

# Ohio River Valley Water Sanitation Commission Annual Report 2018



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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 2018 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 Ralph S. Northam  
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, 2018





## Chairman's Message

2018 marks the 70th anniversary of the signing of the Ohio River Valley Water Sanitation Compact. ORSANCO, along with its member states, the federal government, businesses and industries, local government agencies, and many other stakeholders, have together made great progress at improving Ohio River water quality over the past 70 years. Just within this past year, many accomplishments and successes have contributed to improving water quality in the Ohio River Basin, including:

- Responding to over 500 reports for potential spills impacting the Ohio River, such as the release of a half million gallons of urea ammonia nitrate from a catastrophic barge failure just downstream of Cincinnati, Ohio; a sunken vessel releasing oil into the Big Sandy River; an Ames Tool Plant fire in Parkersburg, West Virginia; and a shale gas well pad fire near Powhatan Point, Ohio.
- Working with local drinking water utilities to analyze more than 15,000 river water samples using ORSANCO's Organics Detection System (ODS) and adding WVAW's Kanawha Valley Water Plant to the ODS network.
- Sponsoring a Harmful Algal Bloom (HAB) Workgroup to coordinate and share Ohio River HAB research along with the US EPA, USGS, and NOAA to analyze the cause of a significant 2015 HAB event along the Ohio River. ORSANCO also worked with a HAB continuous monitoring project along with students from the University of Cincinnati to help provide real-time notification of potential HAB conditions on the river.
- Completing a year-long total load sampling project on the lower Ohio River for a mercury mass balance study.
- Working together with the Ohio River Basin Alliance (ORBA) and being selected, along with the Foundation for Ohio River Education (FORE), as their fiscal sponsor.
- Taking part in the signing ceremony for the Second Amendment to the Ohio River Water Quality Trading Plan that was signed by Ohio, Indiana, and Kentucky this past October.

- Evaluating various alternatives for ORSANCO's future role in water quality standards for the Ohio River and working extensively with ORSANCO's advisory committees as well as listening to the comments and concerns from the general public in evaluating these alternatives.
- Engaging the public with many Ohio River educational activities, including FORE's award-winning River REACH program, the Life Below the Waterline mobile aquarium, and the 29th annual Ohio River Sweep.

So much has happened over the course of this past year, but it is important to also look to the future and stay the course. ORSANCO could not remain strong with their commitment to Ohio River water quality without the assistance and coordination among many partners: ORSANCO's member states, the US EPA, USACE, USGS, USCG, USFWS, NOAA, Emergency Response agencies, drinking water and wastewater utilities, industries, watershed organizations, advisory groups, dedicated and hard-working staff, and many

others. The Commission must continue to: 1) seek sustainable funding for the future, 2) evaluate the most appropriate role for its standards program, 3) work with many partners, including the Ohio River Basin Alliance, 4) consider ORSANCO's role in water quantity and other water resource issues, 5) evaluate, mitigate, and educate the public about mercury loads in the Ohio River, and 6) continue research on Harmful Algal Blooms. The Commission must also not only focus on its technical programs and research but also on public outreach. We must strive to teach the public who we are, what we do, and most importantly, how much Ohio River water quality has improved over the past 70 years. Together, with ORSANCO's partners and with the public, we can stay the course...the course of maintaining and continually improving the quality of this great national resource, the great and beautiful Ohio River.

*Stuart J. Bruny*

# 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 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.



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

Every two years, ORSANCO completes an assessment of Ohio River Water Quality Conditions (305(b) 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 305(b) 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 2018 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. Results of the 2018 assessments according to the four beneficial uses of the river include:

**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.

# Protecting Drinking Water

## Emergency Response

The Ohio River is a vital natural resource that supplies drinking water to millions of people every day, supports a diverse aquatic ecosystem, and provides recreational opportunities for swimmers, boaters and anglers. The Ohio River, however, is also a working river, providing the necessary water resources to support industries for manufacturing and energy production and a cost efficient commercial navigation system. With the industrial and commercial use of the river comes the potential for accidental releases of pollutants that can contaminate the water and make it unsuitable for other uses.

