

ORSANCO



**Ohio River Valley Water
Sanitation Commission
Annual Report 2016**

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To the President and Governors*

The Ohio River Valley Water Sanitation Commission (ORSANCO) is an interstate water pollution control agency created in 1948 by the State of Illinois, the State of Indiana, the Commonwealth of Kentucky, the State of New York, the State of Ohio, the Commonwealth of Pennsylvania, the Commonwealth of Virginia, and the State of West Virginia with approval of the Congress of the United States. The Commissioners of ORSANCO respectfully submit the following fiscal report of activities for 2016 to:

The Honorable Bruce Rauner
Governor of Illinois

The Honorable Mike Pence
Governor of Indiana

The Honorable Matt Bevin
Governor of Kentucky

The Honorable Andrew M. Cuomo
Governor of New York

The Honorable John R. Kasich
Governor of Ohio

The Honorable Tom Wolf
Governor of Pennsylvania

The Honorable Terry McAuliffe
Governor of Virginia

The Honorable Earl Ray Tomblin
Governor of West Virginia

and

The Honorable Barack Obama
President of the United States

* As of June 30, 2016



Chairman's Message

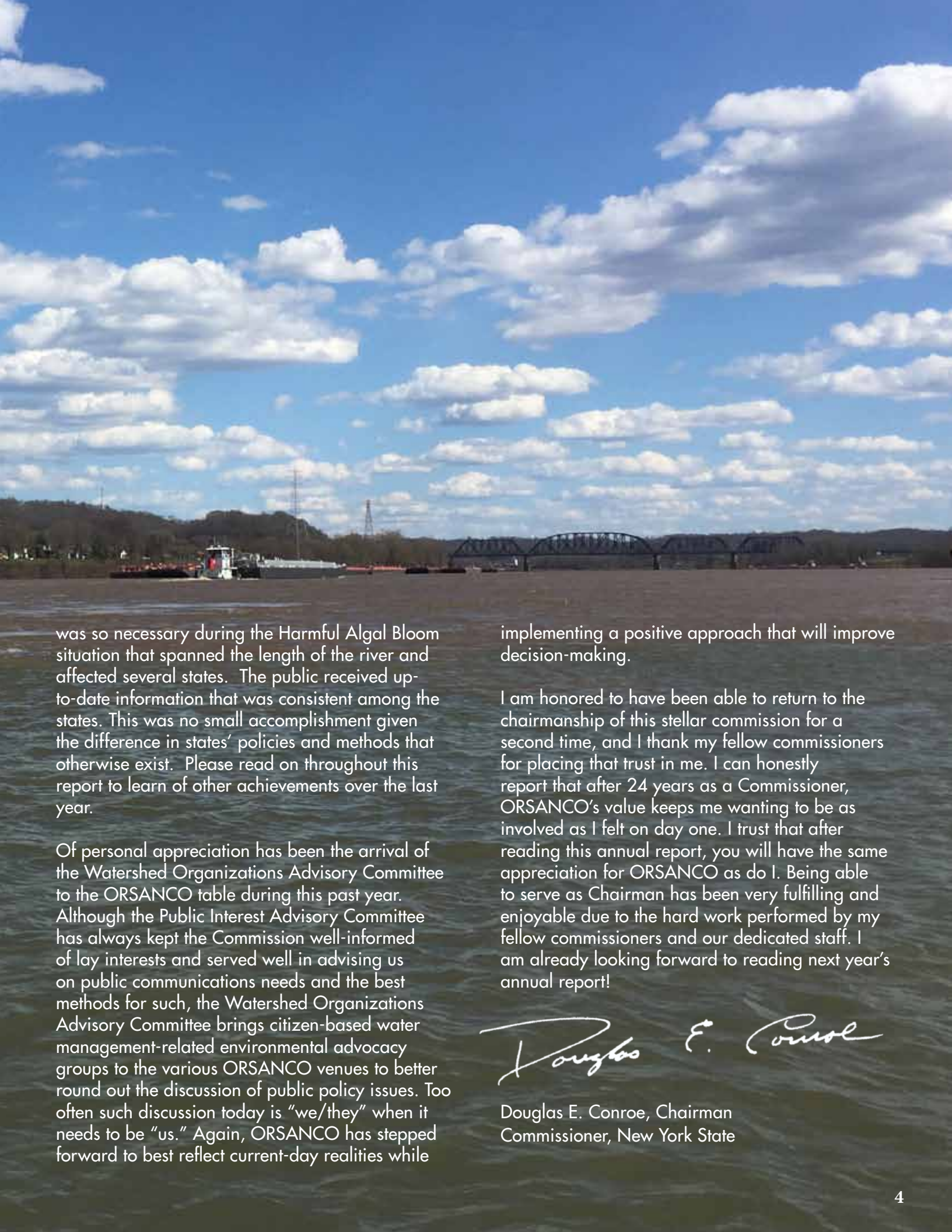
It is an honor and a distinct pleasure to keynote the 2016 Annual Report of ORSANCO's accomplishments that have been achieved during the past year. With some organizations, the annual report is simply a report of activities. Not so with ORSANCO! This past year, ORSANCO has continued its role of always being involved in meaningful and relevant initiatives that protect water quality and provide for the productive use of the Ohio River by industry and citizens alike. And, through its scientific programs, ORSANCO also benefits the management of all basin waters by others, as this New York State-based Commissioner can attest.

I would be remiss if I did not acknowledge the accomplishments of the past. Those achievements made it possible for this past year's improvements to move forward. Key to a vast number of past achievements was the involvement of Peter Tennant, who retired at the beginning of this past year. Peter spent 39 years of dedicated service enhancing ORSANCO's technical programs in a variety of roles, culminating his career as our Executive Director. His retirement is well earned, and his

contributions were not only local in scope but were also national with his involvement in professional organizations and task force gatherings.

Richard Harrison, our new Executive Director, has brought a solid drinking water background to the Commission and is in the process of developing a five-year fiscal plan to help guide us through these challenging fiscal times. This process is causing us to give extra attention to program value and cost. As a result of this analysis, I can report that ORSANCO remains viable and relevant, while at the same time delivers a cost-efficient operation that saves our member states and US EPA thousands of dollars annually; dollars which would otherwise need to be expended in duplicating mode by each entity. Member states' investment in ORSANCO services returns a dollar value far in exceedance of member obligations paid annually.

One example of enhancement to the states was the creation of the Public Information Work Group that is comprised of public information staff from the member states and US EPA. This work group was instrumental in facilitating the collaboration that



was so necessary during the Harmful Algal Bloom situation that spanned the length of the river and affected several states. The public received up-to-date information that was consistent among the states. This was no small accomplishment given the difference in states' policies and methods that otherwise exist. Please read on throughout this report to learn of other achievements over the last year.

Of personal appreciation has been the arrival of the Watershed Organizations Advisory Committee to the ORSANCO table during this past year. Although the Public Interest Advisory Committee has always kept the Commission well-informed of lay interests and served well in advising us on public communications needs and the best methods for such, the Watershed Organizations Advisory Committee brings citizen-based water management-related environmental advocacy groups to the various ORSANCO venues to better round out the discussion of public policy issues. Too often such discussion today is "we/they" when it needs to be "us." Again, ORSANCO has stepped forward to best reflect current-day realities while

implementing a positive approach that will improve decision-making.

I am honored to have been able to return to the chairmanship of this stellar commission for a second time, and I thank my fellow commissioners for placing that trust in me. I can honestly report that after 24 years as a Commissioner, ORSANCO's value keeps me wanting to be as involved as I felt on day one. I trust that after reading this annual report, you will have the same appreciation for ORSANCO as do I. Being able to serve as Chairman has been very fulfilling and enjoyable due to the hard work performed by my fellow commissioners and our dedicated staff. I am already looking forward to reading next year's annual report!



