



Ohio River Valley Water Sanitation Commission Annual Report 2017

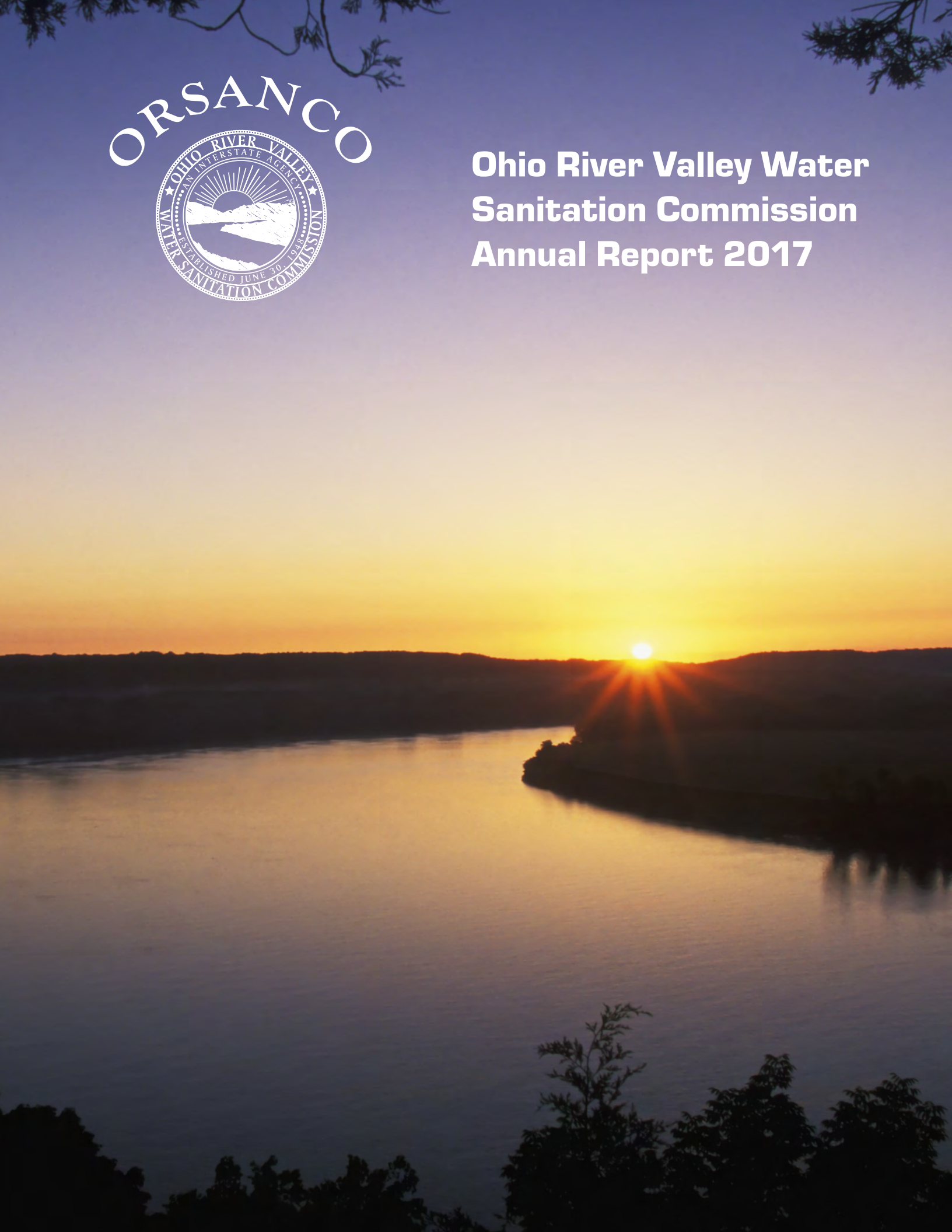


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To the President and Governors*

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 2017 to:

The Honorable Bruce Rauner
Governor of Illinois

The Honorable Eric Holcomb
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 Jim Justice
Governor of West Virginia

and

The Honorable Donald Trump
President of the United States

*As of June 30, 2017



The Roebling Suspension Bridge was the first bridge to span the Ohio River. It opened to traffic on January 1, 1867.

Chairman's Message

First and foremost, it has been a professional privilege and a personal honor to serve this past year as Commission Chairman. The Commission is fulfilling its mission through the dedication and efforts of fellow Commissioners, staff, numerous committee members, and other organizational partners that it has been a pleasure to work with.

