States. The first steamboat appeared in 1811, and upgrading of the Ohio began in 1824, when the Federal government contracted to have snags pulled from the river. Not long afterward, the political strength of the Ohio Valley rose to match its economic strength. Lincoln, Grant, Harrison and Carnegie are just a few of the influential people from the Ohio Valley.

When the Civil War erupted, the Ohio River was pivotal in the success of the Union forces. Large contingents of troops and important generals came from the Ohio Valley. Cairo, Illinois served as a staging area and headquarters for General Grant's amphibious assault on Fort Donnellson and Fort Henry on the Cumberland and Tennessee Rivers. The capture of these forts is often regarded as a decisive campaign in the war. Perhaps most important to the war effort was the industrial and agricultural capacity of the Ohio River Valley, which proved to be the strength of the North.

Steamboats on the Ohio not only helped save the Union, but after the war provided an essential link between the North and South that bound and healed the nation. Riverboat commerce in the postbellem period was essential in reopening trade between the North and South. Riverboats brought both reconstruction southward and former slaves and poor whites northward into the factories of Pittsburgh, Cincinnati and beyond. Equally important, riverboats carried ideas, cultures and traditions up and down the river. The cultural blending made possible by the Mississippi and Ohio Rivers is responsible for the creation of many uniquely American traditions, such as jazz, blues, country and rock-n-roll music. The rivers became part of our national folklore through the writings of Mark Twain and Harriet Beecher Stowe. Romantic notions of rivermen and packet boats have become an integral part of our national myth and collective self image.

The river system was most important to the United States during the first half of the 19th century. The heyday of the Ohio River as a lifeline of commerce and political power ended with the arrival of the railroads, which provided access to eastern markets and western lands faster and more directly than steamboats. By the Great Depression, packet boats were virtually a thing of the past. After the Depression, steam vessels were replaced by diesel tows pushing lengthy chains of barges.

The U.S. Army Corps of Engineers completed the initial canalization of the Ohio River in 1929. Locks and dams made the river deeper and navigable virtually year-round and greatly enhanced the cost efficiency of river navigation. The arrival of more powerful diesel boats, coupled with demand for increased tonnage, produced tows that often surpassed the 600-foot capacity of early lock chambers. It became necessary to break the tow apart and lock it through in two sections. "Double locking" was a hazardous operation and required several hours to complete. The delays caused by this procedure increased delivery time and decreased the cost effectiveness of barge transportation. After World War II the Army Corps of Engineers began a modernization program to refurbish old dams and build new dams. Although the coming of the interstate highways in the post-war era further eroded the role of the river in the broad national economic context, the economy of the Ohio Valley is still intimately tied to the river.

CONCLUSIONS

The Ohio River is many things to many people. While it has inherent value as a natural resource that cannot be conveyed in economic terms, it is important to achieve some sense of the value of the many uses to which the river is put. Public attention is drawn and concern raised when people are made to realize the importance of the resource at their doorstep. Attention was focused on the Great Lakes and the Chesapeake Bay when people realized how economically and environmentally vital these water resources are. In order for attention to be focused on the Ohio River as one of the country's great river systems, its economic, environmental, and cultural values must be demonstrated as well. This study was an attempt to begin that process. While modest in scale, its results should show that the Ohio River is a nationally significant resource deserving national attention.

Information Deficits

This was a broad-based survey focused on readily available information. Such an effort requires the full cooperation of government agencies, communities, and private interests. Unfortunately, many of the requests for information did not receive a response. Specific examples of significant information deficits include:

- ▶ Current data on the full economic impact of all river-related economic activities;
- ▶ More information on the economic consequences of river-related events and festivals;
- ▶ Riverfront enhancement plans and impact studies from each of the communities along the Ohio River;
- ▶ Current and verifiable information on the size, quantity, ownership, and precise location of wetlands, islands and preserves in the Corridor;
- ▶ Information regarding the number of recreationists using the Ohio River and the Corridor's park and recreation facilities for fishing, boating, camping and other outdoor pursuits.

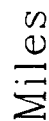
Study Limitations

The primary limitation of this study, besides its limited scale, is that it was conducted on a county-wide basis. While this was important to give an overall picture of the Ohio River Corridor, it also prevented the study from achieving the level of detail necessary to accurately determine the value of the Ohio River itself. While the figures described here provide some indication of the importance of the Ohio River, the true numbers are in all probability considerably higher. Specifically, more information is needed about the industries directly related to the river. For example, a future study should strive to determine the full value and worth of the barge industry and recreational boating industry on the Ohio River. Such a study should also try to ascertain the economic impacts of major industries located on the river that provide the economic base for many communities.

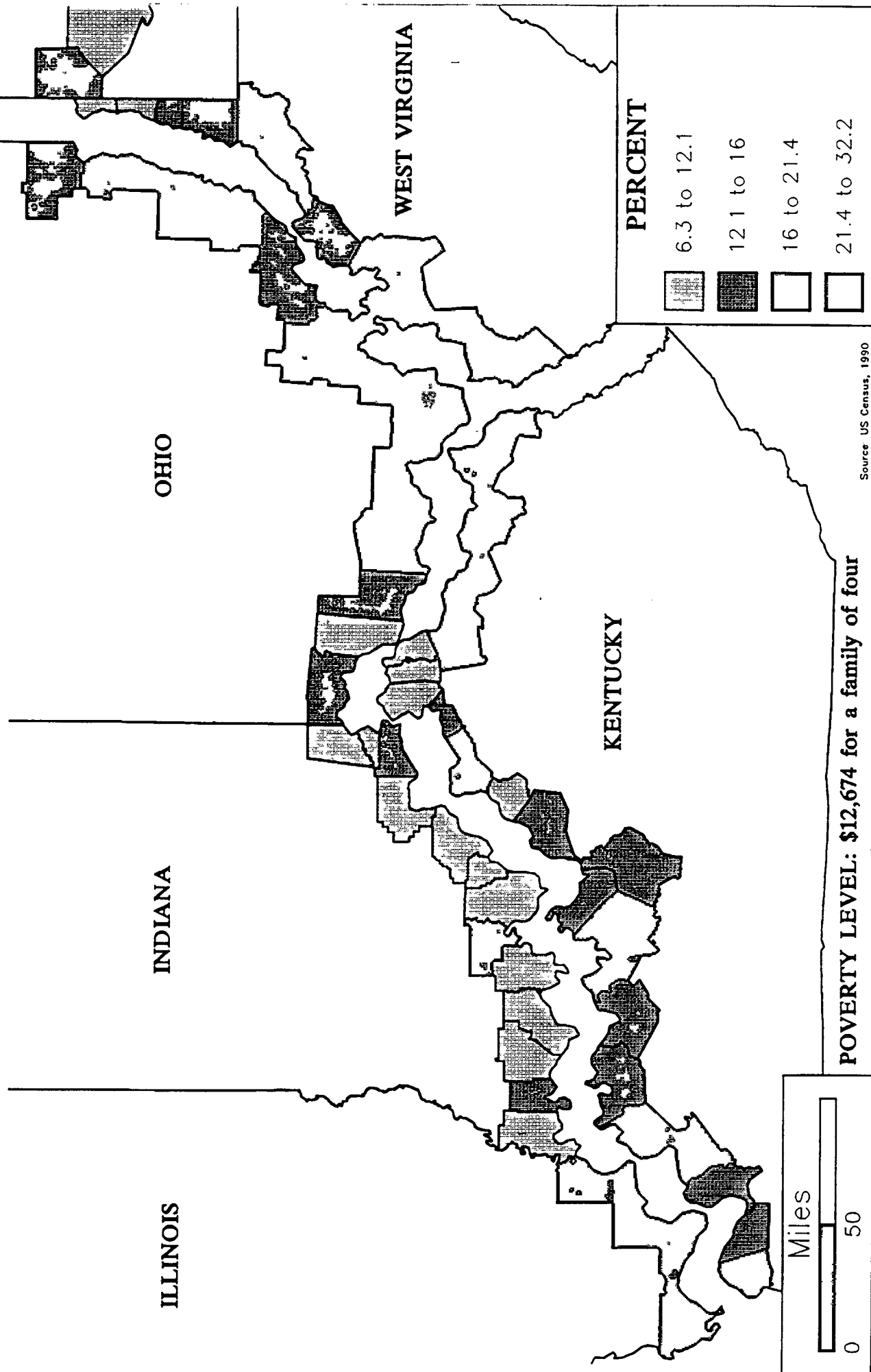
Ideally, a well-funded study will follow this initial exploration. It should involve representatives from each of the six Corridor states, including natural resource, economic development, and environmental protection agencies. Similar cooperation should be secured from every incorporated city and town in the Corridor. People able to obtain more detailed information from the barge

industry, river cruise boat companies, electric power utilities, the recreational boating industry, and other river interests should also be enlisted in an enlarged study effort. In addition, a considerable amount of field investigation is needed to generate meaningful data on activities and resources in the Corridor. Quite simply, an extraordinarily large amount of information and the subsequent analysis of that information is necessary to fully portray the value of the Ohio River Corridor.