ORSANCO serves a critical role in emergency spill response communications by providing notification of spills and other incidents that could adversely affect water quality to state and federal emergency response agencies and to drinking water utilities that may be impacted by a release. Staff maintains a 24/7, 365 day notification system, and incident reports come into ORSANCO from the National Response Center 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 2017 for releases occurring in counties along the Ohio River. The vast majority of these spills are very minor and have little to no impact on water quality. Significant spills, however, do occur from time-to-time.

One such example occurred on December 20, 2017 when a barge split in half during unloading operations downstream of Cincinnati. The ruptured barge released approximately 467,000 gallons of urea ammonia nitrate (UAN) directly into the Ohio River. ORSANCO staff quickly notified downstream utilities and worked closely with state and federal emergency response agencies from Ohio, Kentucky, Indiana, US EPA, and the US Coast Guard to coordinate response efforts. In addition, ORSANCO ran a spill time-of-travel model to estimate arrival times at key downstream locations. Staff also conducted water quality monitoring in coordination with the Louisville Water Company (the nearest water

intake downstream of the incident location) to measure levels of ammonia contamination. Timely water quality monitoring and analysis was critical to the drinking water utility in order to make the best water treatment management decisions to ensure the water was safe to use for drinking water purposes.

## Organics Detection System

The Organics Detection System (ODS) is a voluntary, cooperative effort involving water producers, industry, and ORSANCO to monitor volatile organic compounds (VOCs) in the Ohio River on the main stem and four Ohio River tributaries in the Basin. The primary purpose of ORSANCO's ODS Network is to monitor water quality conditions for the protection of drinking water supplies. Benefits of the ODS include routine daily analysis of river water samples, remote access to each ODS site for real-time water quality monitoring from ORSANCO headquarters, and a coordinated communications network to relay water quality disturbances to upstream and downstream sites during spill or unreported release events.

## History of ORSANCO's Organic Detection System



ORSANCO's first monitoring system was comprised of "Robot Monitors" at 13 fixed locations along the Ohio River. This essential surveillance system was able to monitor up to ten parameters including dissolved oxygen, temperature, chloride, hydrogen, and pH; however, it was unable to adequately detect other spills, discharges, and releases of chemical

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contaminants (such as phenols and petroleum oils) that could potentially impact water quality. These robot monitors were able to transmit and “auto relay” information to ORSANCO headquarters on a continued

and routine basis and served as ORSANCO’s first riverwide network for several years.

In 1979, ORSANCO’s Early Warning Organics Detection System (ODS) was created in response to a 70 ton spill of carbon tetrachloride into the Kanawha River in West Virginia that went undetected for over a week and contaminated several drinking water facilities. This system used purge and trap instrumentation (newly marketed by Tekmar) and gas chromatographs (GCs) to detect the presence of select volatile organics which were installed at 7 locations along the Ohio River. New ODS host sites were added as funding and support became available to provide more coverage along the Ohio River and tributaries to the Ohio and, up until 2010, ORSANCO had 15 ODS monitoring stations. Purge and Trap technology, paired with GCs and GCMS, remains the most efficient way to determine the presence of (or confirm the absence of) VOCs in surface water.