Douglas E. Conroe, Chairman
Commissioner, New York State



Citizens in the Ohio River Basin use the river in various ways, and ORSANCO must protect these uses and help to improve water quality for the citizens of the Ohio River Valley. The Ohio River is a source of drinking water for over five million people, a major transportation route for coal and other energy products, and a natural resource for many plants and animals. ORSANCO works along with many other state and local agencies and organizations to provide safe drinking water, protect aquatic life, advise fish consumption, and guide citizens with decisions about recreational activities in and around the river.

ORSANCO States: Working Together to Protect the Ohio River and its Uses





Evaluating the Ohio River for its Beneficial Uses: ORSANCO's 305b Report

Every two years, ORSANCO completes an assessment of Ohio River Water Quality Conditions (305b report). This report utilizes ORSANCO's monitoring results to assess the degree to which the Ohio River's beneficial uses are maintained. The assessments are guided by a 305b Coordinators Work Group composed of the states' representatives. The report is utilized by the states in developing their state-wide lists of impaired waters. The most recent report was approved by the Commission at its June 2016 meeting.

Four beneficial uses are assessed for the Ohio River including public water supply, aquatic life, fish consumption, and contact recreation. Each of these beneficial uses have various monitoring data and criteria that are used to determine if that particular use is met, or alternatively, impaired. Following are results of the 2016 assessments:

Public Water Supply: The public water supply use is assessed based primarily on water utilities' compliance with their treated drinking water quality requirements. In situations where a water utility cannot meet its water quality requirements because of Ohio River source water quality, the river would be designated as impaired for the public water supply use. Results of the assessment indicate that the entire Ohio River fully supports the public water supply use.

Aquatic Life: For aquatic life, biological and chemical data are utilized in making assessments, with emphasis placed on direct biological measurements. The entire river was determined to fully support the aquatic life use.

Fish Consumption: The fish consumption use is assessed based on historical water monitoring data for dioxin and PCBs and recent fish tissue contaminants data for mercury. The fish consumption use for the entire river is impaired due to dioxin and PCBs; however, the entire river was determined to fully support fish consumption for mercury.

Contact Recreation: For contact recreation, ORSANCO conducts bacteria monitoring in six segments of the river with combined sewer overflows and also relies on results from historical monitoring for the remaining segments of the river. Based on recent and historical data, approximately two-thirds of the Ohio River is impaired for the contact recreational use.

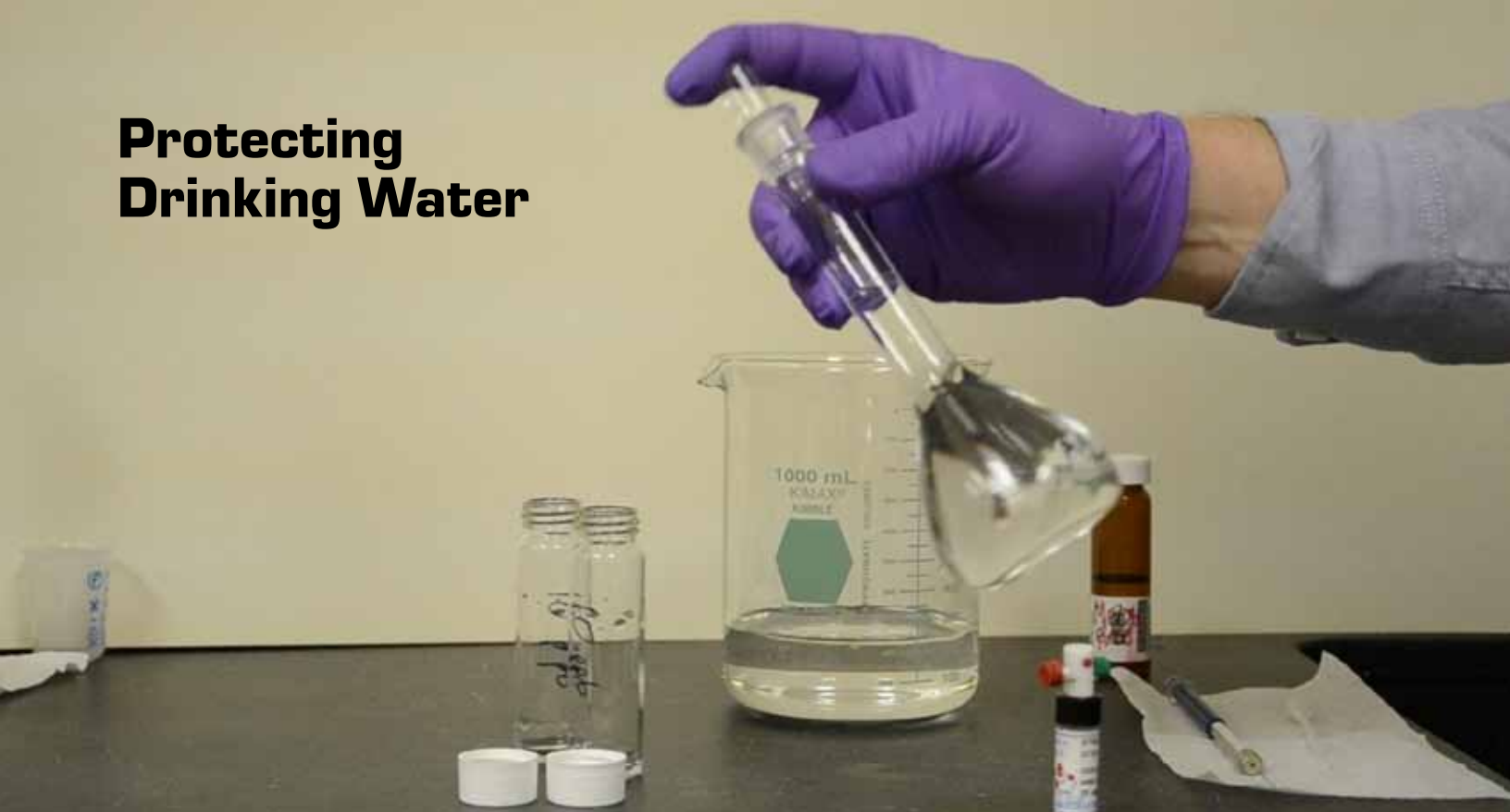
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A New ORSANCO Committee: the Watershed Organizations Advisory Committee

At its February 2016 meeting, the Commission approved the formation of the Watershed Organizations Advisory Committee (WOAC). This committee represents various watershed organizations throughout the Ohio River Basin and includes representatives from citizen-based, environmentally-focused, nonprofit water-related organizations. The advisory committee will serve to inform and make recommendations to the Commission on various water-related concerns. Judy Petersen, Executive Director of Kentucky Waterways Alliance, was named the first chairman of the committee. She will also serve on ORSANCO's Technical Committee in an ex officio capacity.



Protecting Drinking Water



The Ohio River offers unique challenges in the development and implementation of source water protection programs. As the longest, most heavily industrialized river in the nation, source water protection programs must address conditions and situations that are encountered only on a large, dynamic resource such as the Ohio River.

At the heart of the program is communication; communication among and between drinking water utilities, industries, and the multiple states and agencies that have the responsibility for protecting and managing the various uses of the Ohio River. Through a variety of committees, meetings, and presentations, ORSANCO Source Water Protection staff work to promote these communications that help protect drinking water quality.

Source Water Protection Programs

ORSANCO's source water protection programs use a multi-faceted approach to protect drinking water utilities along the Ohio River and tributaries. Key programmatic components include communication, monitoring, and coordination.

Communication

Communication is key to almost any undertaking on a multi-use resource such as the Ohio River.