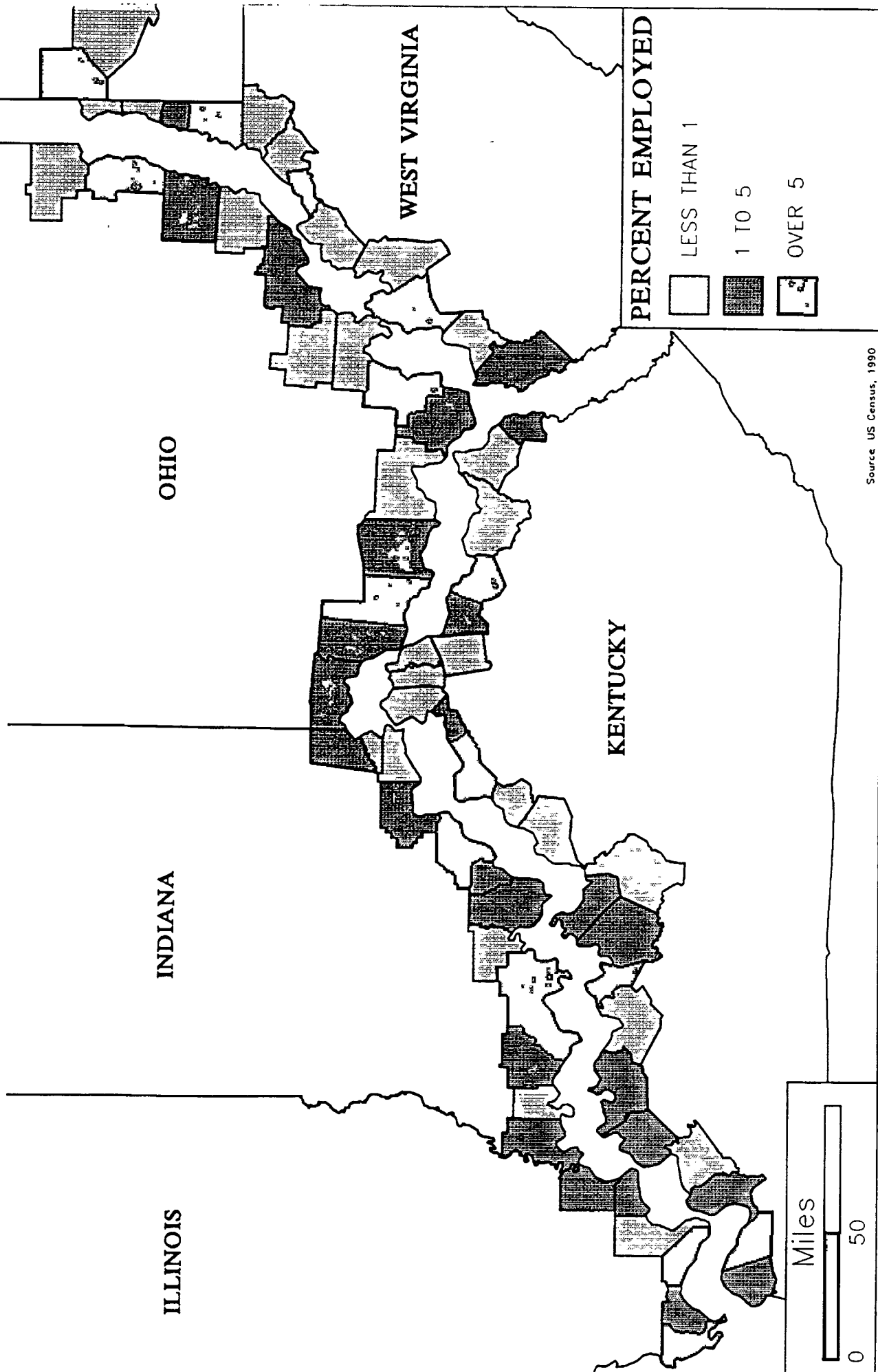
Map 1



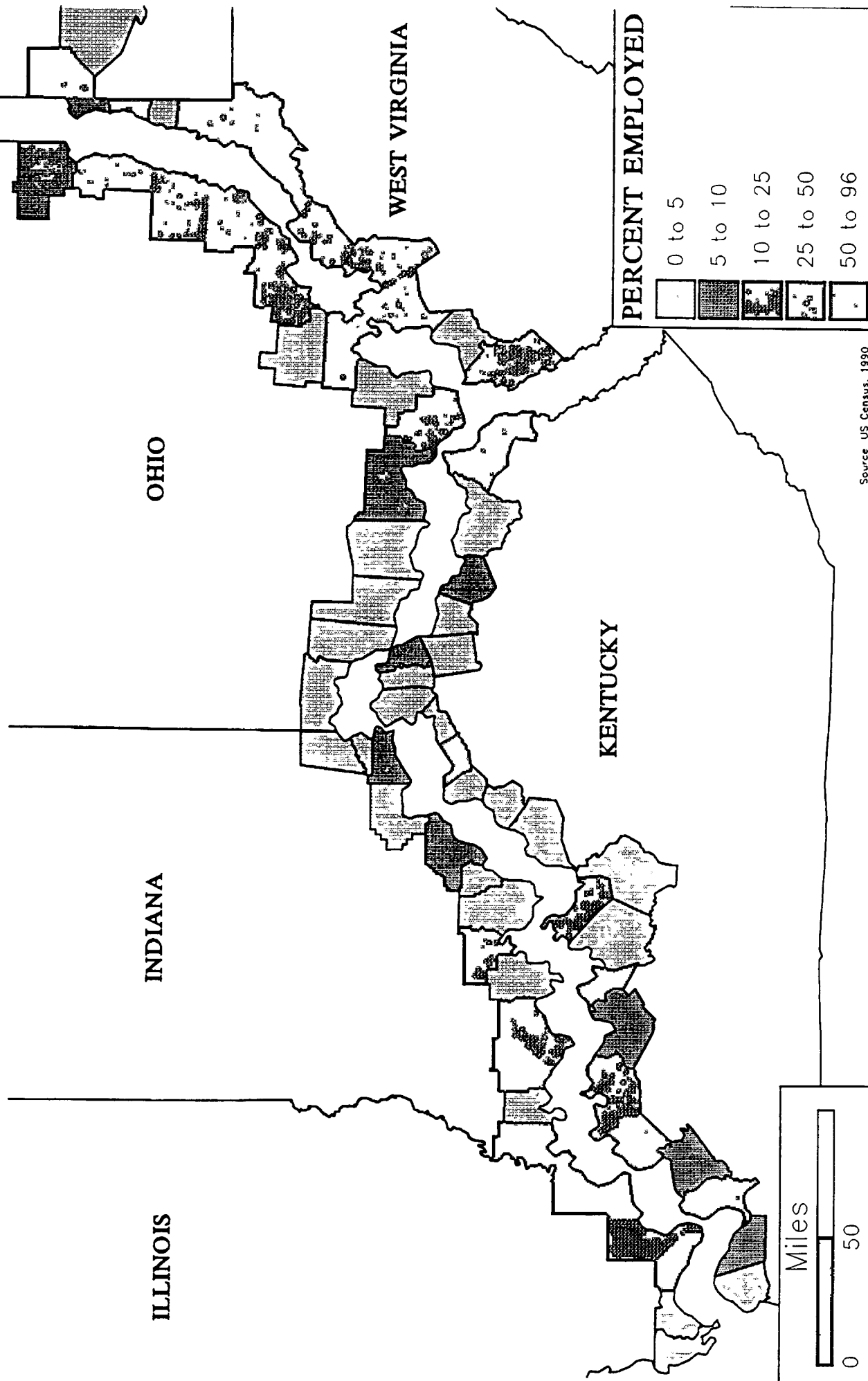
Map 2 People Living in Poverty 1990



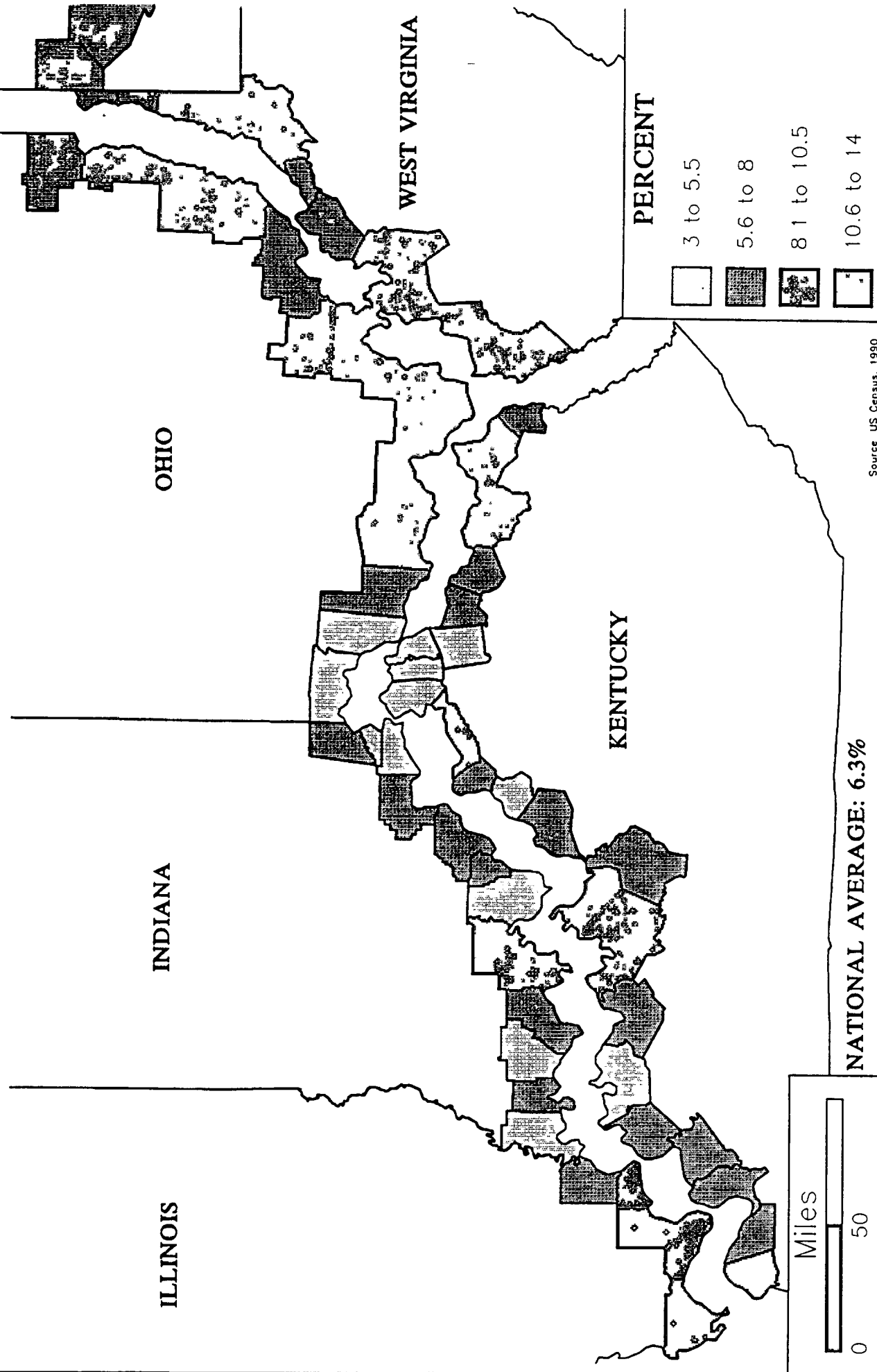
Map 3 Primary Sector Employment



Map 4 Secondary Sector Economy

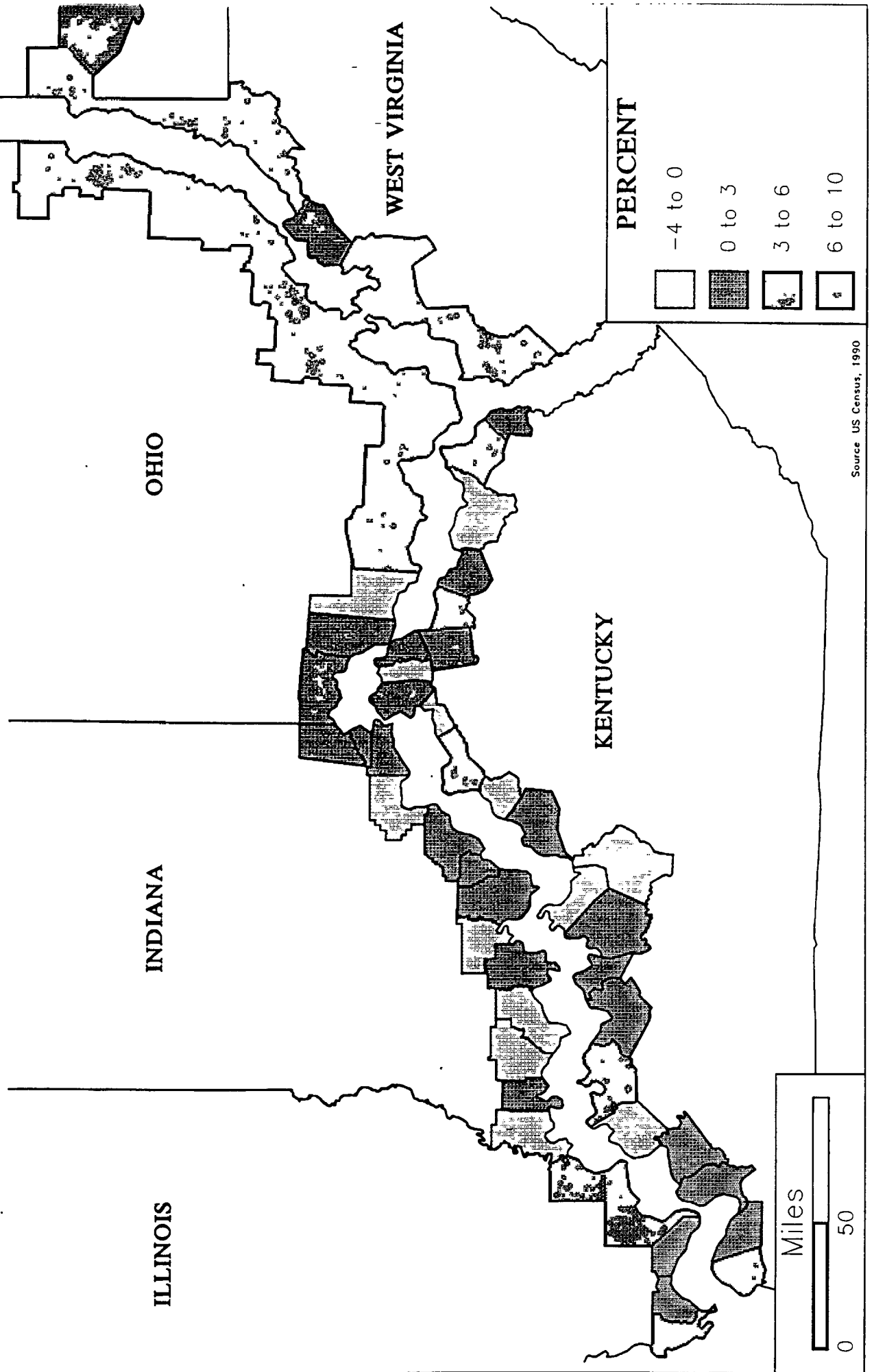