### **Notable Spills of Concern: 1978-Present**

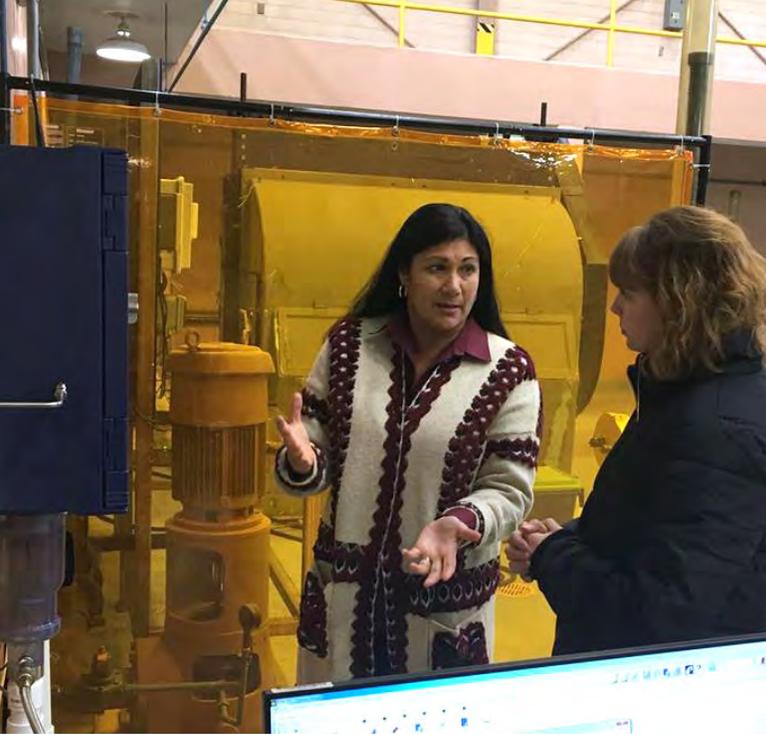
- 1977 Carbon Tetrachloride (Kanawha River)
- 1988 Ashland Oil Spill (Monongahela River)
- 1994 Ethylene Dibromide (Ohio River)
- 2000 Wild Turkey Bourbon Whiskey (KY River)
- 2005 Mid Valley Pipeline Rupture (KY River)
- 2008 Methylene Chloride (Ohio River)
- 2014 MCHM (Elk River)
- 2014 Diesel Spill (Ohio River)
- 2017 IEI Plastics Fire (Kanawha River)
- 2018 Barge Rupture (Ohio River)
- 2018 Sunken Barge (Big Sandy River)

### **ORSANCO’s Current Organics Detection System**

During routine monitoring, raw river water samples are collected, processed, and analyzed up to six times a day at select ODS stations using purge and trap technology and gas chromatographs. The system is calibrated to identify 30 common volatile organic compounds (VOCs), and with mass spectrometer detectors at eight ODS stations, ORSANCO’s ODS network has the capability to detect the presence of thousands of volatile contaminants. The seventeen ODS stations within the Ohio River Basin provide a network of water quality monitoring and information sharing for the protection of public water systems in the event of releases or spills. ORSANCO works closely with local drinking water utilities to detect VOCs by the ODS to help ensure the quality and safety of the Ohio River as a source of drinking water. The operation of this valuable system is only possible through the collaboration of the drinking water utilities and other partners who operate their respective systems on behalf of the ODS network.



In 2017, nearly 21,000 river water samples were screened for the presence of VOCs. Fortunately, the vast majority of these samples did not show signs of contamination of volatile organics. Non-detection or absence of VOCs serves as an indicator that the river water meets its intended designated use for that parameter, which is the overall goal for source water



# 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<sub>n</sub> (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 2017 marked the third year that both the fish index (mORFI<sub>n</sub>) and the Ohio River Macroinvertebrate Index (ORMI<sub>n</sub>) were used in conjunction with each other to assess the biological condition of the Ohio River.