My personal connection to the Ohio River began at an early age. Part of my youth was spent growing up along the banks of the Ohio River in Owensboro, Louisville, Northern Kentucky, and Ashland, Kentucky. From childhood to adulthood, my life has been linked to the River in some way, and my first professional job was with the Commonwealth of Kentucky as a sanitary/environmental engineer working on permitting of industrial discharges. My career has come full circle by proudly serving as an ORSANCO Commissioner and its Chairman. My first exposure to ORSANCO was through former Chairman, Ralph

Pickard, while working with him and Clyde Baldwin at the Kentucky Water Pollution Control Commission over 45 years ago.

During my time as a Commissioner, I have had numerous opportunities to interact and connect with the river and the people associated with this wonderful water resource. I had the unique opportunity to electrofish with Kentucky Congressman Thomas Massie and ORSANCO's biologists to see the abundant variety of fish and aquatic life in the River and participated in the Ohio River Sweep with some of the many volunteers, ORSANCO staff, representatives from Ohio and Kentucky environmental protection agencies, and other organizations. I have encountered many unique opportunities and challenges during my time as an ORSANCO Commissioner and Chairman, but even as progress has been made, challenges remain that are being addressed by dedicated staff, Commissioners, and other partners.

“At the time I did not know that stories of life are more often like rivers than books.”

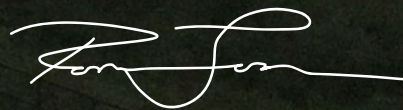
(Norman Maclean, *A River Runs Through It and other Stories.*)

Challenges may require changes to any effective organization, but they survive, and the same is true along the river and with ORSANCO. The Roebling Suspension Bridge in Cincinnati, a prototype of the Brooklyn Bridge, was the only bridge to remain in service during the great flood of 1937 and is still a beautiful and useful resource related to the River. ORSANCO too has stood the test of time and continues its mission: to protect the Ohio River and its many uses. In June of this year, ORSANCO celebrated its 69th anniversary, and we have worked toward the future to maintain fiscal responsibility and develop five-year program and budget forecasts to continue ORSANCO's important work and to support sound decision making during ever-changing economic conditions and a difficult funding climate.

We successfully completed an eight-year renovation to update and modernize ORSANCO's Organics Detection System, which provides a coordinated effort for source water protection between ORSANCO and the drinking water utilities throughout the Ohio River Basin. Staff continues to seek support for this fundamental and critical program to protect our drinking water, recreation, and other uses. The ORSANCO team has played an important role in these and other achievements.

Historically speaking, we are all working in a very brief period of time in the River's history. During the time that we have, we strive each day to have a positive impact on the state of the river, protecting its health and the many uses it will afford generations to come. This history is not only a history of one organization, but of many people connected by one river, the great Ohio River.

Please take the time to read this Annual Report and become familiar with the people and activities that are so critical to sustaining this wonderful River that runs through us all.

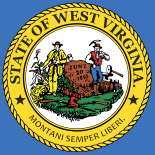


Ron Lovan is President/CEO of the Northern Kentucky Water District. He has been a member of the Commission since April 2012 and served as Chairman from July 1, 2016 – June 30, 2017.



Congressman Thomas Massie (KY) electrofishing with Ron Lovan (ORSANCO Chairman) and Chris Lorentz (Professor/Director) at the Thomas More College Ohio River Biology Field Station in Campbell County, Kentucky.

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



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 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.

Protecting Drinking Water

Source Water Protection

Five million people each day rely on the Ohio River as their source for drinking water. The river, however, has many other uses including industry, transportation, agriculture, energy, and recreation. With each use comes the potential for pollution to enter the basin. Ensuring that the Ohio River remains a safe and reliable drinking water supply is a key element of ORSANCO's mission. The Commission's Source Water Protection Program is designed to do just that.