Map 5 Percent Unemployment 1990



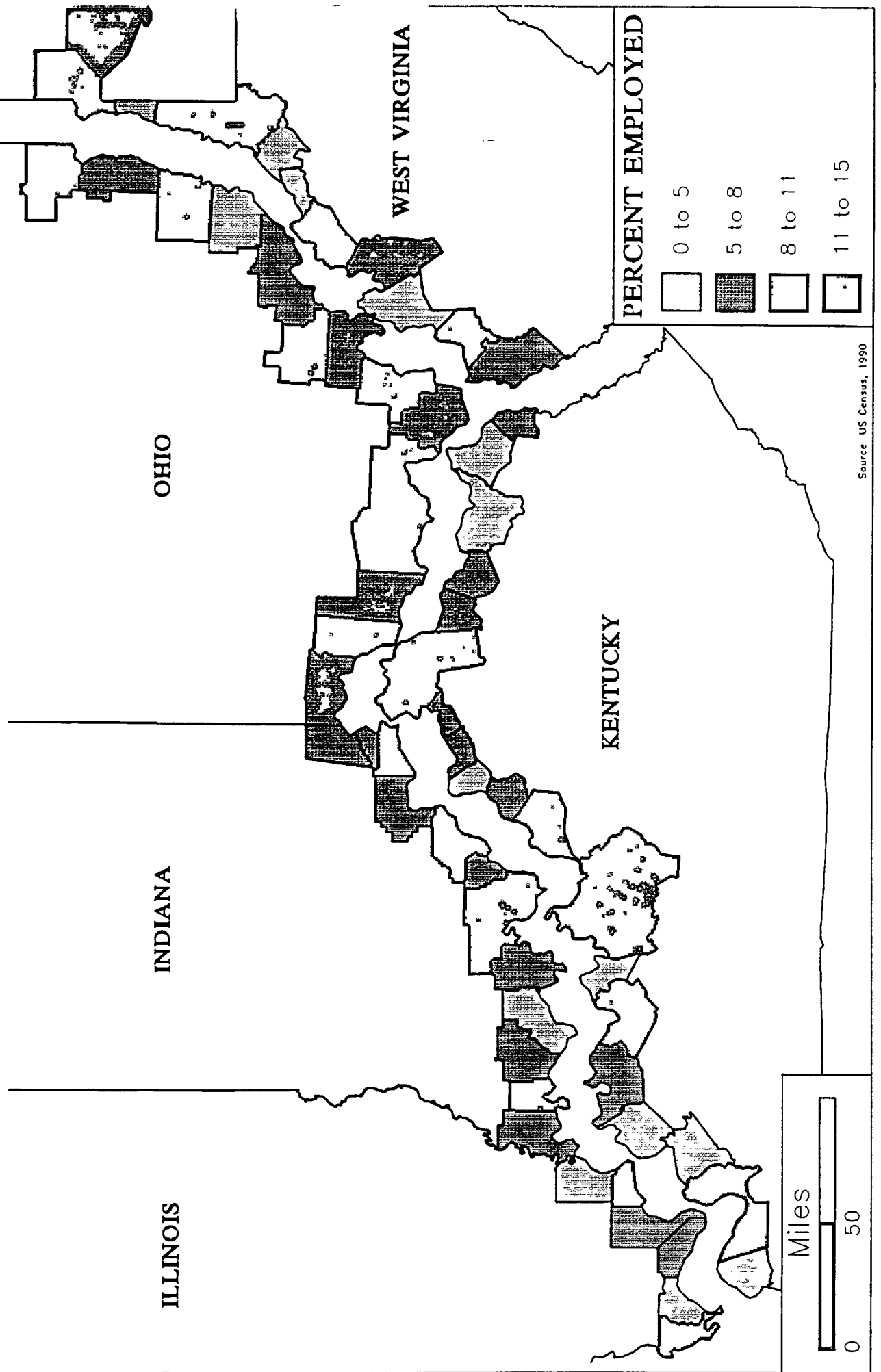
Map 6

Percent Change in Poverty 1980-90

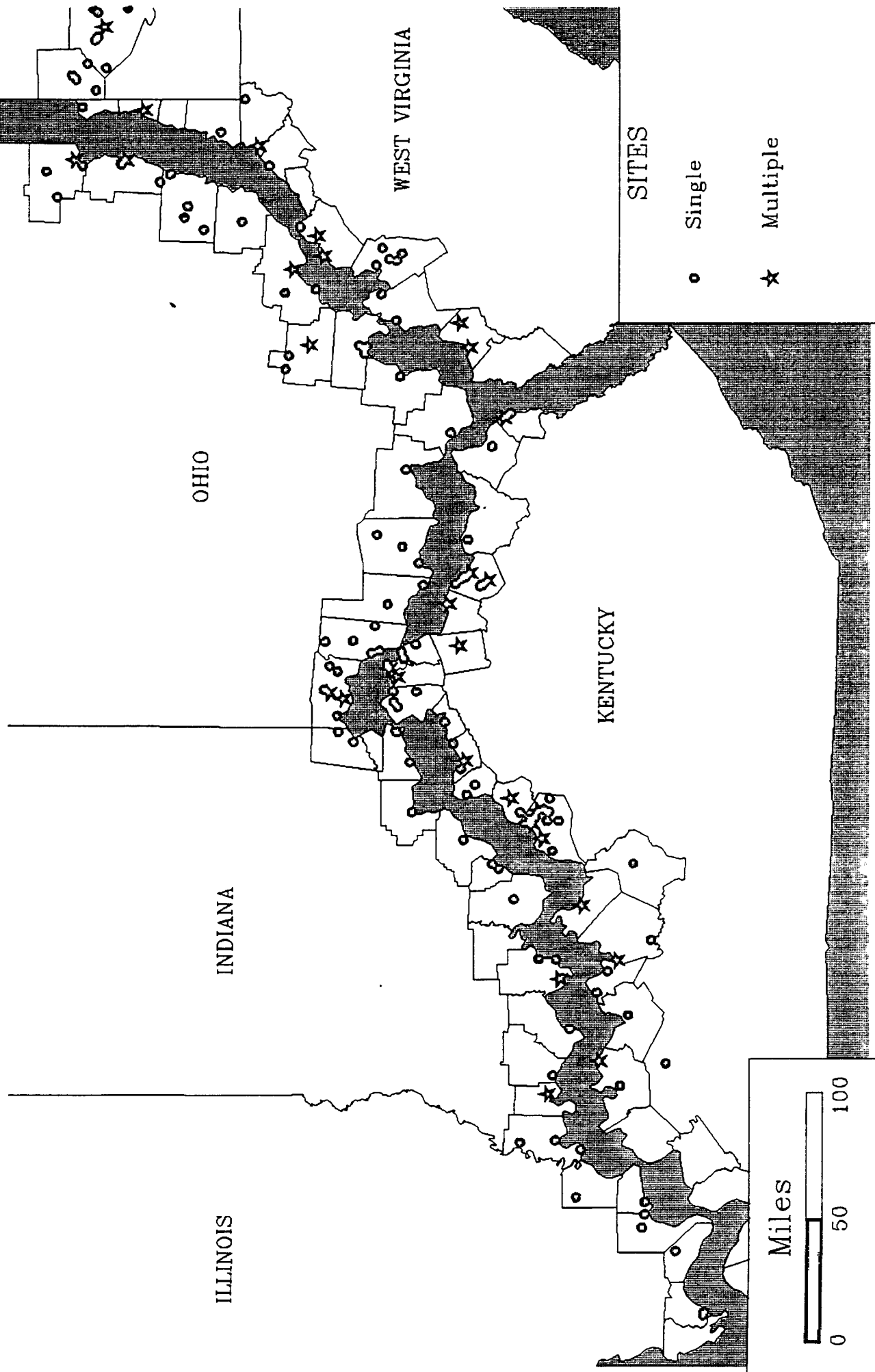


Map 7

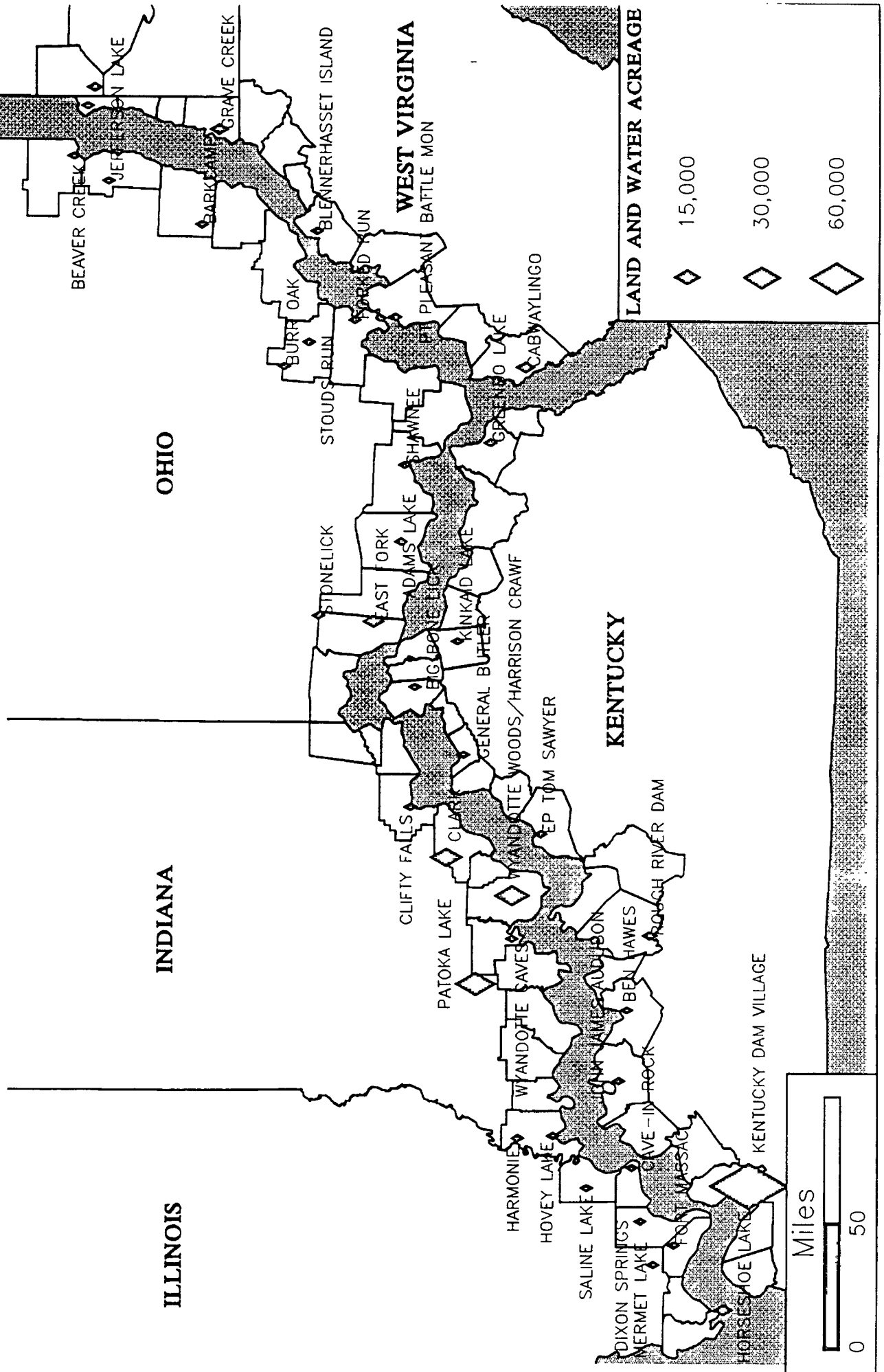
Selected Tourism and Recreation Employment