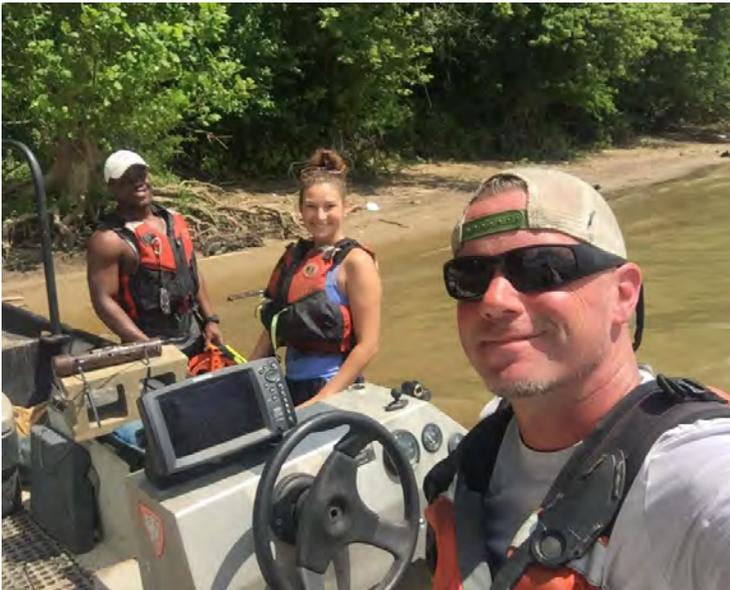
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protection efforts. However, if a VOC is detected at or above the program thresholds, ORSANCO will notify downstream water utilities and state and federal water quality and emergency response agencies as necessary. These organizations will then respond to the detection based on their respective emergency response plans.

In December 2017, a new monitoring station was added to the ODS network along the Elk River in Charleston, West Virginia. There are now 17 operating ODS stations; these stations are located along the Ohio, Allegheny, Monongahela, Kanawha, and Elk rivers in the Ohio River Basin. The success of the ODS is due to the voluntary partnerships between the water utilities, water users, and ORSANCO. The ODS has been highly effective in detecting and tracking numerous spills and discharges since its inception in 1978.

In 2018, the ODS is celebrating its 40th year of continued operation. The ODS has remained one of ORSANCO's flagship programs and has had recognition from around the world. This invaluable monitoring network serves as part of overall source water protection programs implemented by multiple water utilities and water users.





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<sub>n</sub> and ORMI<sub>n</sub> scores.

In 2017, ORSANCO biological crews assessed New Cumberland, Meldahl, and Newburgh pools and will be sampling the Emsworth and Pike Island pools in 2018. 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 Studies**

Three Ohio River pools were surveyed during the 2017 field season (traditionally ORSANCO biologists sample and assess four pools per year). The Biological Water Quality Subcommittee (BWQSC) ranked potential studies to utilize the resources formerly assigned to the fourth pool survey. The studies with the highest priorities involved increasing research efforts within the currently scheduled pools to improve the accuracy and efficiency of the annual assessments and support programmatic

needs of ORSANCO’s state and federal partners. One project involved placing temperature probes in six direct Ohio River tributaries within Meldahl pool on behalf of Ohio EPA (OEPA). All loggers were successfully retrieved and returned to OEPA. ORSANCO biologists placed and successfully retrieved the probes whose data will be analyzed by OEPA to determine the most appropriate temperature standards for each stream. Another study involved electrofishing surveys in the lower portions of direct tributaries to the Ohio River. These unique habitats are largely unassessed by both ORSANCO and state surveys. To fill this data gap, several tributaries within each probabilistic pool were sampled using state sampling protocols, and the data were delivered to each agency for review. The goal of the final study was to provide baseline data to assess the potential impact of existing and planned hydropower facilities on the Ohio River. Staff developed a sampling plan with state and federal agencies, which involved combining standard ORSANCO biological surveys (electrofishing and macroinvertebrate protocols) with dissolved oxygen (DO) and temperature logger deployment. The sampling plan was employed below the upstream Lock and Dam complex in each probabilistic pool.