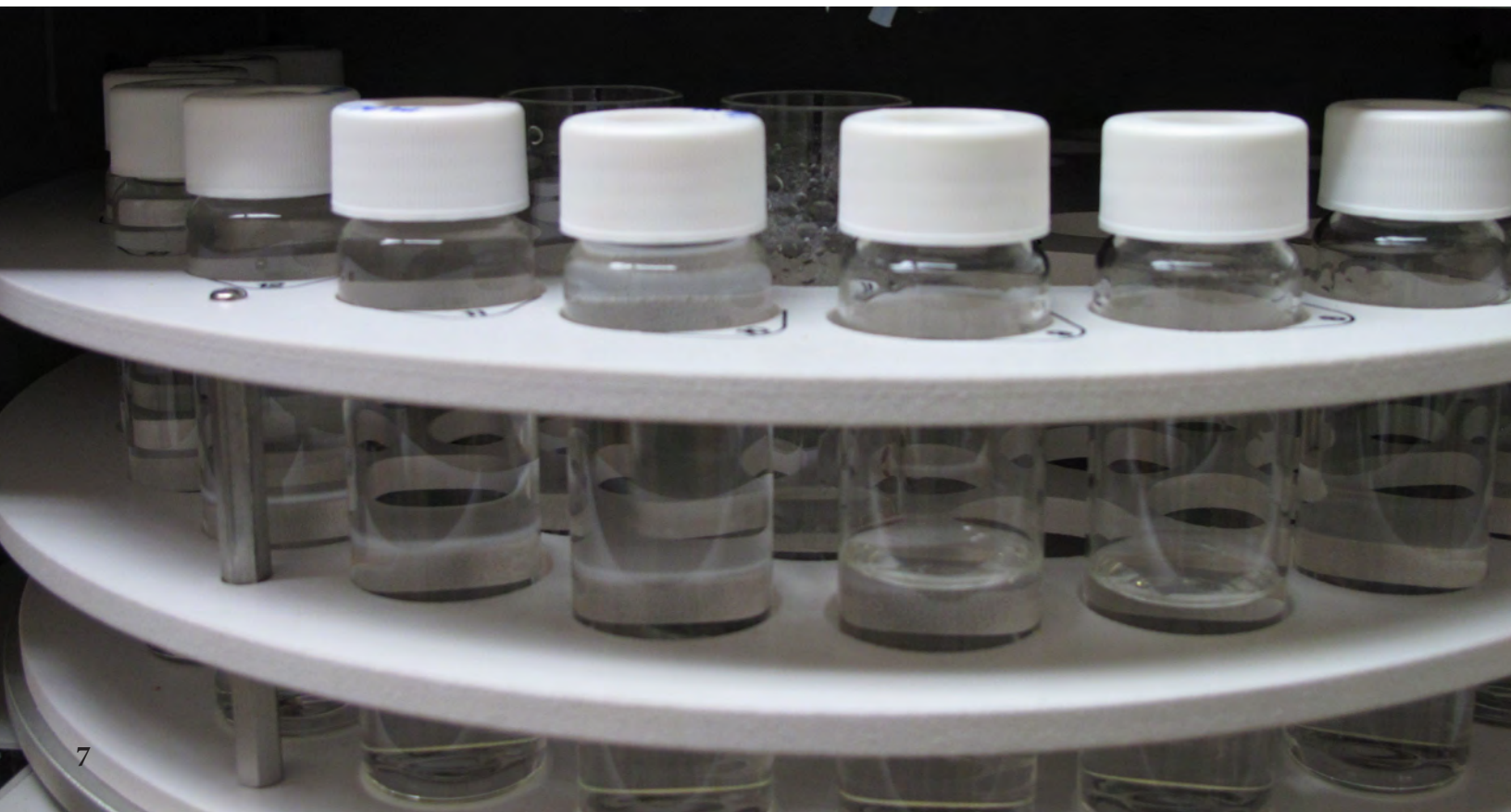
ORSANCO employs a multi-faceted approach to keep drinking water safe. Communication is at the heart of the Source Water Protection Program – communication among drinking water utilities, communication among and between industries, and communication among and between the multiple state and federal agencies that have authority and responsibility for protecting and managing the various uses, users, and the resource that is the Ohio River. Through a variety of committees, meetings, and presentations, ORSANCO Source Water Protection staff work diligently to support and promote these communications that help protect drinking water quality.

Water Users Advisory Committee

The Commission's Water Users Advisory Committee is comprised primarily of drinking water utility managers that use the Ohio River and major tributaries as their primary water source. Formed in 1952, it is one of the longest standing committees of the Commission. Its members meet several times each year to provide input to the Commission on water quality issues that pertain to the daily production of safe drinking water. In addition, this committee provides oversight to the Commission's Organics Detection System (ODS) that monitors the Ohio River daily for the presence of volatile organic compounds. Many of these same utilities participate in other water quality monitoring programs undertaken or sponsored by the Commission.

Organics Detection System

The Organics Detection System (ODS) is a premier early warning spill detection network established in 1978 in the wake of a major chemical release that contaminated many Ohio River drinking water utilities. This chemical detection network serves to monitor river quality daily to protect the public water supply. The ODS is a cooperative effort between ORSANCO and Ohio River Valley drinking water utilities and industrial partners who provide personnel and resources to support the operation of this essential contaminant monitoring network.