ORSANCO's Source Water Protection Communication Program starts with the development of direct lines of communication with all of the drinking water utilities along the Ohio River, including some tributary utilities, and encompasses virtually all environmental agencies and industry sectors. Federal agency partners include: NOAA, USGS, USCG, US EPA, USFWS, USACE; state agency partners are environmental, emergency response, public health and drinking water agency personnel, while industrial sector partners include the towing, pipeline, manufacturing, rail, and power generation industries. All play a critical role in sharing, using, and collaborating to protect this vital resource. Communication is facilitated through various meetings coordinated by Commission staff. The Commission's Water Users Advisory Committee brings together drinking water utility personnel; the Emergency Response Coordinators Workgroup brings together state and federal emergency response personnel whose jurisdictions border the Ohio River but would otherwise not have a forum for meeting with those outside of their geographic area of responsibility. Regionally-specific Ohio River focus groups bring together local emergency response personnel to develop multi-jurisdictional response-planning documents, geographic response plans, and tactical response plans.

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Staff outreach is also a key component to source water communications. This past year, Source Water Protection staff participated in or presented at more than 20 meetings, with audiences ranging from high school students to Congressional Representatives. The goal of each presentation is to highlight the Ohio River as a natural resource and recognize its importance as an economic driver locally, regionally, and nationally.

Social Media & ODS Videos on ORSANCOchannel

ORSANCO now uses social media to communicate more efficiently with its numerous partners. The Organics Detection System (ODS) spans the Ohio River at 16 locations. To help minimize travel and improve operator performance, ODS staff has developed operational and repair-specific videos to assist ODS operators in maintaining or troubleshooting problems associated with their instruments. The videos were created by ORSANCO staff and demonstrate step-by-step instructions to complete basic repairs and upgrades to the ODS equipment. ORSANCO posts the videos to ORSANCOchannel on YouTube so that ODS operators can view these videos at any time. Communicating instructional information in this manner saves valuable staff time and travel costs.

Posting information on social media allows the ability to republish information that might be useful to partner agencies and allows efficient promotion of events, such as the Ohio River Sweep. ORSANCO publishes

several promotions for the Ohio River Sweep prior to the event, and ORSANCO partners republish the information to reach a wider audience.

Ohio River Water Quality Reports

In response to numerous requests, ORSANCO now produces weekly water quality reports for six locations along the Ohio River; Pittsburgh, Wheeling/Bridgeport, Huntington/Chesapeake, Cincinnati/Northern Kentucky, Louisville/New Albany, and Evansville/Henderson. These reports are updated weekly and distributed via email to Congressional Representatives, U.S. Coast Guard personnel, water patrol and rescue teams, and many other interested parties. The reports are also available on ORSANCO's website at www.orsanco.org. Information contained in these reports includes current water temperature, river stage, river velocity, water turbidity, and recent bacteria levels. Providing this near real-time information to a broad audience heightens awareness about the Ohio River and demonstrates the dynamic nature of the resource. It also provides the river user community and the general public with information on which they can base decisions concerning the operational and recreational use of the river.

Monitoring – Organics Detection System

While ORSANCO is responsible for monitoring and assessing the water quality of the Ohio River, it is ORSANCO's Organics Detection System, (ODS), that is the backbone of its source water protection and emergency response programs. The abundance of



petrochemicals stored, transported, manufactured, and refined along the river and in the basin requires close monitoring for the presence of such chemicals in the river and major tributaries. The ODS analyzes roughly 1,500 raw river water samples for volatile organics each month to protect more than five million people who rely on the Ohio River daily as their source for drinking water. This program has detected unreported discharges and releases of chemicals to the river and has provided critical data during known spill events. Chemical detection data provided by the ODS is shared with the drinking water utilities and state and federal agency personnel so appropriate actions can be taken. Due to the multiple ODS sampling locations, the contaminant plume created by a spill or release can be characterized and updated as it travels downstream. In addition, ODS data is used in ORSANCO's Ohio River spill model to project time of arrival and duration information to protect downstream drinking water utilities.

ODS Renovation Grant

Since its inception in 1978, the ODS has undergone four significant instrument upgrades. The most recent upgrade began in 2008, following the receipt of congressionally directed funds, and will be completed by October 2016. This most recent upgrade has expanded the program's analytical capabilities as well as modernized the system's remote communications platform, improving data acquisition and remote instrument management capacities. The ODS continues to provide significant value to ORSANCO and our partners through a coordinated effort between ORSANCO and our drinking water utility partners. This program would not be viable without the significant efforts of the drinking water system professionals who operate the equipment on site.

NRC Spill Reports and USACE Notices to Navigation

Another form of monitoring provided by Commission staff as part of the source water protection program is the 24/7/365 review of spill reports received from the U.S. Coast Guard's National Response Center, (NRC). The NRC forwards ORSANCO all spill reports received from every county along the Ohio River and industrialized tributaries. In 2015, staff received and reviewed more than 600 such reports, evaluating their

potential to affect drinking water utilities as well as other components of this unique ecosystem.

In addition to monitoring the NRC spill reports, staff receives and evaluates Notices to Navigation Interests as issued by the U.S. Army Corps of Engineers. These notices describe events that affect waterway navigation such as maintenance and construction projects, hazards to navigation, and other river-oriented activities. Staff evaluates these notices to determine if the locations of, or the activities described, could impact drinking water intakes or other sensitive areas. Critical comments are provided to resource agencies, and information on activities is passed along to drinking water utilities as appropriate.

Coordination

Tremendous efficiencies are realized when one organization coordinates efforts on the behalf of many. With the multiplicity of agencies, industries, and utilities along the 981-mile length of the Ohio River, coordination and collaboration become valuable components of ORSANCO's mission and its Source Water Protection Program. ORSANCO coordinates source water protection workshops and planning meetings between states, drinking water utilities, and industries. As needed, coordination meetings for emergency response events, water quality sampling efforts, and development of incident-specific data dissemination strategies are all part of the coordination and collaboration services that ORSANCO provides to its member states and stakeholder groups.



Protecting Aquatic Life

ORSANCO's biologists work to ensure that the Ohio River is capable of maintaining healthy populations of fish and aquatic life. They also partner with many different agencies to generate data, complete projects, and attain their goals of maintaining a healthy Ohio River watershed and protecting the aquatic life that depends on the integrity of the habitat and waters in the Ohio River Basin.