### **Collaboration**

During the winter and spring months, ORSANCO biologists work with many other entities to lay the groundwork for initiatives to collect much-needed monitoring information from the Ohio River during the following field season. In late 2017, ORSANCO was awarded an Electric Power and Research Institute (EPRI) agreement to enhance and update an existing Ohio River Mussel Database. Freshwater mussels are among the most imperiled organisms in the world. ORSANCO biologists augmented the database to accept contemporary mussel survey data from multiple entities. This publicly available database will be maintained by ORSANCO staff to provide all interested parties with a common resource for use in the study and conservation of Ohio River mussels.

In 2018, a cooperative agreement between ORSANCO and the U.S. Army Corps of Engineers, Louisville District, will allow for the collection of sediment chemistry, enhanced water chemistry, and macroinvertebrate data from fixed station sites in

the middle and lower Ohio River. These data will allow for better understanding of biological response to environmental condition gradients. In addition, biologists continue to collaborate with Loyola University on fish stomach content analysis. Loyola University staff are examining stomachs from fish used in ORSANCO fish tissue analyses for tiny particles of plastics (microplastics), a growing concern in worldwide waterways.

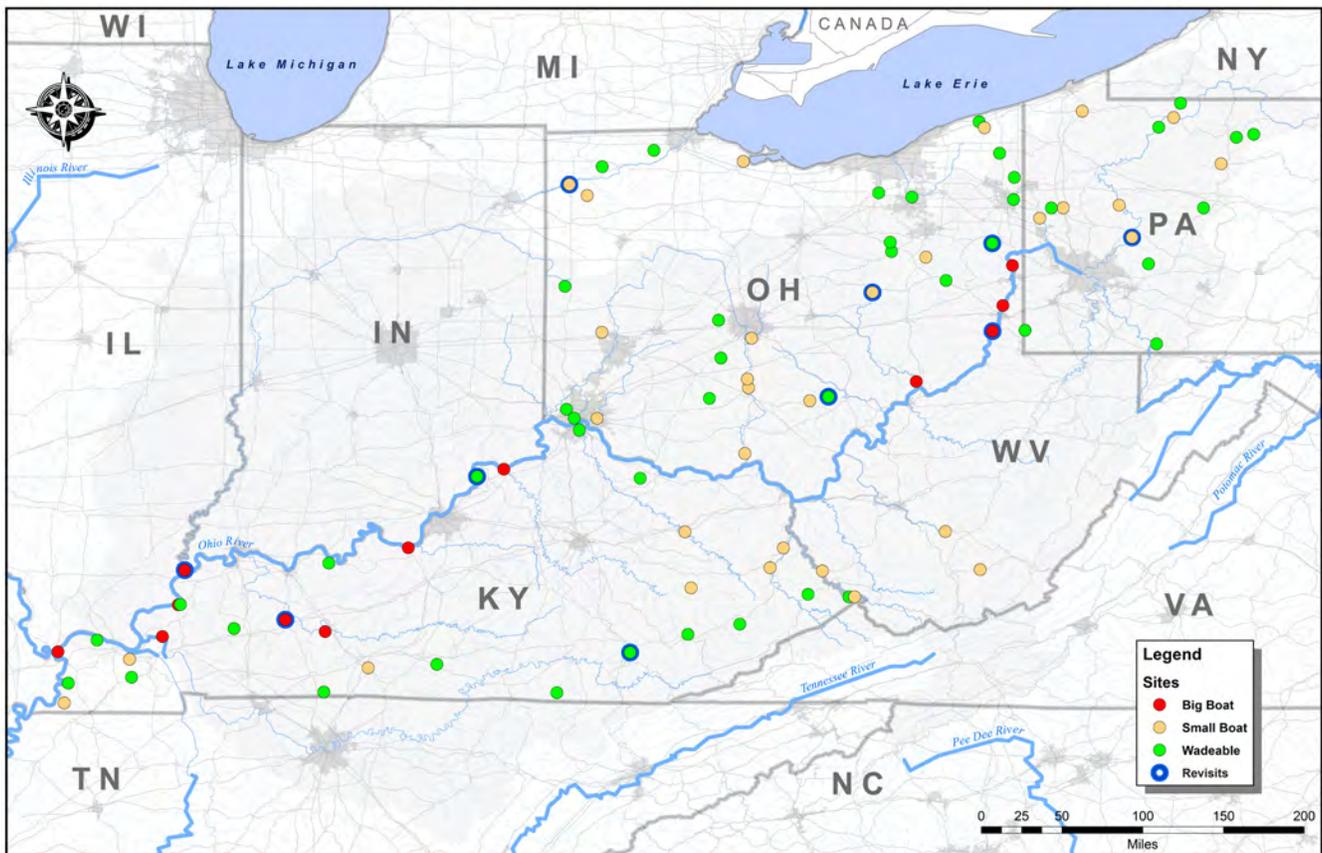
numerous parameters including water chemistry, fish and macroinvertebrate assemblages, nutrients, fecal bacteria, algae, and instream and riparian habitat condition. These data will be collected by ORSANCO on behalf of our states and the data will be given to US EPA for assessment and later release to the general public. The NRSA data will also provide ORSANCO with additional information to consider when investigating basin-level issues and their potential influence on main stem Ohio River conditions.