The ODS network includes sixteen monitoring stations. Thirteen are situated along the length of the Ohio River from Pittsburgh, PA to Paducah, KY. The remaining three sites are on major industrialized tributaries – the Allegheny, Monongahela, and Kanawha rivers. These stations collect and analyze river water daily for a suite of volatile organic compounds (VOCs). Sophisticated and highly sensitive gas chromatograph equipment is calibrated to quantify concentrations of 30 specific VOCs commonly stored, used, or transported on the river; however, the system routinely scans for thousands of other organic compounds that could compromise drinking water quality.

In 2016, over 22,000 river water samples were collected and analyzed with this system. Fortunately, the vast majority of these samples did not show signs of contamination of volatile organics. The system stands at the ready to serve as a sentinel to alert water utilities of unreported chemical releases and to monitor river conditions during spill events to ensure the Ohio

River remains a safe source of drinking water for the five million people who use it every day.

Emergency Response

The main stem Ohio River travels through or along the border of six states and numerous federal agency jurisdictional boundaries. These boundaries can create communication and logistical challenges when spills occur. ORSANCO plays a vital communication role in emergency response to ensure all state and federal emergency response agencies and drinking water utilities are notified of potential releases that may impact their state or region. Staff maintains a 24/7, 365-day notification system. Incident reports come into ORSANCO from the National Response Center (NRC) or through direct calls from agencies or citizens. The information is evaluated to determine the potential threat to Ohio River users and communicated to agencies and utilities as appropriate. ORSANCO received over 600 incident reports in 2016 for releases occurring in counties along the Ohio River.

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 mORFI_n (modified Ohio River Fish Index). Using the collected data, the index

assigns scores to rate the relative

condition of fish communities

among the Ohio River 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 2016 marked the second year that both the fish index (mORFI_n) and the Ohio River Macroinvertebrate Index (ORMI_n) 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 mORFI_n and ORMI_n scores.

In 2016, ORSANCO biological crews assessed Willow Island, Greenup, and Cannelton pools and will be sampling New Cumberland, Meldahl, and Newburgh pools in 2017. 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.”

Exotic Vegetation Survey

The 2016 field season featured a reduction to three pools (traditionally ORSANCO biologists sample and assess four pools per year). The Biological Water Quality Subcommittee (BWQSC) ranked potential projects to utilize the resources formerly assigned to the fourth pool survey. The overall goal of the projects was to improve the accuracy and efficiency of the annual assessments. The one with the highest priority involved an invasive exotic submerged aquatic plant *Hydrilla verticillata* and its effects on Ohio River fish and macroinvertebrate populations. Since its emergence in the Ohio River around 2008, hydrilla has continued to increase in density and longitudinal distribution (currently confirmed in 12 of 19 navigational pools). ORSANCO probabilistic sampling has revealed a dramatic shift in fish species composition and macroinvertebrate abundance at both the site and pool levels where hydrilla is abundant. To better understand these relationships, ORSANCO adapted a probabilistic sampling plan to quantitatively measure native and exotic vegetation at all 2016 sampling sites. Analysis of this study is ongoing, but preliminary results indicate that species composition varies across sites depending on vegetation density and type (native vs. exotic). Furthermore, additional exotic vegetation types were discovered as was the affinity of exotic fish species for these non-native beds. ORSANCO

biologists will continue to investigate these links as the new vegetation survey method will be incorporated in all future pool surveys.

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 was 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 fish. This same lab will also analyze sediment samples from a selection of sites, as data concerning microplastic prevalence in sediments is currently lacking in freshwater lotic systems.



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.

Fish Consumption Advisories

The most recent 10 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 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 how to follow advisories.

At present, all six main stem states defer to a unified protocol to issue ORFCAP-suggested 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 305(b) 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 guidance. To ensure that an updated data set is available to meet reporting requirements, samples in three or four pools are analyzed annually.

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 provides a snapshot of contaminant levels of nearly all commonly encountered and commonly consumed fish from the main stems of two of the largest rivers within the state. Composite samples of Channel Catfish, Flathead Catfish, White or Black Crappie, Smallmouth Bass, Largemouth Bass, White Bass, Walleye, Sauger, Freshwater Drum, Common Carp, and Hybrid Striped Bass or Striped Bass were targeted from five locations throughout the Kanawha River and two locations on the Monongahela River. Fillets from all samples were analyzed for mercury, methylmercury, and PCBs. Fillets from specified locations on the Kanawha River were also analyzed for dioxins. Whole fish analyses were 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 state of West Virginia for determining fish consumption advisories and fish consumption use assessments.