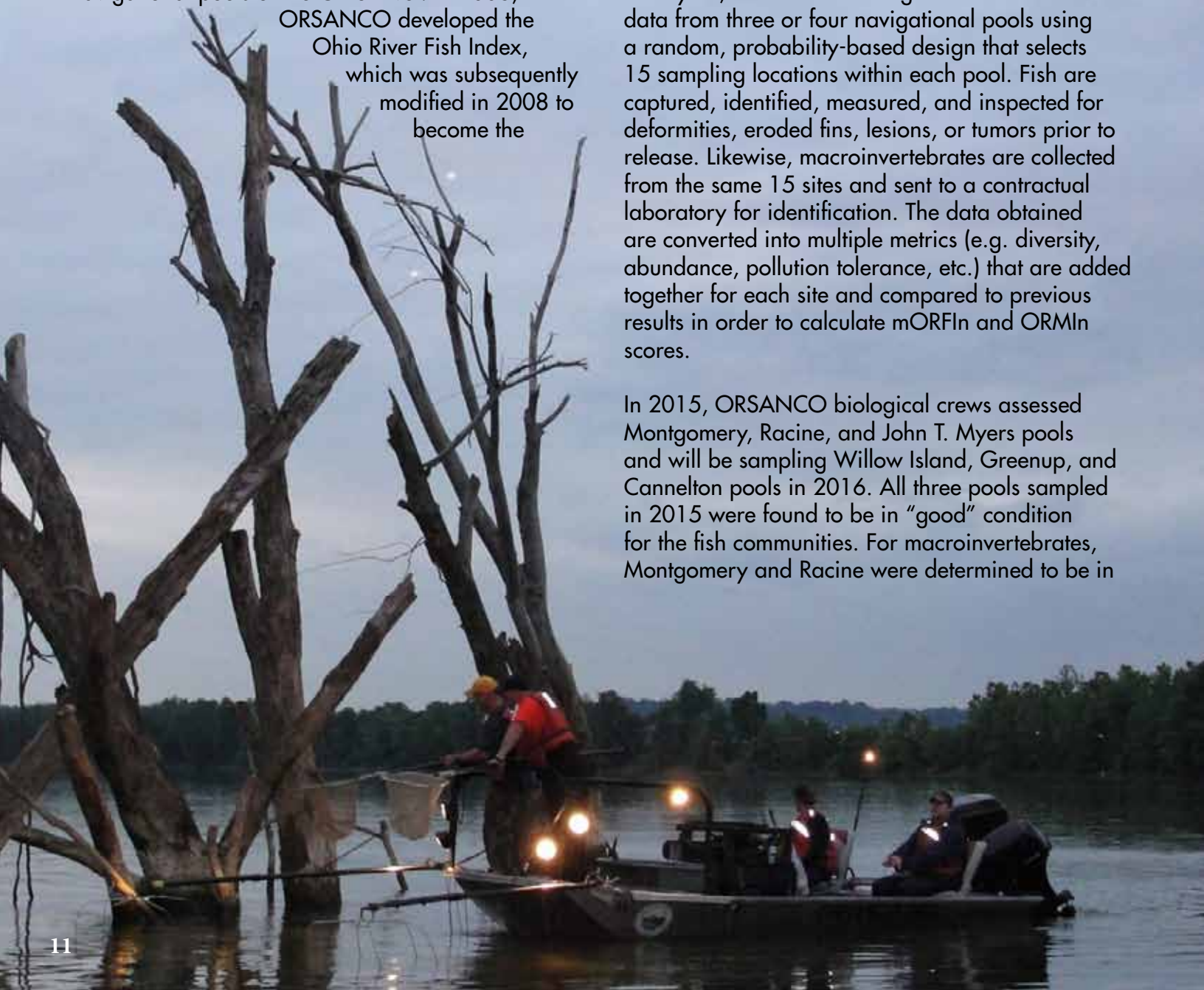
Ohio River Fish and Macroinvertebrate Indices

In 1993, ORSANCO developed and implemented an assessment technique to compare fish and environmental data sampled from the various navigational pools of the Ohio River. In 2003, ORSANCO developed the Ohio River Fish Index, which was subsequently modified in 2008 to become the

mORFIn (modified Ohio River Fish Index). Using the collected data, the index assigns scores to rate the relative condition of fish communities among the pools. Similarly, after over a decade of research, ORSANCO recently completed an index that uses information from the macroinvertebrate populations encountered at each sampling site to assess conditions. Assessments of the pools sampled in 2015 mark the first time that both the fish index (mORFIn) and the Ohio River Macroinvertebrate Index (ORMIn) were used in conjunction with each other to assess the biological condition of the Ohio River.

Each year, ORSANCO biological crews collect data from three or four navigational pools using a random, probability-based design that selects 15 sampling locations within each pool. Fish are captured, identified, measured, and inspected for deformities, eroded fins, lesions, or tumors prior to release. Likewise, macroinvertebrates are collected from the same 15 sites and sent to a contractual laboratory for identification. The data obtained are converted into multiple metrics (e.g. diversity, abundance, pollution tolerance, etc.) that are added together for each site and compared to previous results in order to calculate mORFIn and ORMIn scores.

In 2015, ORSANCO biological crews assessed Montgomery, Racine, and John T. Myers pools and will be sampling Willow Island, Greenup, and Cannelton pools in 2016. All three pools sampled in 2015 were found to be in "good" condition for the fish communities. For macroinvertebrates, Montgomery and Racine were determined to be in



“fair” condition, and John T. Myers was found to be in “good” condition. Over the years, the various pools have generally ranked from “fair” to “very good” for fish. To date, after two complete cycles plus three pools completed in the third cycle, no pools have ranked as “poor” or “very poor.”

Special Biological Studies

Beginning in 2016, ORSANCO biologists will be modifying their annual monitoring design. Since 2004, efforts have been made to conduct four pool assessments a year in order to obtain new data from each of the 19 assessment units (navigational pools) every five years. Due to recent discussions with the Biological Water Quality Subcommittee (BWQSC), sampling will be reduced to three pool surveys per year, so that new assessments are completed for each pool over a six year cycle. In lieu of the fourth pool surveyed each year, the BWQSC has prioritized a list of special studies that will allow the biologists to better understand how certain environmental and ecological factors are affecting biotic index scores and overall condition assessments. Each year, the highest ranked study will be conducted, allowing for more accurate estimations of the condition of the aquatic life of the Ohio River. The following list shows the eight projects considered and listed in order of priority. In 2016, ORSANCO biologists will be conducting a study of the effects of an invasive submerged aquatic plant (*Hydrilla verticillata*) on Ohio River fish and macroinvertebrate populations and index scores.

Possible Biological Projects for Consideration:

1. Determine effects of **hydrilla** on biotic indices
2. Collect **water/sediment chemistry** at fish/bug sites
3. Conduct **next-year revisits** to a pool with a borderline or questionable assessment
4. Conduct **same-year revisits** to estimate mORFI precision
5. Conduct **targeted** biological sampling
6. Coordinate **mussel surveys** at fish/bug sites
7. Determine upstream extent of **Asian carp** reproduction in the Ohio River
8. Determine impacts of **microplastics** on aquatic life

Collaboration

In late 2015 through the spring of 2016, ORSANCO biologists worked with many other entities to lay the groundwork for initiatives to collect much-needed monitoring information from the Ohio River during the 2016 field season. Supported by the U.S. Army Corps of Engineers, Louisville District, ORSANCO will be able to collect sediment chemistry and enhanced water chemistry data from each of the biological survey sites in the Cannelton pool of the Ohio River (below Louisville, KY). These data will allow for better understanding of biological response to environmental condition gradients.

In addition, biologists collaborated on a plan to submit the stomach contents of fish that will be processed for fish tissue analysis to Loyola University to be examined for the presence of tiny particles of plastics (microplastics) which may be harmful to the fish. Biologists will also be working with a professor from John Carroll University in Cleveland, OH to look for the presence of a certain blue-green algae associated with the invasive aquatic plant *Hydrilla verticillata*, and lastly, a collaboration with a professor at the University of Maryland should provide more insight to determine if Ohio River fish are exhibiting characteristics of intersex (e.g., male fish producing eggs).



Protecting Fish Consumption

Fish Tissue Contaminants Program

Every year, ORSANCO collects composite fish fillet samples from species that are thought to be commonly consumed from the Ohio River main stem for contaminant analysis. These samples are sent to a contract laboratory and are analyzed for mercury, methylmercury, polychlorinated biphenyls (PCBs), pesticides, and other contaminants. Resulting data are reviewed by ORSANCO staff and are then posted online at www.orsanco.org and shared with members of the Fish Consumption Advisory Workgroup (FCAW), which comprises members of regulatory agencies representing each of the six main stem states.

listings by species, state, and river segment. The site includes links to individual state pages and provides information on the health benefits of consuming fish as well as tips on how to properly prepare fillets. The site details information about the FCAW, specific contaminants, and information on how to follow advisories.

In early 2016, Kentucky fish consumption advisories were updated to correspond directly with those suggested by the ORFCAP. This marks the first time that all six main stem states have deferred to a unified protocol to issue consumption advisories for the Ohio River, greatly enhancing the consistency of information relayed to the public.



Assessing the Fish Consumption Use of the Ohio River for Mercury

The 305b section of the Clean Water Act requires reporting the condition of waterbodies with regard to designated uses of the river, including fish consumption. A contaminant in fish flesh that may be responsible for impairing this designated use in some waterbodies is methylmercury, for which ORSANCO analyzes regularly. To assess fish consumption, ORSANCO biologists calculate trophic (food chain) level average fish tissue concentrations on a pool by pool basis incorporating estimated national consumption rates using US EPA published guidelines. To ensure that an

updated data set is available to meet reporting requirements, samples in three or four pools are analyzed annually.