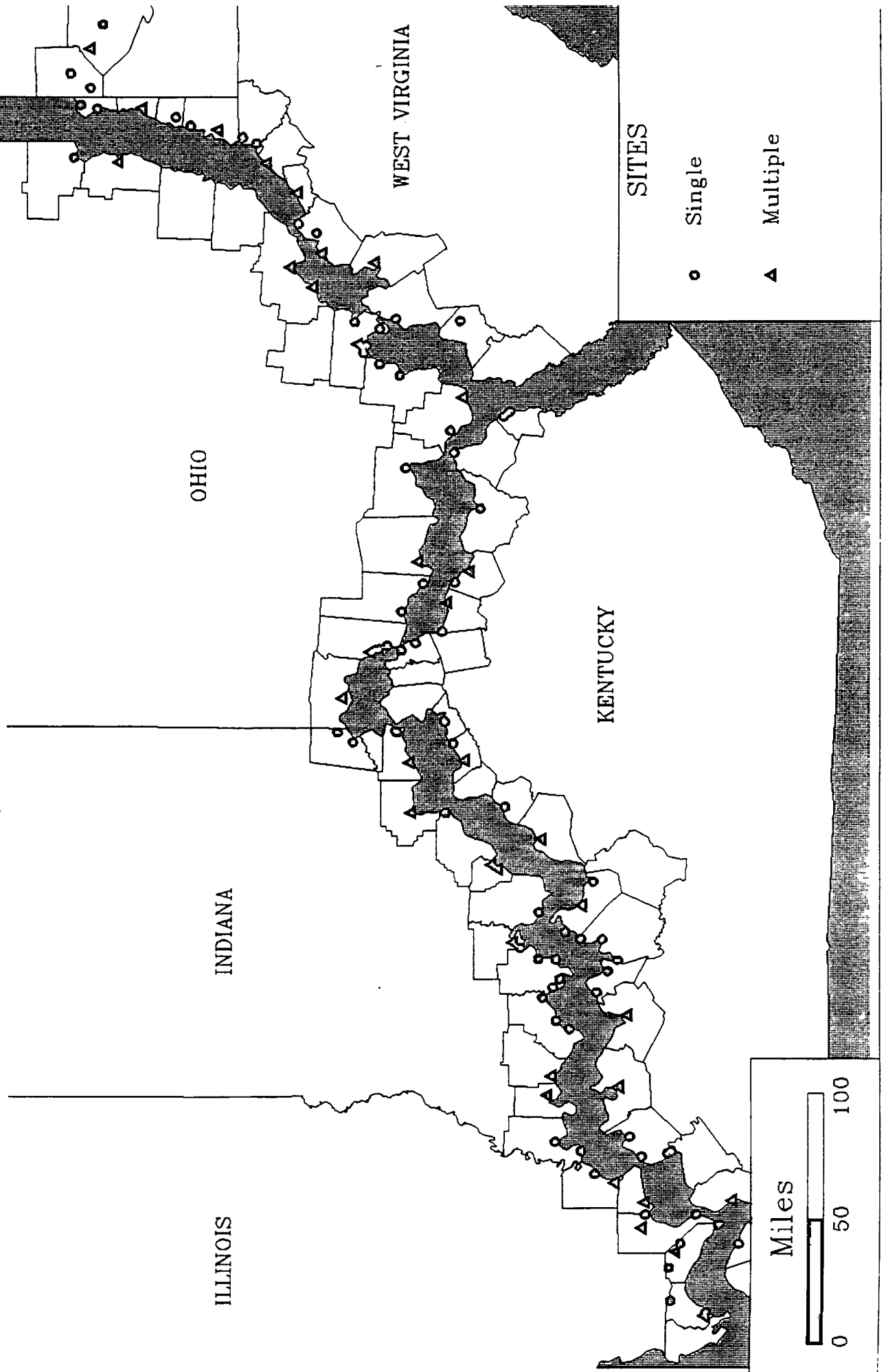
Map 8 Historic Districts



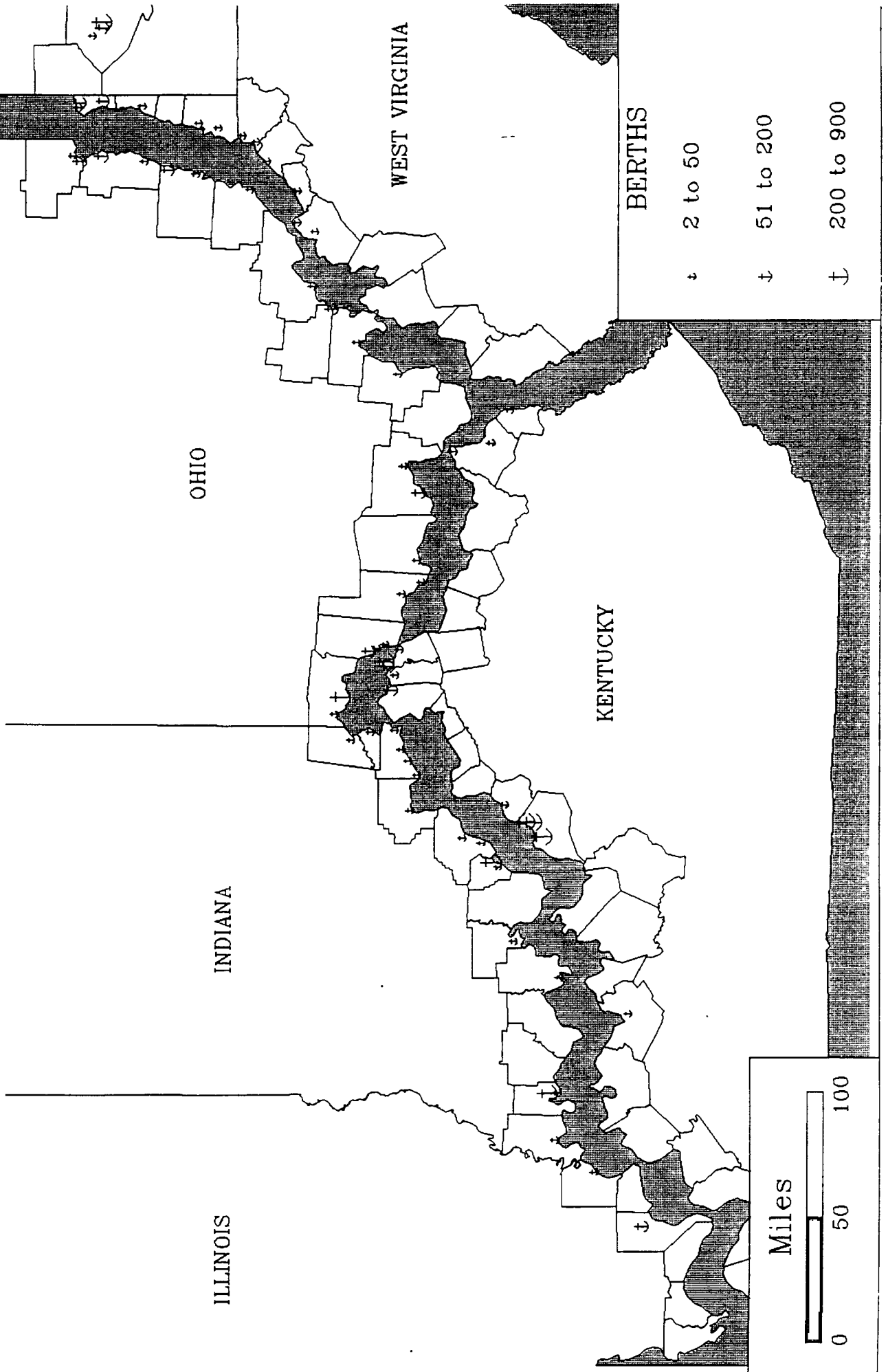
Map 9 State Parks and Recreation Areas



Map 10 Public Access Sites



Map 11 Marinas



Map 12

Woodall's Campgrounds

PENN.

OHIO

INDIANA

WEST VIRGINIA

NUMBER OF SITES

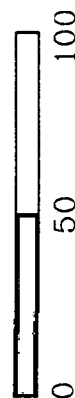
△ 100 0

△ 200 0

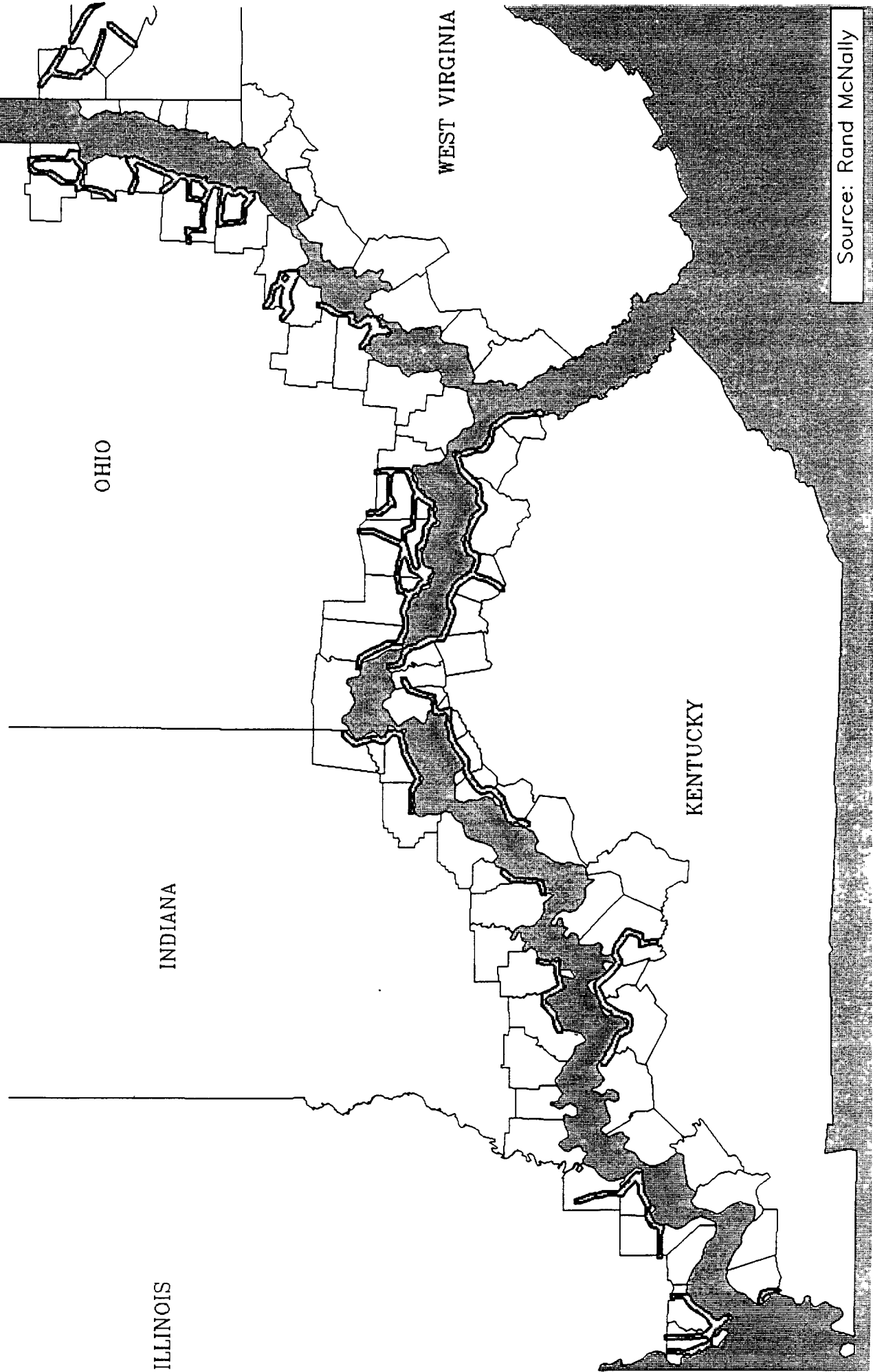
△ 400 0

KENTUCKY

MILES



Map 13 Scenic Highways



Source: Rand McNally

Table 1
Standard Industrial Classification Codes
Used in Corridor Analysis

Primary Sectors

3730	Ship and boat building and repairing	4910	Electric services
4410	Deep sea foreign transportation of freight	4930	Utility services
4440	Water transportation of freight, nec	5146	Fish and seafoods
4480	Water transportation of passengers	5171	Petroleum bulk stations and terminals
4490	Water transportation services	5550	Boat dealers