At present, all sample collection is complete. Once analyses are finalized, data will be reviewed, summarized and incorporated into a comprehensive report issued to WVDEP.



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 for the Ohio River. The committee was charged 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.

In October 2016, the Ad Hoc Committee made a recommendation to the Commission regarding a needed study on mercury, which was endorsed by the Technical Committee and accepted by the Commission. The approved study is to complete a mercury mass balance of in-stream and source loadings of mercury for the Ohio River and its major tributaries. The study is designed to be highly efficient, utilizing existing studies to estimate mercury loads in the Ohio River and major tributaries, and using available discharge monitoring data to estimate loads from point sources.

ORSANCO has already completed year-long monitoring surveys at three Ohio River locations, with a fourth Ohio River location currently being completed, that will allow ORSANCO to estimate Ohio River annual mercury loadings. Year-long mercury monitoring surveys were completed this year on the fifteen largest tributaries to the Ohio River, which account for approximately eighty-five percent of the inflow to the Ohio River. Annual mercury loading estimates are currently being generated for each of these tributaries. Staff has begun accessing the US EPA's Permit Compliance System/Integrated Compliance Information System to estimate mercury loads from point sources along the Ohio River and

in the tributary watersheds. The outcome from all of these efforts will be an estimate of how much mercury is coming from the tributaries, from the point sources within those tributaries, and from the direct point source discharges to the Ohio River. This will allow for a better understanding of the future management needs regarding mercury in 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 Project 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 US 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.

A new round of proposals from farmers have been accepted, with awards expected in late 2017. This round of funding will bring the total to over \$1,000,000 in awards for nutrient reduction projects.

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, Olmstead/Open Water, Montgomery, Racine, JT Myers, Willow Island, Greenup, and Cannelton pools in the Ohio River. Additionally, water samples were obtained for nutrient and chlorophyll-a analysis at each of these sites.

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ORSANCO staff are currently analyzing the data from this paired study, and early indications are promising that defensible nutrient criteria can be developed from this approach. This study is scheduled to continue during the 2017 field season.

Harmful Algal Blooms

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).

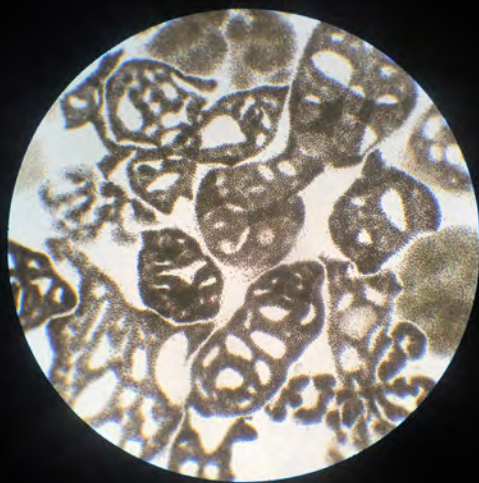
Cyanobacteria can produce toxins which can be harmful if ingested. For this reason, an algal bloom which consists primarily of cyanobacteria is considered a Harmful Algal Bloom (HAB). These

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, notify 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 Locks and Dam (ORM 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 (ORM 84.2 to 720.7). Below Cannelton L&D, there were intermittent patches of the bloom but not a continuous coverage. No illnesses were reported as a result of this bloom and no toxins were detected in finished drinking water.



In 2016, ORSANCO responded to seven separate reports of algal blooms (four on the Ohio River and three on tributaries). Of the seven incidents, two were reported by citizens, two by the U.S. Army Corps of Engineers (USACE), and three by ORSANCO staff. ORSANCO coordinated with three States and two Federal Agencies to respond to these reports. Although these blooms were reported, no HABs were identified on the Ohio River. More information on these reports is outlined below:

Reported algal blooms on the Ohio River:

- Pike Island Pool (ORM 63) - A citizen reported a potential HAB to Ohio EPA. This was forwarded to ORSANCO, who worked with local US EPA staff to identify it as a large area of submerged aquatic vegetation.
- Huntington, WV (ORM 310) - USACE personnel identified a small amount of *Microcystis* in the water column.
- Cincinnati, OH (ORM 462) - ORSANCO personnel also identified a small amount of *Microcystis* in the water column; however, no toxins were detected in samples collected throughout the area.
- Olmsted Lock and Dam (ORM 962) - USACE personnel observed a large amount of floating algae. KY Department of Water (DOW) and Illinois EPA personnel investigated the area but were unable to find any significant algae. It is believed that work on dams immediately upstream released a mat of algae which was then quickly washed into the Mississippi River.