Fish Consumption Advisories

The most recent ten years of fish tissue data are separated by river segment, species, and size (where appropriate) and compared to Ohio River Fish Consumption Advisory Protocol (ORFCAP) concentration thresholds, which were derived from a consensus of the FCAW and are unique to the Ohio River, to determine appropriate proposed consumption advisory categories.

These proposed advisories are then discussed with the FCAW and, upon reaching consensus, are updated in state publications and on a website hosted by ORSANCO (www.orsanco.org/fca) that sums up the approved advisories and breaks down the

Fish Contaminants Survey of the Kanawha and Monongahela Rivers in West Virginia

In the spring of 2016, ORSANCO biologists began a special project collaborating with the West Virginia Department of Environmental Protection (WVDEP) on a two-year study of fish contaminants in the Kanawha and Monongahela rivers. The project will provide a snapshot of contaminant levels of nearly all commonly encountered and commonly consumed species from the main stems of two of the largest rivers within the state. Composite samples of channel catfish, flathead

catfish, crappie, smallmouth bass, largemouth bass, white bass, walleye, sauger, freshwater drum, common carp, and hybrid striped bass (or striped bass) will be targeted from five locations throughout the Kanawha River and two locations on the Monongahela River. Fillets from all samples will be analyzed for mercury, methylmercury, PCBs, and dioxins, and whole fish analyses will be conducted

on all samples for methylmercury. Data collected will provide insight into the spatial and species-specific patterns of these contaminants and will also significantly enhance the existing dataset available to the states for determining fish consumption advisories and fish consumption use assessments.



Protecting Recreational Use

ORSANCO monitors water quality for the safety of people who live in the Ohio River Watershed during the spring, summer, and fall when people engage in recreational activities such as fishing, boating, skiing, and swimming.

Contact Recreation Bacteria Monitoring

During the recreation season from April through October, ORSANCO monitors bacteria levels in six urban areas with combined sewer systems on the Ohio River. In addition to ORSANCO's environmental specialists, staff from local water plants and wastewater treatment plants sample these sites every week. The samples are then taken to a local

laboratory to be analyzed for bacteria, including *E.coli* and fecal coliform. These bacteria indicate the presence of fecal contamination that can cause illness after swimming, jet-skiing, or participating in other activities with the potential for ingestion of or immersion in the river.

Bacteria levels are typically lower during the dry summer months; however, all six urban areas can be unsuitable for contact recreation for some period of the season, especially when there is frequent rainfall. Because of the unpredictability of the weather, ORSANCO has also provided monitoring for events that bring numerous people in contact with the river.



Investigating Current Water Quality Issues

Mercury Studies

Mercury Ad Hoc Committee

In June 2015, the Commission established an Ad Hoc Committee on Mercury Studies to address scientific information needs concerning mercury in the Ohio River. The committee was formed to identify the information needs surrounding the impacts of mercury on Ohio River water quality and fish contaminants and to make recommendations to the Commission for further study needs. The committee is composed of ORSANCO Commissioners, selected experts in the field of the environmental impacts of mercury, and representatives of the Power Industry Advisory Committee and Watershed Organizations Advisory Committee.

The committee has developed a prioritized list of information needs along with the data that is currently available to fill those needs. They are currently in the process of determining what scientific studies may be needed to fill in information gaps, particularly with regard to the impacts on water quality from sources of mercury.

ORSANCO is currently conducting multiple scientific studies to provide some of the identified information needs. Two surveys on the Ohio River main stem are near completion; those studies involved monthly sampling for one year to determine the amount of mercury in the Ohio River. At the same time, multiple fish tissue samples are being collected and analyzed to determine the relationships of river mercury levels and the amount that accumulates in fish tissue. Fish tissue contamination is a human health concern for people eating fish caught from the river.

ORSANCO is also collecting monthly mercury samples for one year on the 15 largest tributaries to the Ohio River. These 15 tributaries collectively account for approximately 85% of the flow in the Ohio River. Analysis of the data, when completed, will allow ORSANCO to determine how much of the mercury in the Ohio River is contributed from these

watersheds. ORSANCO is in the process of trying to account for all of the various sources of mercury to the Ohio River.



Nutrient Reduction Activities

Nutrient Trading Program

The Electric Power Research Institute (EPRI) is leading an effort to develop an interstate water quality trading program for the Ohio River Basin. Partners in the effort include American Farmland Trust, ORSANCO, the University of California at Santa Barbara, and the Ohio Farm Bureau. The project partners are facilitating “pilot trades” of nutrients between point and nonpoint sources, marking the first trades in what could provide a model for dischargers to comply with emerging requirements in many watersheds facing high nutrient levels.

Water quality trading programs in the United States have been confined by political boundaries, while many pollutants, notably nutrients, are problems on a watershed scale. Some regions, such as the Chesapeake Bay, have allowed cross-state trading; however, even the Chesapeake Bay Nutrient Trading Program has limited participation due to conflicting rules between the states surrounding the Bay. The Ohio River Basin Trading Project is the first trading project designed from its inception to be interstate in nature. During the pilot phase of the project, three states (Ohio, Kentucky, and Indiana) agreed to allow an agricultural best management practice (BMP) in one state to offset the permit limit in another state. The Pilot Trading Plan 1.0 for the Ohio

River Basin Interstate Water Quality Trading Project was signed August 9, 2012 by the Commissioners of the agricultural and permitting agencies of each of the states. The first trades under this agreement were completed on March 11, 2014.

The Trading Program has funded over 35 projects in Ohio, Kentucky, and Indiana. These projects have resulted in the removal of over 100,000 lbs. of nitrogen and phosphorus from the Ohio River Basin. The first credits generated from these projects were sold to Duke Energy, American Electric Power, and Hoosier Energy.

In 2015, the Trading Project was awarded the U.S. Water Prize. The Water Prize honors individuals, institutions, and organizations that have made an outstanding achievement in the advancement of sustainable solutions to our nation's water challenges. The program is continuing to implement best management practices (BMPs) in Ohio, Kentucky, and Indiana and bring the credits generated to the market.

Nutrient Criteria Development

Excessive nutrients have long been an issue in our nation's waterways, and the Ohio River is no

exception. To resolve this issue, ORSANCO staff have been working towards defensible nutrient criteria for the Ohio River for over a decade using nutrient, planktonic algae, and chlorophyll-a (an indicator of algae production) data collected from locations in the lower section of the river. However, this approach failed to develop a causal relationship which is a required step in developing criteria.

During the stressor identification portion of the macroinvertebrate index (ORMIn) development, certain metrics exhibited a response to ambient nutrients. Tying a biological response to excessive nutrients is a common approach taken by other agencies to establish nutrient criteria. However, macroinvertebrates do not directly respond to excess nutrients, but rather to the ambient conditions resulting from eutrophication, namely fluctuating and depressed concentrations of dissolved oxygen.

In 2014, ORSANCO purchased 60 continuous dissolved oxygen loggers to obtain this information that was previously unavailable. Since then, these loggers have been placed alongside the macroinvertebrate samplers in the Belleville, Markland, McAlpine, Olmsted/Open Water, Montgomery, Racine and JT Myers pools.

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Additionally, water samples were obtained for nutrient and chlorophyll-a analysis at each of these sites.

ORSANCO staff are currently analyzing the data from this paired study to determine relationships between nutrients and macroinvertebrate health. This study is scheduled to continue during the 2016 field season.

2015 Ohio River Harmful Algal Bloom

Algae are present in the Ohio River throughout the year. During optimal conditions, some algae may rapidly proliferate causing a "bloom." During a bloom, the algal concentration may go from a few thousand cells per milliliter (cells/ml) of water to hundreds of thousands or even millions of cells/ml. Algal blooms are most common in the summer, although they may occur at any time of the year. On the Ohio River, the conditions that allow these blooms to occur are typically low and slow flow, clear water, and warm water.