Secondary Sectors

10--	Metal mining	2990	Miscellaneous petroleum & coal products
1220	Bituminous coal and lignite mining	3240	Cement, hydraulic
1240	Coal mining services	3250	Structural clay products
1310	Crude petroleum and natural gas	3270	Concrete, gypsum, and plaster products
1320	Natural gas liquids	3280	Cut stone and stone products
1380	Oil and gas field services	3310	Blast furnace and basic steel products
1440	Sand and gravel	3320	Iron and steel foundries
1470	Chemical and fertilizer minerals	3330	Primary nonferrous metals
1480	Nonmetallic minerals services	3340	Secondary nonferrous metals
1490	Miscellaneous nonmetallic minerals	3360	Nonferrous foundries (castings)
2810	Industrial inorganic chemicals	3390	Miscellaneous primary metal products
2820	Plastics materials and synthetics	4220	Public warehousing and storage
2840	Soup, cleaners, and toilet goods	4230	Trucking terminal facilities
2850	Paints and allied products	4730	Freight transportation arrangement
2860	Industrial organic chemicals	4780	Miscellaneous transportation services
2870	Agricultural chemicals	5050	Metals and minerals except petroleum
2890	Miscellaneous chemical products	5093	Scrap and waste materials
2910	Petroleum refining	5160	Chemicals and allied products
2950	Asphalt paving and roofing materials	5170	Petroleum and petroleum products

Tourism Sectors

4725	Tour operators	7992	Public golf courses
5810	Eating and drinking places	7996	Amusement parks
7010	Hotels and motels	7999	Amusement and recreation, nec
7030	Camps and recreational vehicle parks	8410	Museums and art galleries
7920	Producers, orchestras, and entertainers	8420	Botanical and zoological gardens
7940	Commercial sports		

Table 2
Ohio River Navigation Dams

Mile Point	Name	Normal Pool Elevation (feet)*	Year Placed In Operation**
6.2	Emsworth	710.0	1921
13.2	Dashields	692.0	1929
31.7	Montgomery	682.0	1936
54.4	New Cumberland	664.5	1959
84.2	Pike Island	644.0	1963
126.4	Hannibal (h)	623.0	1972
161.7	Willow Island	602.0	1972
203.9	Belleville	582.0	1965
237.5	Racine (h)	560.0	1967
279.2	Robert C. Byrd	538.0	1937
341.0	Greenup (h)	515.0	1962
436.2	Meldahl	485.0	1964
531.5	Markland (h)	455.0	1963
606.8	McAlpine (h)	420.0	1961
720.7	Cannelton	383.0	1972
776.1	Newburgh	358.0	1975
846.0	Uniontown	342.0	1975
918.5	Smithland	324.0	1980
938.9	Lock and Dam 52	302.0	1928
962.6	Lock and Dam 53	290.0	1929

* National Geodetic Vertical Data (NGVD)

** Year placed in operation defined as when the pool was raised.

(h) These dams have hydropower facilities.

Information provided by the U.S. Army Corps of Engineers

Table 3
List of Power Generating Facilities on the Ohio River

Mile Point	Operating Company	Station Name	Capacity (MW)	Fuel	Cooling	Average Withdrawal (MGD)
2.5	Duquesne Light	Brunet Island	204	Gas & Oil	NA	NA
15.3	Duquesne Light	F.R. Phillips	365	Coal	Once Through	234
34.0	Pennsylvania Power	Bruce Mansfield	2,505	Coal	Off Steam	45
34.9	Duquesne Light	Beaver Valley	1,646	Nuclear	Off Steam	58
53.0	Ohio Edison	W.H. Sammis	2,303	Coal	Once Through	1,094
57.5	Ohio Edison	Toronto	176	Coal	Once Through	111
76.5	Ohio Power (AEP)	Tidd	70	Coal	Once Through	131
76.5	Ohio Power/Buckeye Power (AEP)	Cardinal (1&2)	1,200	Coal	Once Through	1,165*
77.3	Buckeye Power (AEP)	Cardinal (Unit 3)	630	Coal	Off Steam	
102.0	Ohio Edison	R.E. Burger	544	Coal	Once Through	651
111.0	Ohio Power (AEP)	Kammer	713	Coal	Once Through	655
112.5	Ohio Power (AEP)	Mitchell	1,632	Coal	Off Steam	35
119.5	PPG Industries, Inc.	New Martinsville	124	Coal	Once Through	
126.4	City of New Martinsville, WV	Hannibal	34	Hydro	NA	NA
160.0	Monongahela	Pleasants	1,252	Coal	Off Steam	43
160.5	Monongahela	Willow Island	243	Coal	Once Through	198
176.8	Union Carbide	Marletta	200	Coal	Once Through	
237.5	Ohio Power (AEP)	Racine	48	Hydro	NA	NA
241.6	Central Op. Co. (AEP)	Phillip Sporn	1,050	Coal	Once Through	1,058
242.5	Appalachian Power (AEP)	Mountaineer	1,300	Coal	Off Steam	22
258.0	Ohio Power (AEP)	Gen. J.M. Gavin	2,600	Coal	Off Steam	173
260.0	Ohio Valley Electric Corp.	Kyger Creek	1,086	Coal	Once Through	1,109
341.0	City of Hamilton, OH	Greenup	72	Hydro	NA	NA
390.0	Dayton Power & Light	Killen	666	Coal	Off Steam	8
405.7	Dayton Power & Light	J.M. Stuart (1,2,&3) (Unit 4)	1,830	Coal	Once Through	839*
414.0	East Kentucky Power Cooperative	H.L. Spurlock	610	Coal	Off Steam	4
443.5	Cincinnati Gas & Electric	Zimmer	800	Coal	Off Steam	
			1,408	Coal	Off Steam	59

List of Power Generating Facilities on the Ohio River (Cont.)

Mile Point	Operating Company	Station Name	Capacity (MW)	Fuel	Cooling	Average Withdrawal (MGD)
453 0	Cincinnati Gas & Electric	W.C. Beckjord	1,201	Coal	Once Through	758
490 0	Cincinnati Gas & Electric	Miami Fort	260	Coal	Once Through	308*
			1,056	Coal	Off Steam	
495 5	Indiana & Michigan Power (AEP)	Tanners Creek	995	Coal	Once Through	1,093
510 0	Cincinnati Gas & Electric	East Bend	650	Coal	Off Steam	15
531 5	Public Service of Indiana	Markland	55	Hydro	NA	NA
536 0	Kentucky Utilities	Ghent	2,200	Coal	Off Steam	69
560 0	Indiana-Kentucky Electric Corp	Clifty Creek	1,304	Coal	Once Through	1,267
571 8	Louisville Gas & Electric	Trimble County	500	Coal	Off Steam	6
606 8	Louisville Gas & Electric	Ohio Falls (McAlpine)	80	Hydro	NA	NA
610 0	Public Service of Indiana	Gallagher	600	Coal	Once Through	244
616 8	Louisville Gas & Electric	Cane Run	608	Coal	Once-Through	498
			140	Gas	Once-Through	108
625 9	Louisville Gas & Electric	Mill Creek	321	Coal	Once Through	242
			1,241	Coal	Off Steam	20
728 4	Big Rivers Electric Corp	Coleman	485	Coal	Once Through	258
745 0	Indiana & Michigan Power (AEP)	Rockport	2,600	Coal	Off Steam	43
753 5	Owensboro Municipal Utilities	Elmer Smith	416	Coal	Once-Through	204
773 0	Southern Indiana Gas & Electric	F B Culley	397	Coal	Once-Through	284
774	Southern Indiana Gas & Electric	Warrick	720	Coal	Once Through	409
794	Southern Indiana Gas & Electric	Ohio River	135	Gas & Oil	NA	NA
804	City of Henderson, KY	Henderson**	38	Coal	Once Through	15
817	Southern Indiana Gas & Electric	A B Brown	500	Coal	Off Steam	4
946	Tennessee Valley Authority	Shawnee	1,750	Coal	Once-Through	1,066
952	Electric Energy, Inc	Joppa	1,086	Coal	Once-Through	467

Total generating capacity, facilities operating 1/93. 44,649

* Combined flow for all units

** Plant discharge is source of supply for municipal water system

Information provided by ORSANCO Power Industry Advisory Committee

Table 4
Ohio River Corridor Camping Facilities

<u>CITY</u>	<u>STATE</u>	<u>CAMPGROUND NAME</u>	<u>NUMBER OF SITES</u>
Pittsburgh	PA	Pittsburgh North Campground	126
New Brighton	PA	Brady Run Park	150
Frankfort Springs	PA	Raccoon Creek State Park	176
Beaver	PA	Orchard Grove Campsites	70
Wheeling	WV	Dallas Pike Campground	133
Weirton	WV	Tomlinson Run State Park	54
Southside	WV	Chief Cornstalk Fishing & Hunting Area	25
Ripley	WV	Larry's Locker Campground & Marina	45
Point Pleasant	WV	Krodel Park	50
Parkersburg	WV	Trailer Center Campground	33
Milton	WV	Foxfire Camping Resort	178
Huntington	WV	Beech Fork State Park	275
Ashton	WV	Riverview Campground	120
Walton	KY	Big Bone Lick State Park	62
Carrollton	KY	General Butler State Resort Park	111
Florence	KY	Florence RV Park	69
Greenup	KY	Greenbo Lake State Resort Park	63
Henderson	KY	Audubon State Park	64
Louisville	KY	Otter Creek Park	202
Louisville	KY	Village Mobile Home & RV Park	15
Muldraugh	KY	Ft. Knox MilitaryDiamond Lake Resort	55
Owensboro	KY	Diamond Lake Resort	440
Owensboro	KY	Windy Hollow Campground	242
Paducah	KY	Fern Lake Campground	71
Sanders	KY	Eagle Valley Camping Resort	231
Woodsfield	OH	Shadow Lake Campground	104
Toronto	OH	Austin Lake Park & Campground	121
Rogers	OH	Terrace Lakes	200
Rogers	OH	Hide Away Hollow	50
Ripley	OH	Chief Logan's Gap Camping Resort Park	300
Richmond	OH	Jefferson State Lake Park	100
Reedsville	OH	Fork Run State Park	198
Portsmouth	OH	Anderson's Trailer Park	18
Portsmouth	OH	Wolford's Landing	84
Peebles	OH	Mineral Springs Lake Resort	150
Pedro	OH	Wayne National State Forest	43
Marietta	OH	Landing Family Campground	221
Lisbon	OH	Guilford Lakes State Park	42
Lisbon	OH	Lil' Beaver Park	99
Lisbon	OH	Vagabond Park Campground	90