Reported algal blooms on tributaries to the Ohio River:

- Paint Lick Creek (KY) - A citizen reported a red algal bloom. ORSANCO identified this as *Euglena sanguinea*. The bloom was localized to the backwater area of the creek and did not extend into the Ohio River.
- Woolper Creek (KY) - ORSANCO staff identified a bloom which was primarily *Euglena*. This bloom was also limited to the backwater area of the creek and did not extend into the Ohio River.
- Muskingum River (OH) - ORSANCO staff identified a bloom of the dinoflagellate *Peridinium*. This was localized around ORM 40 on the Muskingum River and did not extend into the Ohio River.





Life Below the Waterline Aquarium at RiverPark Center in Owensboro, Kentucky.

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 several years is the Dayton, OH Children's Water Festival. This one-day event for 2,000 students at the 4th grade level offers a series of continuous 25-minute presentations on groundwater, surface water, conservation, land use and other water-related topics, various games, experiments, exhibits, and entertainment.

Over the winter of 2017, the aquarium received much-needed renovations. A custom shop sandblasted off all the old paint and rust, repaired any holes, sprayed

on new urethane paint, and finished with a clear coat to protect against the sun. They also sandblasted and applied a spray-on liner to the underside of the aquarium. These improvements ensure that the aquarium can now be displayed prominently at Ohio River Basin events for years to come. In 2017, the aquarium is scheduled to be displayed at the following events in the Ohio River Watershed:

Event/Location

- Ohio State Biological Museum Open House/ Columbus, OH
- Children's Water Festival/Dayton, OH
- AEP Earth Day/Conesville, OH
- Ohio River Sweep/Cincinnati, OH
- Water for Life/Lexington, KY
- Inland Waterways Festival/Marietta, OH
- ALCOSAN Open House/Pittsburgh, PA
- Safety Fair/Jeffersonville, IN
- Subaru Outdoor Experience/Dayton, OH
- Adventures in Water Festival/Louisville, KY
- BBQ on the River/Paducah, KY





Ohio River Sweep

The Ohio River Sweep is a volunteer cleanup of the Ohio River which has been organized by ORSANCO since 1989. This annual event brings together people from the six states which border the Ohio River for the purpose of removing litter from the shoreline of this great resource. Each year, thousands of volunteers from Pittsburgh, PA to Cairo, IL participate in the cleanup. The Ohio River Sweep allows volunteers to experience hands-on, environmental stewardship in an easily-accessible, community event.

Many volunteers now share their Ohio River Sweep experience on social media. Volunteers often post photographs of themselves, as well as their friends and family, at the cleanup. These positive images showcase the community nature of the event and the results of this litter cleanup. This increased use of social media will help to generate additional awareness of the event and recruit participants for years to come.

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 grades kindergarten through twelfth 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 2017 Ohio River Sweep poster winner was Nick Boczek from Florence, KY, and the T-shirt design winner was Abigail DiBiaso from West Union, OH. Congratulations to these river artists and thanks to all of our many volunteers for making 2017 another year of Sweep(ing) success!





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 five 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.

2017 Participating RiverWatchers

- 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 (OH)
- Mater Dei High School (IN)

A Legacy of RiverWatching (as told by Dave Barr, Wahama High School, WV)

The RiverWatchers program at Wahama was originally started under the supervision of Gary Fields in 2005. Mr. Fields used RiverWatchers in his Biology classes. After he retired in 2006, I took over the water monitoring program and integrated the program into my Advanced Placement Environmental

Science class. Wahama classes have been dedicated "environmental watchdogs" of the Ohio River over the years.

Budgets for public schools are always really tight. This is especially true in science because so much of what we use can be pretty expensive. One of the strengths of our participation in RiverWatchers is the partnership we have with ORSANCO. They provide us with materials to do actual field work, and our kids provide the labor. The students get to be involved in actual field work in the area of water quality.