Sampling on the Ohio River has identified over 300 different species of algae. These algae are divided into eight taxonomic divisions, with the most common being diatoms (Bacillariophyta), green algae (Chlorophyta), and blue-green algae (Cyanobacteria). Cyanobacteria can produce toxins which can be harmful if ingested. For this reason, an algal bloom which consists primarily of Cyanobacteria is considered a Harmful Algal

Bloom (HAB). These toxins can affect people and animals who ingest them, either through recreation, such as swimming, or in drinking water.

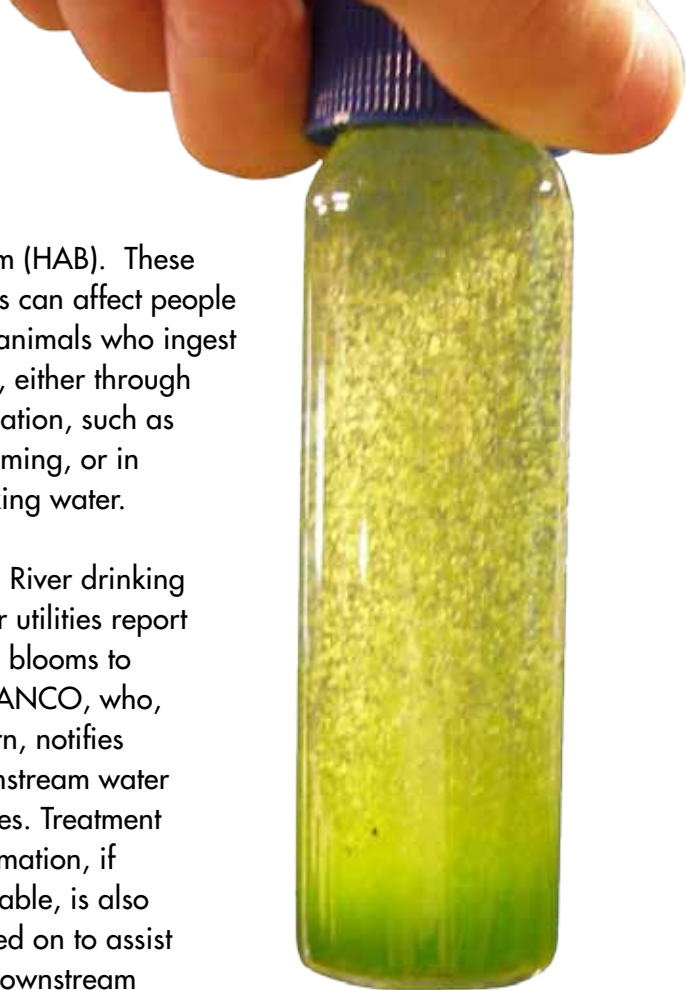
Ohio River drinking water utilities report algal blooms to ORSANCO, who, in turn, notifies downstream water utilities. Treatment information, if available, is also passed on to assist the downstream utilities in the development of treatment strategies.

ORSANCO's Source Water Protection Program serves to protect drinking water interests along the Ohio River and major tributaries. ORSANCO uses and evaluates all available information to develop the best protection strategies and promotes the use of the Ohio River as a quality source for drinking water.



On August 19, 2015, ORSANCO received an NRC report of a paint-like green material on the Ohio River at Pike Island L&D (mile 84.2), which covered 100 X 200 feet. This was quickly identified as the blue-green algae *Microcystis aeruginosa*.

Over the next month, this bloom expanded to cover the Ohio River from Pike Island L&D to Cannelton L&D (river mile 84.2 to 720.7).



Below Cannelton L&D, there were intermittent patches of the bloom but not a continuous coverage.

The bloom reached its peak around September 23, 2015, after which point it began to decay. The bloom was determined to be over by early November.

Due to the presence of the toxin microcystin associated with this bloom, Ohio, West Virginia, Kentucky, and Indiana issued recreation advisories for the Ohio River since the bloom extended into their areas. Illinois issued a precautionary statement concerning recreation in the river due to concern that the bloom might reach their border. After the bloom ended, these recreation advisories were lifted.

No illnesses were reported as a result of this bloom and no toxins were detected in finished drinking water.

Our member states and federal and local partners did a great job working together with ORSANCO to share resources and expertise that helped make this a very successful response.



Public Information, Education, and Outreach

ORSANCO participates in various river-related events and activities throughout the Ohio River Basin to provide the public with educational opportunities to learn more about the Ohio River and the quality of this great natural resource.

Life Below the Waterline

Since 2002, ORSANCO's 2,200 gallon mobile aquarium has put local fish species on display at over 80 events throughout the Ohio River Basin in portions of all eight compact states, reaching hundreds of thousands of people in the process.

The consistent message conveyed from ORSANCO staff during these events is that the Ohio River main stem and other local waterways support much more diverse and healthy fish populations than perceived by the public and are therefore resources worth enjoying and protecting.

The aquarium is often displayed at educational events for children, various festivals, and other celebrations generally located in cities situated on the banks of the Ohio River. One of the events at which the aquarium has been displayed for four of the last five years is the Earth Day educational event for children hosted by American Electric Power at their Conesville, OH facility. In addition to ORSANCO's aquarium, the event also features hands-on displays staffed by nationally-recognized local experts discussing small stream fish, freshwater mussels, and fossils.



The one-day event provides a fantastic outdoor learning opportunity for approximately 800 local school children every spring.

Over the winter of 2015-2016, the Lexan panels in the aquarium were replaced with new, lighter-weight acrylic panels, and all associated gaskets were replaced. An advantage of the acrylic panels is that any blemishes can be buffed out so that the panels will not need to be replaced for 20 years or more, compared to the Lexan panels that were replaced about every five years. These recent renovations ensure that the aquarium can now be displayed prominently at Ohio River Basin events for years to come.

In 2016, the aquarium is scheduled to be displayed at the following events in the Ohio River Watershed:

Event/Location

Earth Day/Cincinnati, OH
AEP's Earth Day Celebration/Conesville, OH
Kids Outdoor Adventure Expo/Cincinnati, OH
Ingram Barge Bring Your Kids to Work Day/Paducah, KY
Water for Life/Knoxville, TN
Paddlefest/Cincinnati, OH
Rural Heritage Festival/Ripley, OH
ALCOSAN Open House/Pittsburgh, PA
Evansville Museum Open House/Evansville, IN
River Days/Mt Vernon, IN
ORSANCO Commission Meeting/Owensboro, KY
Adventures in Water Festival/Louisville, KY
BBQ on the River/Paducah, KY



Ohio River Sweep

In 1989, ORSANCO developed the Ohio River Sweep, a volunteer shoreline cleanup of the Ohio River and many of its tributaries. For 27 years, this multistate event has been a success due to the collaboration of ORSANCO and numerous individuals and organizations. Organizations such as the Illinois EPA and the WV Make It Shine Program provide assistance by distributing supplies to the county coordinators in their states. ORSANCO member states also help to promote the event by social media. Many of the local coordinators are affiliated with solid waste agencies, local government, or litter prevention groups; this partnership of states, counties, and individual coordinators, working together, is critical to the success of the program.



Each year, thousands of volunteers from Pittsburgh, PA to Cairo, IL participate in the Ohio River Sweep. The event promotes environmental stewardship of the Ohio River and allows volunteers to experience a hands-on stewardship practice, which highlights the value of the Ohio River for recreational purposes and environmental sustainability.

In conjunction with the Ohio River Sweep, a student poster contest is held to promote awareness of the event and the need for volunteers. Students in kindergarten through 12th grade who live in the Ohio River Valley are eligible to participate. One grand prizewinner is selected, and the winning artwork adorns promotional materials and advertisements for the event. A T-shirt design winner and one winner from each grade level are also recognized.



The 2016 poster winner was John Martino from Cincinnati, OH. John is pictured with his art teacher.



The T-shirt design winner was Elijah Nelson from Dillsboro, IN. Elijah is pictured with his family.