<u>CITY</u>	<u>STATE</u>	<u>CAMPGROUND NAME</u>	<u>NUMBER OF SITES</u>
Ironton	OH	Wayne National State Forest	65
Goshen	OH	Cozy Dale Campground	110
East Liverpool	OH	Beaver Creek State Park	55
Coolville	OH	Carthage Gap Campground	145
Cincinnati	OH	Woodland Trailer Park	20
Cincinnati	OH	Quality Inn RV Park	11
Belmont	OH	Barkcamp State Park	151
Batavia	OH	East Fork State Park	416
Aurora	IN	Campshore Campground	260
Clarksville	IN	Add More Campground	60
Clarksville	IN	KOA Louisville Metro	97
Corydon	IN	Harrison Crawford State Forest	60
Dale	IN	Lincoln State Park	270
Evansville	IN	Weather Rock Campground	50
Evansville	IN	Rockfalls Campground	60
Ferdinand	IN	Ferdinand State Forest	72
Hamburg	IN	Dream Lake State Forest Recreation Area	280
Henryville	IN	Clark State Forest	70
Lawrenceburg	IN	Hickory Lake Campground	40
Madison	IN	Clifty Falls State Park	165
Marengo	IN	Marengo Cave Park	20
Milltown	IN	Cave County Canoes	64
Mt. Vernon	IN	Hovey Lake State Fish & Wildlife Area	48
Selvin	IN	Yellow Banks Recreation Center	90
St. Croix	IN	Hoosier National Forest	27
St. Croix	IN	Hoosier National Forest	39
Tell City	IN	Hoosier National Forest	25
Cairo	IL	Garden Inn Trailer Park	37
Cave In Rock	IL	Shawnee National Forest	35
Cave In Rock	IL	Cave In Rock State Park	60
Equality	IL	Saline City State Conservation Area	45
Golconda	IL	Dixon Springs State Park	50
Karber Ridge	IL	Shawnee National Forest	76
Metropolis	IL	Fort Massac State Park	58
Olive Branch	IL	Horseshoe Lake State Conservation Area	178
STATE TOTALS			
Pennsylvania			522
West Virginia			913
Kentucky			1,625
Ohio			2,793
Indiana			1,797
Illinois			539
Source: Woodall's Campground Directory, 1993	TOTAL CORRIDOR SITES		8,189

Table 5
State Parks and Recreation Areas in Corridor Counties

<u>PARK NAME</u>	<u>TYPE*</u>	<u>STATE</u>	<u>CITY</u>	<u>ACRES</u>	<u>WATER ACRES</u>
Raccoon Creek	SP	PA	Hookstown	7,342	0
Cabwaylingo	SP	WV	Dunlow	8,123	0
Blennerhasset Island	SHP	WV	Parkersburg	500	0
Grave Creek	SHP	WV	Moundsville	2	0
Pt. Pleasant Battle Mon.	SHP	WV	Pt. Pleasant	4	0
Tomlinson Run	SP	WV	New Manchester	1,398	33
Ben Hawes	SRP	KY	Owensboro	297	0
Big Bone Lick	SP	KY	Union	525	7
Kentucky Dam Village	SRP	KY	Gilbertsville	1,351	128,807
Kincaid Lake	SP	KY	Falmouth	850	183
Tom Sawyer	SP	KY	Louisville	376	0
General Butler	SRP	KY	Carrolton	791	30
Greenbow Lake	SRP	KY	Greenup	3,008	225
John James Audubon	SP	KY	Henderson	619	28
Rough River Dam	SRP	KY	Fall of Rough	637	4,860
Adams Lake	SP	OH	West Union	48	47
Barkcamp	SP	OH	Belmont	1,115	117
Beaver Creek	SP	OH	E. Liverpool	3,038	0
East Fork	SP	OH	Bethel	8,420	2,160
Forked Run	SP	OH	Reedsville	715	102
Jefferson Lake	SP	OH	Richmond	906	800
Shawnee	SP	OH	Portsmouth	1,100	68
Stonelick Lake	SP	OH	Pleasant Plain	1,058	200
Burr Oak	SP	OH	Glouster	2,592	664
Stouds Run	SP	OH	Athens	2,606	161
Clark	SF	IN	Henryville	23,979	0
Clifty Falls	SP	IN	Madison	1,360	0
Deam Lake	SRA	IN	Borden	1,300	0
Harmonie	SP	IN	New Harmony	3,465	0
Harrison-Crawford	SF	IN	Corydon	25,619	0
Hovey Lake	FWA	IN	Mt. Vernon	4,298	0
Wyandotte Caves	SRA	IN	Leavenworth		0
Wyandotte Woods	SRA	IN	Corydon		0
Patoka Lake		IN	Birdseye	25,583	8,880

<u>PARK NAME</u>	<u>TYPE*</u>	<u>STATE</u>	<u>CITY</u>	<u>ACRES</u>	<u>WATER ACRES</u>
Cave In Rock	SP	IL	Cave In Rock	150	0
Mermet Lake	SCA	IL	Belknap	2,580	0
Saline Lake	SCA	IL	Equality	1,248	0
Dixon Springs	SP	IL	Golconda	496	0
Fort Massac	SP	IL	Metropolis	1,470	0
Giant City	SP	IL	Makanda	3,694	0
Horseshoe Lake	SP	IL	Cairo	9,550	0

*SP-State Park

SHP - State Historic Park
 SRP - State Recreation Park
 SRA - State Recreation Area
 SF - State Forest
 SCA - State Conservation Area
 FWA - Fish & Wildlife Area

STATE TOTALS

Illinois	19,188	0
Indiana	85,604	8,880
Kentucky	8,454	134,140
Ohio	21,598	4,319
Pennsylvania	7,342	0
West Virginia	10,027	33

CORRIDOR TOTAL	152,213	147,372
----------------	---------	---------

Source: Omni Directory, 1990

Table 6
Ohio River Islands*

<u>River Mile</u>	<u>Island Name</u>	<u>County</u>	<u>Acres</u>	<u>Perimeter (Mi.)</u>	<u>Ownership</u>	<u>Aquatic Back Channel (M)</u>	<u>Shoreline Length (M)</u>
35-35.6	Phillis	Beaver PA	27.2	1.1	Dravo (F&W)	29.8	0.6
37.5-37.8	Georgetown	Beaver PA	16.5	0.8	Dravo (F&W)	17.1	0.4
41.8-42.7	Babbs	Hancock WV	39.8	1.6	Dravo	36.8	0.8
49.4-49.7	Baker	Hancock WV	4.7	0.1	Dravo	1.8	0.1
51.8-52.3	Cluster	Hancock WV	12.3	0.9	Dravo	17.5	0.5
60.7-63.8	Browns	(part of Griffen)				255.6	3.0
62.8-63.1	Upper Griffen	Meigs OH	6.3	0.6	National Steel		
63.4-63.7	Lower Griffen	Jefferson OH	3.3	0.3	National Steel		
89.3	Wheeling						
85.1-85.3	Upper Sister	Ohio WV	2.3	0.2	Dravo	17.4	0.3
85.7-86.1	Lower Sister	Ohio WV	13.0	0.7	Tn-State Materials	23.6	0.5
93.1-93.6	Boggs	Belmont OH	15.3	1.0	Delta Concrete	4.2	0.6
108.1-108.5	Captina	Marshall WV	17.9	0.9	Lawrence C. Heil	5.5	0.6
113-113.7	Fish Creek	Marshall WV	62.4	1.4	Consol	49.3	0.7
131.9-133.1	Paden	Wetzel WV	76.9	2.2	Dravo (F&W)	24.0	1.1
133.9-135.5	Williamson	Tyler WV	130.9	2.9	Dravo (F&W)	100.3	1.8
135.5-135.8	Witten Towhead	Tyler WV	9.1	0.7	Dravo (F&W)		
138.2-138.4	Crab	Tyler WV	1.6	0.3	Dravo (F&W)	0.7	0.2
138.8-139.6	Wells	Tyler WV	50.6	1.4	Dravo	31.6	0.7
141.4-141.9	Mill Creek	Tyler WV	26.2	1.0	Dravo	13.8	0.5
142.6-143.2	Grandview	Tyler WV	15.4	0.7	Dravo	**	**
151.6-152.2	Grape/Bat	Pleasants WV	48.8	1.1	Dravo (F&W)	43.0	0.6
158.3-159.2	Broadback	Pleasants WV	40.6	1.2	Dravo (F&W)	**	**

* Islands on this page comprise the Ohio River Islands National Wildlife Refuge

** No true backchannel

<u>River Mile</u>	<u>Island Name</u>	<u>County</u>	<u>Acres</u>	<u>Perimeter (Mi.)</u>	<u>Ownership</u>	<u>Aquatic Back Channel (M)</u>	<u>Shoreline Length (M)</u>
158 9-160 4	Eureka	Pleasants WV	18 1	1 0	American Cyanamid	**	**
168 9-171 9	Marietta	Wood WV	159.5	5 0	Howard Buckley	176 7	2 5
175 2-177 2	Muskingum	Wood WV	117 9	3 5	Dravo	148 4	1 8
178-178 7	Halfway	Wood WV	36.4	1 5	Dravo	23 8	0 8
181.2-182 6	Neal	Wood WV	133 3	2 4	Dravo	62.0	1 2
186-189 9	Blennerhassett	Wood WV	507.1	8 6	E I DuPont DeNemours	285 5	3 6
194 7-194 9	Newberry	Wood WV	4.7	0 3	Pfaff & Smith Builders	7 4	0 1
196 7-197 3	Mustapha	Wood WV	23 7	1.1	YMCA/Shelly&Sands	45 3	0 5
216 5-217 8	Buffington	Mergs OH	155 8	2 2	Pfaff & Smith Builders	33 5	1 0
235-235 6	Letart	Mason WV	25 1	1 1	Dravo	30 2	0 6
257 7-258 1	Eight Mile	Mason WV	19 8	0.9	Appalachian Power	6 7	0 5
268 6-269	Gallipolis	Mason WV	4 2	0 6	M T Epling	7 5	0 3
289-289 8	Lesage	Cabell WV	19.7	1 4	Lincoln&William Polan	8 3	0 7
387 9-388 4	Brush Creek	Lewis KY	25.7	0 9	Earl&Pauline Parr	32 3	0 4
395 2-395 8	Manchester #1	Lewis KY	23 2	1 0	Ed Loving/Dale Meyer		
395 4-396.8	Manchester #2	Lewis KY	102 1	2 4	George McNeill	31 9	
501 9	Laugherty						
581 4	Eighteen Mile						
592 0	Twelve Mile						
597 1	Six Mile						
602 1	Towhead						
604 4	Shippingport						
606 7	Sand						
660 8	Upper Blue River						
226 7	Blue River						
688 8	Flint						
735 1	Anderson						
753 9	Yellow Bank						
760 2	Little Hurricane						
765 5	Ellis						
765 7	French #1						

<u>River Mile</u>	<u>Island Name</u>
766 0	French #2
774 3	Scuffletown
796 8	Dutch
805.8	Henderson
807.3	Dead Man's
818.0	Diamond
827.8	Mt. Vernon Towhead
832.1	Slim
823.2	Towhead
836 9	Slim Island Towhead
846 5	Wabash
860 1	Cincinnati
870 0	Battery Rock Towhead
897 0	Cave In Rock
883 0	McKinley
885 1	Hurricane
900.0	Rondeau
904.8	Pryors
906.5	Sisters
913.0	Stewarts
920 0	Cumberland
920.9	Hamletsburg Towhead
922 8	Cumberland Towhead
932.7	Cuba Towhead
933 0	Tennessee or Owens
TOTAL: 79	

Sources: U S Army Corps of Engineers Navigation Charts 1993
U S Fish & Wildlife Service