The experience they get is invaluable for them; it is something we ordinarily wouldn't be able to do. At Wahama, our goal has been to provide ORSANCO with a minimum of one dataset per month. Each month, students take the short walk from our classroom to the Ohio River. Once there, we set about the task of gathering data for dissolved oxygen, turbidity, nitrate and phosphate levels, E. coli, and other water quality parameters. After the data is tabulated, the students perform some calculations that allow them to assess the quality of the water in the river. They enter this data into an online database on ORSANCO's website.

We have used our experience with RiverWatchers to teach concepts regarding water quality in addition to teaching the scientific method. This means that our students test at all times of the year no matter what the weather conditions have been like. Students know



they have to keep mud boots at school, and they will need coats sometimes because we test even if it's really cold or if it has been raining. They learn that science doesn't stop for Mother Nature!

We have seen some interesting things in our time on the river. In the fall, we often see enormous schools of baitfish that enter the main channel to feed before they settle into streams for the winter. In 2015, we made it to our dock on one particular afternoon to discover an algal bloom in full progress. Both days were great teachable moments. Seeing these events helped the students connect water quality with the things that live in the river.

The experience has also brought some funny moments. One fall afternoon in 2010, we got caught in a cloudburst on the way back from our field testing. The students set a new land speed

record over the roughly one mile trek back to the school as we tried hard to dodge some seriously big raindrops!

Dave and his students clearly show the dedication of real scientists who are out there every day working together to protect the great Ohio River and the entire watershed.





The Foundation for Ohio River Education

The Foundation for Ohio River Education (FORE) is ORSANCO's non-profit education foundation. FORE teaches people of all ages in the Ohio River Basin to become environmental stewards through hands-on programs that get people on the water and engaged in preserving the cultural, ecological, and economic value of the Ohio River watershed.

Each year, FORE's programs have continued to grow, and last year was no exception. In 2016, FORE reached 5,353 people, which was a new milestone. Audiences included children, teachers, scientists, water quality professionals, and the general public, at schools, parks, and universities throughout the Ohio River Basin.

FORE's River REACH floating classroom program continues to provide an unforgettable learning experience on the Ohio River for students in grades four through college. Since the program began, the majority of the students served by the program each year have been students in need. Fifty-seven percent of the students who participated in the program in 2016 were disadvantaged.

Although the floating classroom program focuses on engaging students in Science, Technology, Engineering, and Mathematics (STEM) disciplines through hands-on water monitoring, it also provides students a strong connection to the river and a unique understanding of what role the river plays in their

lives, from the time they wake up until the time they go to sleep at night.

FORE receives dozens of letters each year from appreciative teachers like this one, from a teacher at Woodward High School in Cincinnati, Ohio:



Thank you for a wonderful field trip....this trip has really renewed my passion for teaching (no joke)! The students have been talking non-stop today telling others how they should have gone. Thank you for all the patience and time you have spent helping Woodward be part of this program!

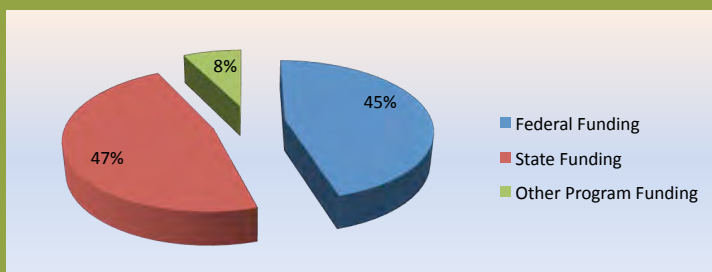
In addition to the River REACH program, FORE engages thousands of participants in outreach programs each year. In 2016, FORE partnered with 21 Greater Cincinnati organizations to bring 41 outreach programs to over 3,400 participants. Activities included summer camps, classroom and library presentations, and festivals. FORE also trained 556 teachers and non-formal educators through innovative professional development programs.

FORE continues to work with NKU and US EPA on the development of an algorithm that is designed to detect potential Harmful Algal Blooms (HABs) by color. FORE installed a camera at their floating classroom site at Queen City Riverboats in Dayton, Kentucky over the winter. The camera takes continuous pictures of the water at the site, while FORE's staff and students collect and identify algae present in order to confirm what the camera is



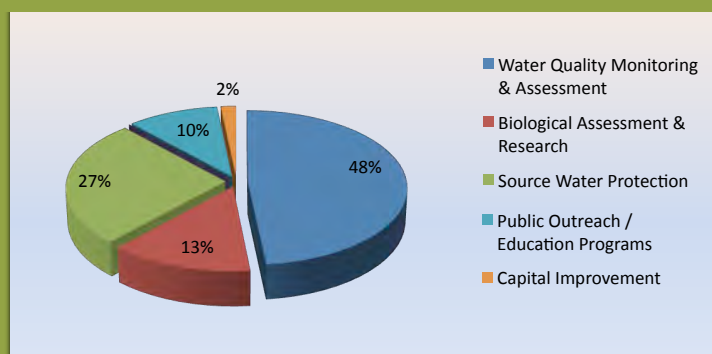
detecting. The algorithm used in training the camera will be used to develop a smart phone app. This exciting project will benefit scientists, students, utility operators, and citizens alike. FORE looks forward to connecting students, teachers, professionals, and citizens to the Ohio River through innovative, hands-on programs for many years to come.