Riverwatchers

RiverWatchers is a citizen volunteer monitoring program for the Ohio River and selected tributaries. The program began as a pilot project in 1992 with five monitoring groups, and since that time, the program has expanded to include groups in six states throughout the Ohio River Watershed. These groups, which include many schools, collect water quality data throughout the year and submit these results to ORSANCO. RiverWatchers data are available on ORSANCO's website.

2015-2016 Participating RiverWatchers

- Clymer Central School (NY)
- Warren Co. Conservation District (PA)
- Woodland Hills School District (PA)
- Sewickley Montessori Middle School (PA)
- Williamstown High School (WV)
- Wahama High School (WV)
- Leon Elementary School (WV)
- Raceland High School (KY)
- New Richmond High School (OH)
- Cincinnati State and Technical Community College (OH)
- Mater Dei High School (IN)

Our Newest RiverWatchers Group: Sewickley Montessori Middle School

Cathy Rohrer and Tess Riesmeyer, along with their seventh and eighth graders at Sewickley Montessori Middle School, have been working to adopt a dock from their city so that they can clean up, monitor, and beautify the area along the Ohio River.



In addition to cleaning up trash in the area, they also want to create murals along the riverfront and continually monitor the water quality through ORSANCO's RiverWatchers program. They began testing in October 2015, and all of their samples for the 2015-2016 season have been in the "good" range for water quality.

The students also work with the Tireless Project, a collaboration of local organizations and businesses committed to clean up Pittsburgh's waterways. A cleanup boat takes the students out on the water to remove litter, tires, and trash that accumulate along their section of the riverfront. To promote the student's mission to beautify the dock, they also produced a video about their water quality monitoring and cleanup adventures. This video is available at [ORSANCOchannel on YouTube](#).



The students not only learn valuable real world skills, but they also learn the importance of constant vigilance in protecting our most valuable resource, water. These seventh and eighth graders show how, even at a young age, ordinary people can work together to protect our planet and make an extraordinary difference, through the cooperation of many individuals and organizations working together to protect our watershed in its many areas within the Ohio River Basin.





The Foundation for Ohio River Education

For over 12 years, the Foundation for Ohio River Education (FORE), ORSANCO's non-profit education foundation, has reached thousands of teachers, students, and citizens in the Ohio River Watershed through programs that get people engaged in preserving the cultural, ecological, and economic value of our rivers.

FORE's award-winning River REACH floating classroom program brought over 1,500 students from Ohio, Kentucky, and Indiana out on the Ohio River in 2015, where they collected and tested water samples while learning how aquatic invertebrates and Ohio River fish are used as indicators of water quality. Students also got to see great blue herons and bald eagles as they passed barges, mooring stations, and drinking water intakes that allow the river to provide us with vital resources that we use every day!

In addition to immersing students in hands-on activities rooted in Science, Technology, Engineering, and Mathematics (STEM) disciplines, the River REACH program is changing the way students think about and connect to the Ohio River. In post-voyage surveys, 82% of the students who participated in 2015 indicated that their image of the Ohio River had improved because of the River REACH program, and 85% of students indicated they would change their habits to protect water quality in the rivers, lakes, and streams in their own backyards.

In addition to the River REACH program, FORE had a full schedule of outreach programs that reached over 2,900 people in 2015. The events included festivals, classroom presentations, and summer programs that were held in collaboration with Northern Kentucky University (NKU), Riverworks Discovery, and park

systems in Cincinnati and Northern Kentucky. The programs also included eight professional development trainings for science teachers and environmental educators.

FORE's excellent programs were recognized last year at the Ohio River Basin Consortium for Research and Education's (ORBCRE) annual symposium, when Director Heather Mayfield was presented the "Friend of ORBCRE" award. FORE's audience, programs, and collaborations continue to grow each year, with exciting new citizen monitoring projects on the horizon for 2016.



Additional Community Outreach Events

ORSANCO staff regularly gives presentations throughout the year at various events. In 2016, ORSANCO staff members, Richard Harrison, Sam Dinkins, Lila Ziolkowski, and Jeff Thomas, had the opportunity to present on ORSANCO's monitoring activities at a meeting of the Northern Kentucky Professional Engineers Society. Jeff was also once again invited to speak to a Northern Kentucky sixth grade science club about the importance of mussels in the Ohio River. Rob Tewes was invited to speak as a guest lecturer for a Miami University Environmental Sustainability class, and he also helped lead a Thomas More College Ecology class field trip to demonstrate aquatic biological sampling techniques.

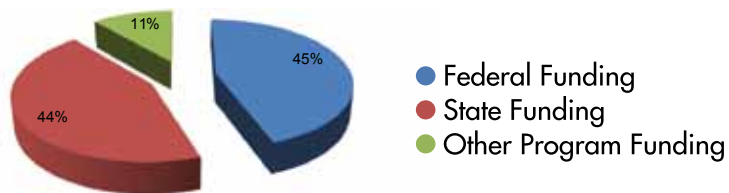
These events, as well as the many others that took place in 2016, were successful in not only generating interest in science careers but in bringing awareness to ORSANCO's initiatives and activities within the Ohio River Basin.



2016 Resources Overview

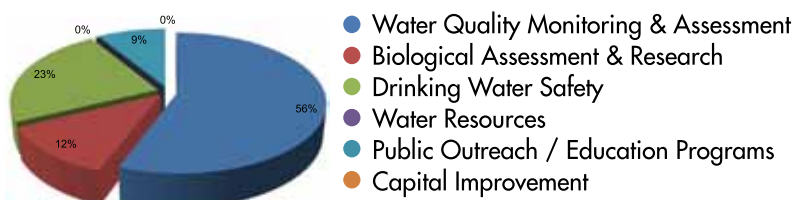
Projected Resources by Major Source

Federal Funding
State Funding
Other Program Funding



Projected Resources by Major Program Area

Water Quality Monitoring & Assessment
Biological Assessment & Research
Drinking Water Safety
Water Resources
Public Outreach / Education Programs
Capital Improvement



*Audited financial statements for 2016 will be available in February 2017.



ORSANCO Staff

Richard Harrison, P.E., Executive Director &
Chief Engineer
Tracey Edmonds, Administrative Assistant

Technical Programs

Jason Heath, P.E., Technical Programs Manager
Eben Hobbins, Environmental Scientist
Greg Youngstrom, Environmental Scientist

Biological & Research Programs

Jeff Thomas, Manager of Biological Programs
Ryan Argo, Senior Biologist
Rob Tewes, Senior Biologist

Source Water Protection & Emergency Response

Jerry Schulte, Manager of Source Water Protection,
Emergency Response & External Relations
Travis Luncan, Environmental Chemist/ODS
Lila Xepoleas Ziolkowski, Analytical & Environmental
Chemist, QAO

Water Resources

Sam Dinkins, Water Resources Assessment Manager
Steve Braun, Environmental Scientist
Stacey Cochran, Environmental Scientist

Public Information Programs

Lisa Cochran, Communications Coordinator
Melissa Mann, Public Information/Education Specialist

Administrative Programs & Human Resources

David Bailey, Director of Administration & Human
Resources
Adam Scott, Computer Systems Administrator
Donna Beatsch, Data Processing Specialist, Part-time
Joe Gilligan, Comptroller
Matt Glazer, Head of Maintenance, Part-time

FORE

Heather Mayfield, Executive Director

Staff Milestones

Sam Dinkins – 20 years
Tracey Edmonds – 20 years
Eben Hobbins – 15 years
Travis Luncan – 10 years
Melissa Mann – 10 years



Special Recognition

Peter Tennant retired from ORSANCO after serving on the Commission for more than 39 years. Peter has been an active and vocal proponent of the value of water quality monitoring and environmental assessments since his early days with the Massachusetts Division of Water Pollution Control. From 1972 to 1976, he led water quality monitoring efforts within the state, including developing sampling methods and mathematical models for rivers. In 1976, Peter moved to Cincinnati and began his work at ORSANCO. Since that time, he has continually supported the collection of high quality data needed to run ORSANCO's programs on behalf of its eight member states. Throughout his rise to Executive Director of ORSANCO, he has been instrumental in the evolution of large river monitoring methods, helping to form the globally respected programs that exist today.