Table 7
Embayments and Wetlands on the Ohio River

<u>RIVER MILE</u>	<u>PARCEL NAME</u>	<u>COUNTY</u>	<u>TYPE</u>
31.4	Ohioview (unnamed)	Beaver PA	E
34.8	off Head Phyllis Island	Beaver PA	W
37.3	off Head Georgetown Island	Beaver PA	W
40.6	below Little Beaver	Columbiana OH	W
47.5	Congo Run	Hancock WV	E
51.5	above Cluster Islands	Hancock WV	W
53.0	Tomlinson Run	Hancock WV	E
53.5	below Tomlinson Run	Hancock WV	W
55.4	Deep Cut Run	Hancock WV	W
56.5	Hardin Run	Hancock WV	W
71.5	Virginia Cross Creek	Brooke WV	E
84.6	above Sister Islands	Belmont OH	W
86.3	Glenns Run	Ohio WV	W
86.5	below Glenns Run	Belmont OH	W
89.3	off Head Wheeling Island	Belmont OH	W
96.7	Jim Run	Marshall WV	W
105.0	inside Bend (unnamed)	Marshall WV	W
107.8	above Captina Island	Marshall WV	W
109.6	Captina Creek	Belmont OH	E
113.8	Fish Creek	Marshall WV	E
114.3	Johnson's Run	Monroe OH	E
115.0	Coon Run	Marshall WV	W
116.5	Stillhouse Run	Monroe OH	W
116.8	Sims Run Bar	Marshall WV	W
118.0	Sunfish Creek	Monroe OH	E
119.8	Opposum Creek	Monroe OH	E
122.2	Proctor Creek area	Wetzel WV	E
124.5	Muhleman to Litman Run	Monroe OH	W
125.0	Leiminger Run	Wetzel WV	E
128.6	below Fishing Creek	Wetzel WV	W
130.8	Havely Run	Monroe OH	W
132.0	Patton Run and Bar	Monroe OH	W
133.7	above Williamson Island	Tyler WV	W
135.8	Deadhorse/Claylick Runs	Monroe OH	E
136.0	below Witten Towhead	Tyler WV	W
136.5	below Witten Towhead	Monroe OH	W
137.5	Miller Run	Monroe OH	E
138.5	Cow Hollow Run	Tyler WV	E
139.5	Jims Run/Draper Run	Monroe OH	E
139.7	Narrows Run/Pigeon Roost	Tyler WV	E

<u>RIVER MI.</u>	<u>PARCEL NAME</u>	<u>COUNTY</u>	<u>CODE</u>
140.5	Cochransville (unnamed)	Monroe/Wash. OH	E
144.0	Collins Run	Washington OH	E
146.7	above Bens Run	Tyler WV	W
147.5	Bens Run/Eagle Run	Tyler/Ples. WV	E
149.0	Sheets Run	Washington OH	E
150.0	Leith's Run	Washington OH	E
150.2	Spring Run	Pleasants WV	E
151.0	Reas Run	Washington OH	E
154.3	Ferguson Run	Washington OH	E
156.8	Danas Run	Washington OH	E
157.7	French Run	Pleasants WV	E
284.2	Eighteen Mile Creek	Mason WV	E
286.7	Swan Creek	Gallia OH	E
287.3	Guyan Creek	Mason/Cabell WV	E
288.7	above Lesage Island	Cabell WV	W
289.0	Greenbottom Swamp	Cabell WV	W
292.0	Crown City	Cabell WV	W
294.6	Federal Creek	Lawrence OH	E
299.0	Nine Mile Creek	Cabell WV	E
300.0	Seven Mile Creek	Cabell WV	E
310.7	Buffalo Creek	Lawrence OH	E
311.2	Charlies/Sandusky Creeks	Lawrence OH	E
312.0	Fourpole Creek	Cabell/Wayne WV	E
324.3	Ice Creek	Lawrence OH	E
328.1	Storms Creek	Lawrence OH	E
331.1	Pond Run	Greenup KY	E
332.8	Uhlans Run	Greenup KY	E
336.4	Little Sandy River	Greenup KY	E
338.6	Smith Branch	Greenup KY	E
339.0	Ginat Run	Scioto OH	E
340.8	Franklin Run	Scioto OH	E
353.0	Bonanza Bar	Greenup KY	W
361.5	Turkey Creek	Scioto OH	E
363.2	Nace Run	Scioto OH	E
168.0	above Island Run	Wood WV	W
172.0	Williamstown Wetland	Wood, WV	W
174.3	Williams Creek/Big Run	Wood WV	W
175.0	Boaz Marsh Complex	Wood WV	W
180.0	Vienna River Road	Wood WV	W
182.0	Mall behind Neal Island	Wood WV	W
183.5	Pond Run	Wood WV	W
184.7	Neal Run/Little Kanawha	Wood WV	E
188.7	Davis Run	Washington OH	E
192.5	Sawyer Run	Washington OH	E
192.8	Whites Run/Dunfee Run	Washington OH	E

<u>RIVER MI.</u>	<u>PARCEL NAME</u>	<u>COUNTY</u>	<u>CODE</u>
194.2	Sandy Creek	Wood WV	E
194.6	above Newberry Island	Wood WV	W
195.4	2-Branch/Lamp's Cove	Washington OH	E
197.5	below Mustapha (unnamed)	Wood WV	E
198.3	Swan Run	Athens OH	E
199.2	Unnamed	Wood WV	E
199.4	below Hocking River(unnamed)	Athens OH	E
200.3	Indian Run	Meigs OH	E
200.9	Unnamed	Wood WV	E
201.3	Neal's Pond	Wood WV	E
201.9	Lee Creek	Wood WV	E
202.4	Sugar Camp Run	Meigs OH	E
203.3	Rock Run	Meigs OH	E
204.2	Cove Run Slough	Wood WV	W
212.0	Robison Run	Jackson WV	W
212.8	Unnamed	Jackson WV	W
214.0	Swan Bar	Jackson WV	W
215.0	Wheaton Run	Jackson WV	W
216.5	above Buffington Island	Meigs OH	W
217.8	below Buffington Island	Jackson WV	W
218.5	Groundhog Creek	Meigs OH	E
219.5	Turkey Run	Jackson WV	E
221.5	Sandy Creek Bar	Meigs OH	W
222.8	Rock Bar	Jackson WV	W
223.2	Cedar Run	Jackson WV	W
226.0	Old Town Towhead	Jackson WV	W
227.8	Tanners Run	Meigs OH	E
229.2	Spring Creek	Jackson WV	E
230.0	Old Goose Island	Jackson WV	W
231.3	Mill Creek	Jackson WV	E
231.5	Little Mill Creek	Jackson WV	E
232.3	Johns Run	Meigs OH	E
234.8	Tombleson Run	Mason WV	E
240.9	Yellowbush Creek	Meigs OH	W
242.5	below Power Plant	Mason WV	W
245.0	Broad Run	Mason WV	E
247.1	Sliding Hill Creek	Mason WV	E
254.2	Leading Creek	Meigs OH	E
257.5	above Eight Mile Island	Mason WV	W
260.6	Kyger Creek	Gallia OH	E
263.2	Old Town Creek	Mason WV	E
264.2	Georges Creek	Gallia OH	E
265.6	Point Pleasant Backwater	Mason WV	E
268.6	Mill Creek	Gallia OH	E
270.2	Chickamauga Creek	Gallia OH	E

<u>RIVER MI.</u>	<u>PARCEL NAME</u>	<u>COUNTY</u>	<u>CODE</u>
276.0	Crab Creek	Mason WV	E
276.0	Raccoon Creek	Gallia OH	E
279.0	Teens Run	Gallia OH	E
281.1	below Apple Grove(unnamed)	Mason WV	W
368.1	Kinniconnick Creek	Lewis KY	E
382.0	Quick Run Creek	Lewis KY	E
392.2	Donaldson Creek	Adams OH	E
395.4	Island Creek	Adams OH	E
398.4	Isaacs Creek/McClelland	Adams OH	E
401.5	Crooked Creek	Lewis KY	E
412.1	Big Three Mile Creek	Brown OH	E
414.9	Lawrence Creek	Mason KY	E
415.6	Eagle Creek	Brown OH	E
417.1	Red Oak Creek	Brown OH	E
419.1	Lees Creek	Mason KY	E
421.6	Straight Creek	Brown OH	E
424.0	White Oak Creek	Brown OH	E
426.4	Bracken Creek	Bracken KY	E
428.5	Big Turtle Creek	Bracken KY	E
430.4	Wrangling Run	Bracken KY	E
431.6	Bull Skin Creek	Clermont OH	E
432.5	Little Locust Creek	Bracken KY	E
433.0	Big Locust Creek	Bracken KY	E
433.2	Patterson Run	Clermont OH	E
434.0	Crooked Creek	Clermont OH	E
434.4	Little Snag Creek	Bracken KY	E
435.8	Big Snag Creek	Bracken KY	E

TOTAL.