2017 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
Source Water Protection
Public Outreach / Education Programs
Capital Improvement

*Audited financial statements for 2017 will be available in February 2018.

ORSANCO Staff



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Director & Chief
Engineer



Tracey Edmonds,
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Assistant

Technical Programs



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Senior Biologist



Rob Tewes,
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Melissa Mann,
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Matt Glazer,
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Part-time

FORE



Heather Mayfield,
Executive Director

☀ **Staff Milestones**

Joe Gilligan – 25 years

Steve Braun – 10 years





Special Recognition: Jerry Schulte

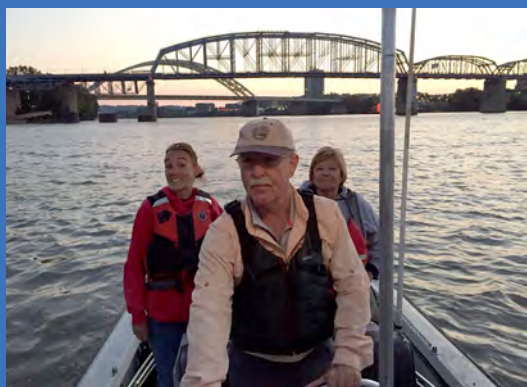
In October 2016, Jerry Schulte retired from ORSANCO and was recognized for 29 years of exceptional service to the Commission as manager of Source Water Protection and Emergency Response. From research on

countless numbers of fish at lockchamber surveys to numerous emergency response events and work with Congress, Jerry worked tirelessly with water protection and emergency response programs, including ORSANCO's Organics Detection System (ODS).

Jerry's journey with ORSANCO began as a young biologist working for his manager, mentor, and friend, Louise Kedziora. He worked under the direction of former

Executive Director, Alan Vicory, working together over the years from the Ashland Oil Spill in 1988 to the formation of the Ohio River Basin Congressional Caucus in 2009. Jerry worked in so many aspects of ORSANCO's role in protecting the river. During his career, he was elected Chairman of the Interstate Council on Water Policy (ICWP), which serves to promote integrated water resources management with state, interstate, regional, and other resource agencies and water managers. He represented both ORSANCO and ICWP at national meetings and conferences in Washington, DC.

Jerry received other numerous awards and recognition throughout his career, including the Risk Communication Excellence Award from the Alliance for Chemical Safety for ORSANCO's spill response efforts. Jerry may have retired from ORSANCO, but his legacy to protect the Ohio River will never be forgotten.



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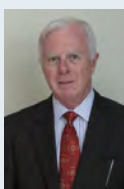
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Consulting



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* As of June 30, 2017. An updated list of ORSANCO's Commissioners is available at www.orsanco.org.





Serving the Commission with Excellence: Remembering Mel Hook

Former Commissioner Mel Hook passed away on March 3, 2017. Mel served ORSANCO with distinction for 23 years as a Pennsylvania Commissioner and served as Chairman twice in 1992-1993 and 2005-2006. Prior to his time as a Commissioner, Mel served in the Army Air Forces during World War II and later earned a master's degree in civil engineering. He was the manager of Fox Chapel Water Authority in Pittsburgh for 40 years, and later served as a consultant for an engineering firm. We honor Mel for his commitment to improving water quality in the Ohio River Valley. He will be fondly remembered and greatly missed.

Special Recognition

In 2017, Lisa Bonnett (IL), Carol Comer (IN), and Randy Huffman (WV) completed their service on the Commission, and Austin Caperton (WV), Alec Messina (IL), and Bruno Pigott (IN) were appointed to the Commission. ORSANCO would like to welcome Austin, Alec, and Bruno to the Commission and would like to thank Lisa, Carol, and Randy for their dedicated years of service. We wish them the best of luck in the years ahead.



Lisa Bonnett



Carol Comer



Randy Huffman

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