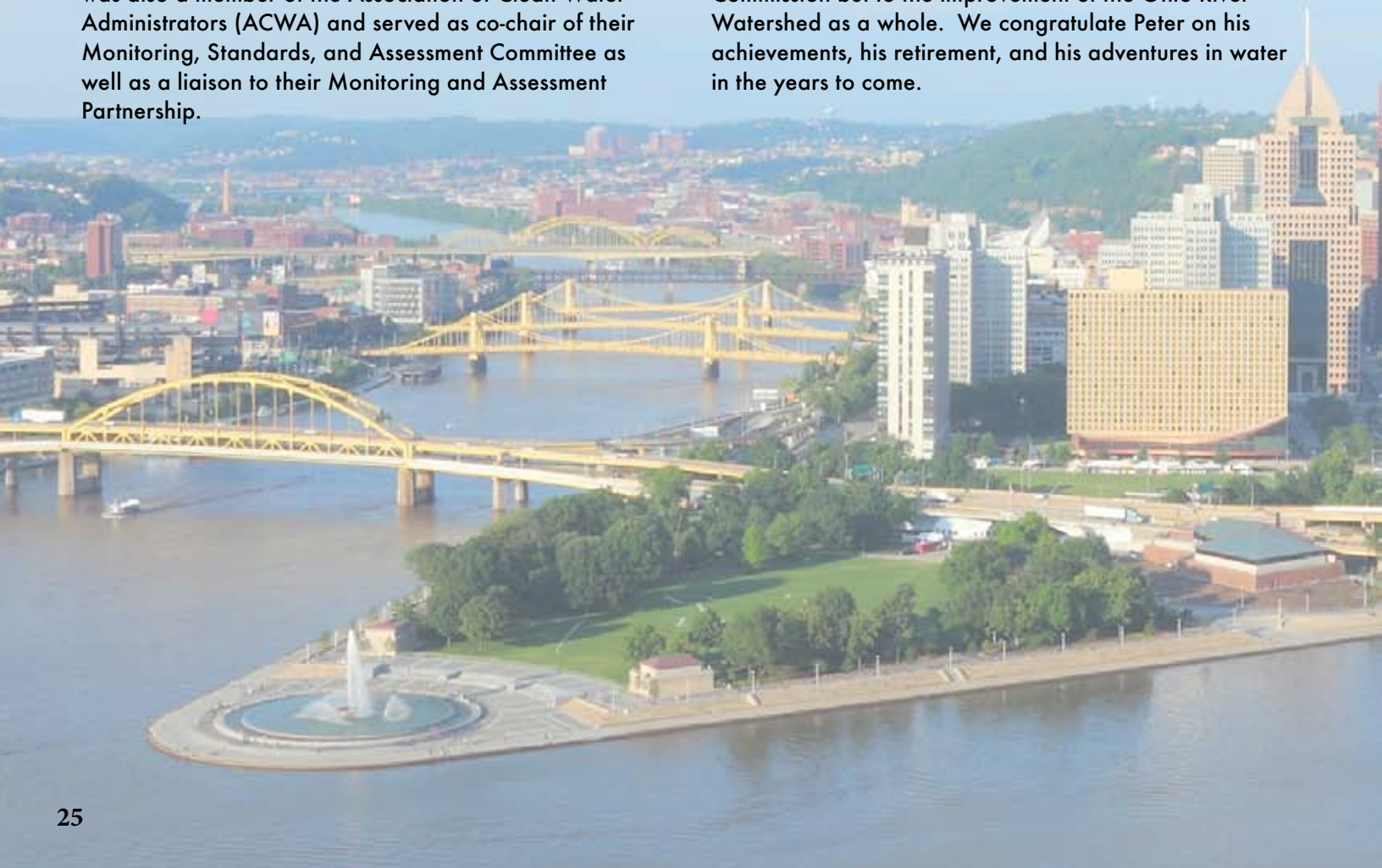
Among Peter's many significant achievements throughout his career, Peter has been instrumental in leading many workgroups and committees to improve the environment. In addition to the many ORSANCO committees he has served on, he has voluntarily held positions in national organizations to advocate the importance of good water quality and the need for first-class monitoring programs. Peter was a longtime member of the National Water Quality Monitoring Committee since its inception. He was also a member of the Association of Clean Water Administrators (ACWA) and served as co-chair of their Monitoring, Standards, and Assessment Committee as well as a liaison to their Monitoring and Assessment Partnership.

Throughout his career, he has worked to develop relationships between environmental agencies, groups, and organizations on important monitoring-related issues.

Peter represented ORSANCO as a member of the Ohio River Sub Basin Committee to address the effects of nutrient loadings from the Ohio on the Gulf of Mexico. He also served as co-chair of the Monitoring, Standards and Assessment Task Force of the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA).

Peter received a BS in Civil Engineering from Northeastern University in 1972. He is a registered professional engineer in the state of Ohio and a Board Certified Environmental Engineer by the American Academy of Environmental Engineers.

Peter has been invaluable in his service not only to the Commission but to the improvement of the Ohio River Watershed as a whole. We congratulate Peter on his achievements, his retirement, and his adventures in water in the years to come.



Members of the Commission

Chairman: Douglas E. Conroe

Vice-Chairman: C. Ronald Lovan

Secretary/Treasurer: Stuart F. Bruny

Executive Director and Chief Engineer: Richard Harrison, P.E.

Illinois

Lisa Bonnett, Director, Illinois EPA

Toby Frevert

Indiana

Carol S. Comer, Commissioner, Indiana Department of Environmental Management

Joseph H. Harrison, Jr., Massey Law Offices, LLC

John Kupke

Kentucky

Jenean Hampton, Lieutenant Governor

C. Ronald Lovan, P.E., President/CEO, Northern Kentucky Water District

Charles G. Snively, Secretary, Kentucky Energy and Environment Cabinet

New York

Douglas E. Conroe, Executive Director, Chautauqua Lake Association Inc.

Basil Seggos, Commissioner, New York Department of Environmental Conservation

Michael P. Wilson

Ohio

Stuart F. Bruny

Craig Butler, Director, Ohio Environmental Protection Agency

John M. Hoopingarner, Executive Director, Muskingum

Watershed Conservancy District

Pennsylvania

Charles Duritsa

Patrick McDonnell, Acting Secretary, Pennsylvania Department of Environmental Protection

Virginia

Lou Ann Jessee-Wallace, Virginia Water Control Board & Owner of Design Printers

David Paylor, Director, Virginia Department of Environmental Quality

West Virginia

David Flannery, Steptoe & Johnson, PLLC

Randy C. Huffman, Cabinet Secretary, Department of Environmental Protection

Ronald R. Potesta, President, Potesta and Associates

Federal

George Elmaraghy, Senior Project Manager, Stantec Consulting

Tom FitzGerald, Director, Kentucky Resources Council

*As of June 30, 2016. An updated list of ORSANCO's Commissioners is available at www.orsanco.org.

Special Recognition

In 2016, Carol Comer (IN), John Hoopingarner (OH), and Lou Ann Jessee-Wallace (VA) were appointed to the Commission, while Phil Morgan (IL), Tom Easterly (IN), and Susan Hedman (federal commissioner, EPA Region 5) completed their service on the Commission. Phil served on the Commission for 26 years, while Tom completed 10 years of service to the Commission. ORSANCO would like to thank Phil, Tom, and Susan for their dedicated service to the Commission, and we wish them the best of luck in the years ahead.



Carol Comer



John Hoopingarner



Lou Ann Jessee-Wallace



Phil Morgan



Tom Easterly



Susan Hedman

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