EMBAYMENTS 114

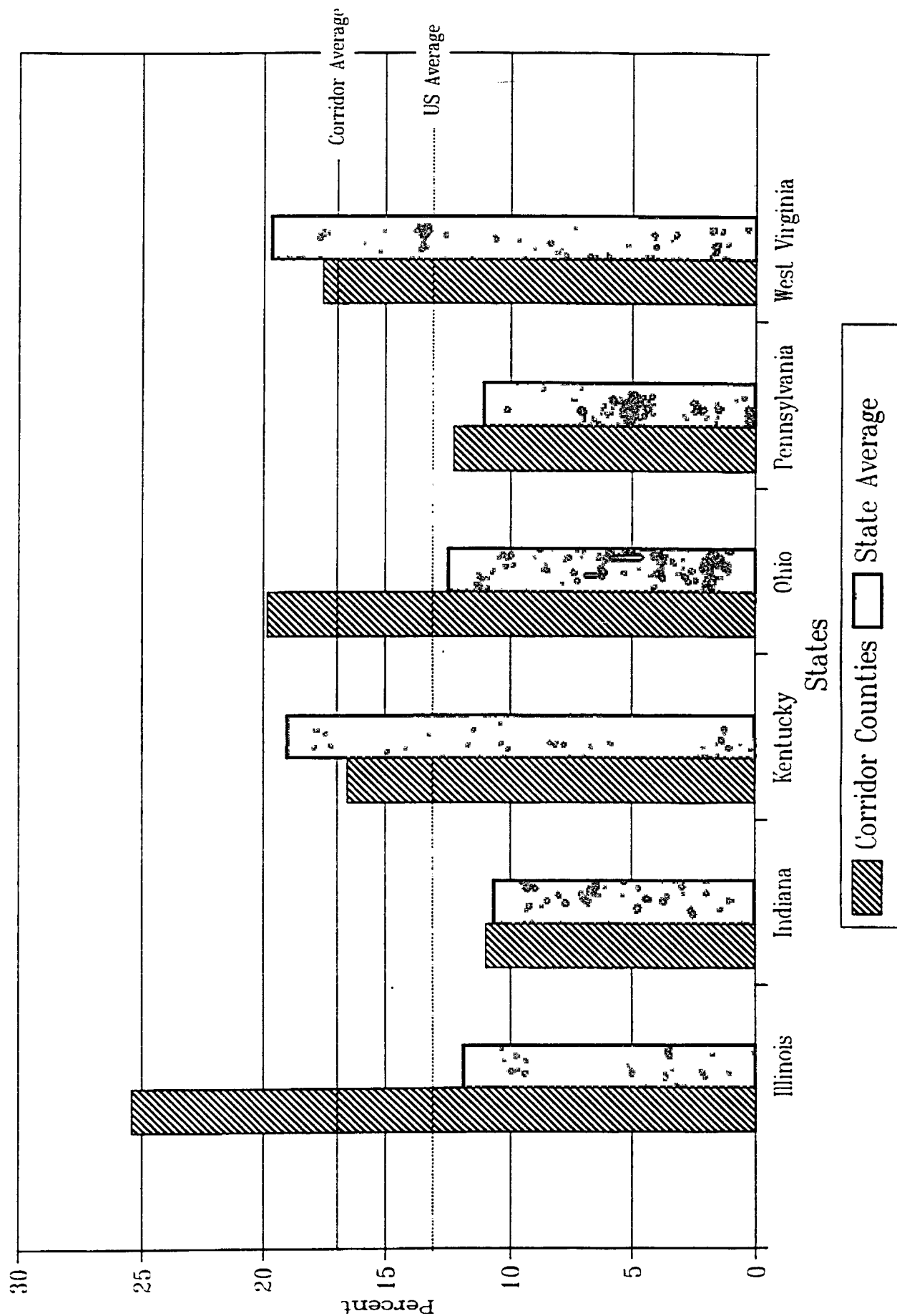
WETLANDS 57

Source: US Fish and Wildlife Service, 1993

Graph 1

OHIO RIVER CORRIDOR

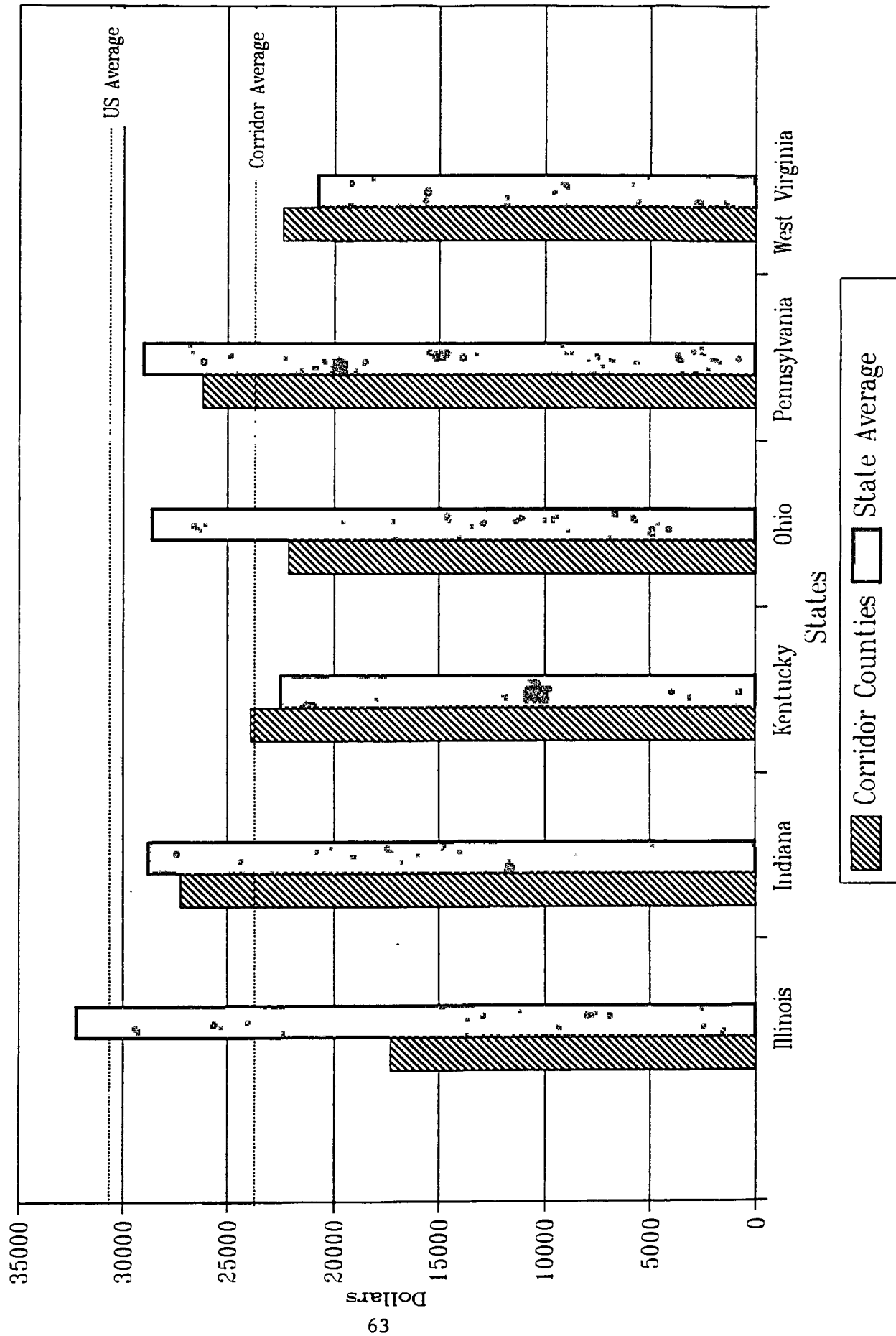
Persons Living Below Poverty Level-1990



Graph 2

OHIO RIVER CORRIDOR

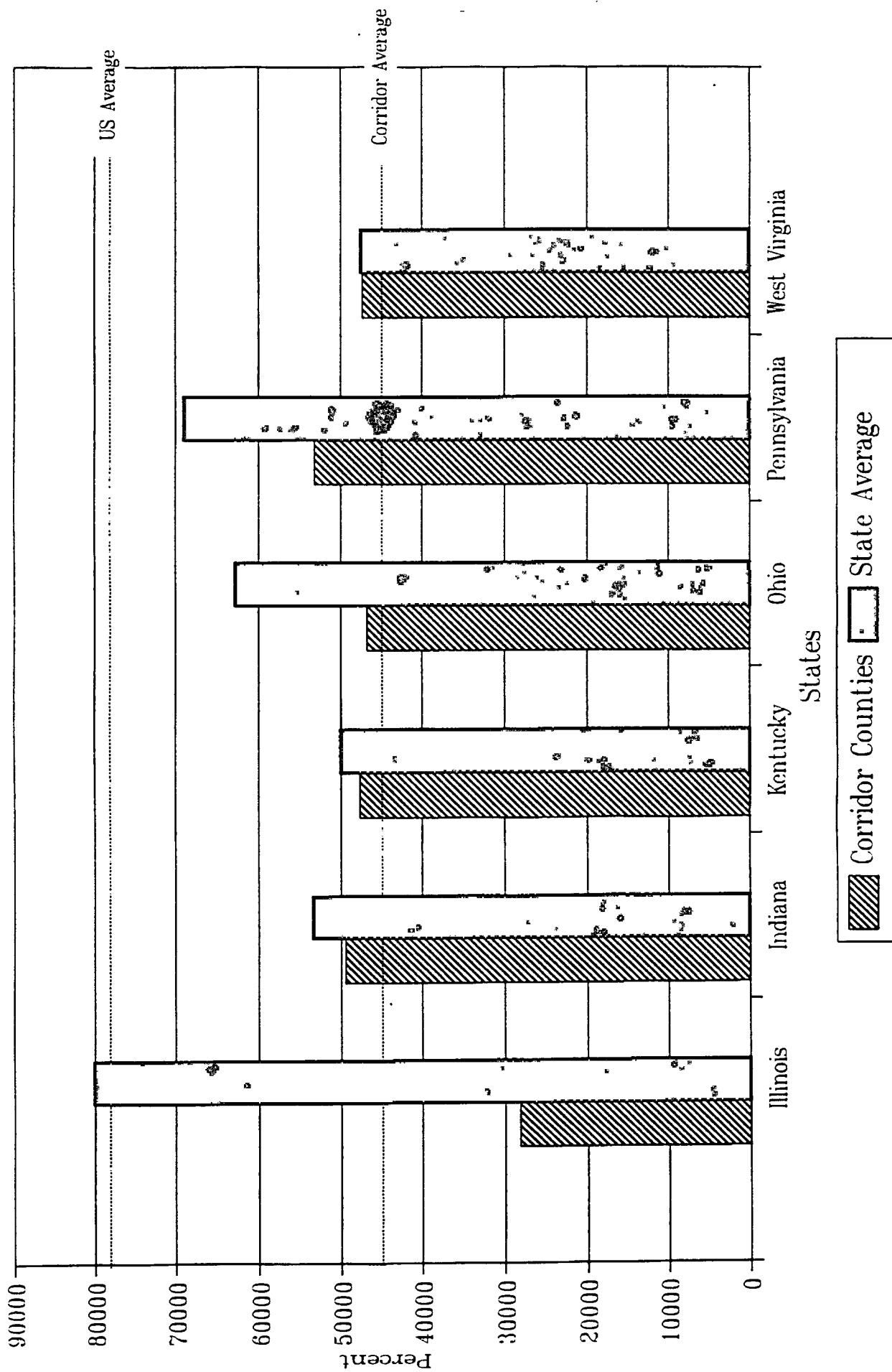
Median Household Income--1990



Graph 3

OHIO RIVER CORRIDOR

Median Home Value--1990



SELECTED BIBLIOGRAPHY

Banta, R.E. The Ohio. New York: Binehart and Company, 1949.

DINAMO (The Association for the Development of Inland Navigation in America's Ohio Valley). DINAMO Economic Report, August 1989, October 1989, June/July 1990, August 1990, and October 1991.

Indiana Department of Natural Resources, Division of State Parks. Indiana Recreation Guide 1994.

Indiana Department of Natural Resources, Division of State Parks. The Falls of The Ohio State Park (brochure).

Jackle, John. Images of the Ohio Valley. New York: Oxford University Press, 1977

Kentucky State Nature Preserves Commission. Natural Heritage Program, 1993.

Klein, Benjamin and Eleanor, Eds. The Ohio River Handbook and Picture Album. Cincinnati: Young and Klein, Inc., 1954.

Ohio River Valley Water Sanitation Commission. Ohio River Fact Book. 1988.

Pearce, John. The Ohio River. Lexington: The University Press of Kentucky, 1989.

Reid, Robert, Ed. Always a River: The Ohio River and The American Experience. Bloomington: Indiana University Press, 1991.

U.S. Army Corps of Engineers. Ohio River Navigation System, 1990.

U.S. Army Corps of Engineers. Ohio River Basin 1993.

U.S. Army Corps of Engineers. Water Resources Development in Ohio. 1991.

U.S. Army Corps of Engineers, Louisville. Falls of the Ohio National Wildlife Conservation Area. 1991.

U.S. Army Corps of Engineers, Louisville. Ohio River Islands from Pittsburgh to Cairo/ Navigational Chart 1993.

U.S. Army Corps of Engineers, Vicksburgh. Wetlands Research Program.

U.S. Department of the Census. County Business Patterns. 1990

U.S. Department of the Census. Selected Population, Economic and Housing Characteristics. 1970, 1989, 1990.

U.S. Department of Transportation. Port Economic Impact Kit. 1986.

U.S. Fish & Wildlife Service. Ohio River Islands National Wildlife Refuge. 1992.

U.S. Fish & Wildlife Service. List of Embayments and Wetlands. 1993

U.S. Fish & Wildlife Service. Final Environmental Assessments of Ohio River Islands National Wildlife Proposal. 1989.

West Virginia Division of Natural Resources. Green Bottom Wildlife Management Area.

SOURCES CITED

1. All demographic data were obtained from the U.S. Census Bureau.
2. All information on the barge industry was provided by the American Waterways Operators of America and The Association for the Development of Inland Navigation in America's Ohio Valley (DINAMO).
3. DINAMO Economic Report, October 1989, August 1990, and October 1991.
4. DINAMO Economic Report, October 1991.
5. J. Michael Gurnee, Ashland Planning and Community Development Director.
6. James F. Scafide, Mayor of East Liverpool
7. River Fields "Members Update" April 8, 1994, and February 21, 1994 press release
8. "The Maysville Area Invites You to Be Our Guest" pamphlet
9. Newport Lands Channel Crossing Deal" Jeff McKinney. Cincinnati Enquirer, July 9, 1993.
10. Nick Wolf and Terry Flynn. "First Event Scheduled at New Richmond Park" Cincinnati Enquirer.
11. "Metro Wheeling, West Virginia: Where Your Business Belongs" pamphlet, and discussions.
12. Duke Rohlffs, Vice President of Corporate Development, Players Riverboat Casino.
13. Jan Thuerbach, Executive Director of the Evansville Freedom Festival
14. Russ King, Portsmouth River Days Festival
15. Tall Stacks '92 Commission Report
16. Johnda Brumfield, Executive Director of the Ashland Area Convention and Visitor's Bureau and "Regatta's success Assessed. Festivals Generated Millions Across Area," by Greg Collard. The Daily Independent. August 4, 1993
17. U.S. Fish & Wildlife Service, 1989
18. "Falls of the Ohio State Park" brochure, Indiana Department of Natural Resources
19. U.S. Fish & Wildlife Service, 1989