### National Rivers and Streams Assessment (NRSA)

In 2018 and 2019, ORSANCO aquatic biologists and environmental scientists will be participating in a US EPA initiative to assess the nation's rivers and streams. Part of the larger National Aquatic Resource Survey program, whose goal is to assess all waterways (lakes, wetlands, estuaries, etc.), ORSANCO staff will lend their expertise to sample waterways within the basin states of Pennsylvania, West Virginia, Kentucky, and Ohio. In total, 99 events will be surveyed for



ORSANCO Sites for the 2018-2019 National Rivers and Streams Assessment (NRSA)



# Protecting Fish Consumption

## 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](http://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](http://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.

# 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

ORSANCO assesses whether the river is suitable for contact recreation based on bacteria data collected from urban areas with combined sewer systems. It also uses bacteria data from longitudinal surveys conducted between 2003 and 2008 at over 200 sites along the Ohio River. Using these data provides a more accurate picture of water quality because bacteria levels fluctuate frequently depending on local or regional weather conditions. During the contact recreation season of April through October, Ohio River bacteriological conditions are often suitable for swimming and other contact recreation activities except during significant rain events and periods of high river flow. This is largely due to the multi-billion dollar investments that wastewater utilities have made to improve wastewater discharge water quality. Based on these data, ORSANCO is able to classify sections of the Ohio River as being impaired for contact recreation caused by *E. coli* bacteria. Although all sections of the river may be unsafe for contact recreation at times, as a testament to the Ohio River's significant water quality improvements, it is now the home to Paddlefest, the nation's largest annual paddling event, as well as the Great Ohio River Swim. Because of the unpredictability of the weather, ORSANCO has also provided monitoring for certain events on the Ohio River that bring large numbers of the public in contact with the river.

In August, ORSANCO staff participated in the Dragon SUP Race during the 2017 Paddlefest weekend. During the event, paddlers competed in teams of four on stand up paddle boards on the river. A month later, ORSANCO not only provided water quality monitoring for the Great Ohio River Swim in Cincinnati, Ohio, but some of our environmental scientists assisted swimmers with a safety boat and provided a turn-around buoy for the event. ORSANCO staff definitely knows how to protect (and enjoy!) recreation on 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 completed year-long mercury monitoring surveys at four main stem Ohio River locations and fifteen major tributaries that will allow ORSANCO to estimate the quantity of mercury flowing in the Ohio River, as well as the amount of mercury contributed to the Ohio River by each of the fifteen major tributaries. Annual mercury loading estimates are currently being generated for each of these tributaries. In addition, ORSANCO will be investigating the sources of mercury for each of the fifteen major watersheds in the Ohio River Basin, both from atmospheric deposition and point source discharges. When this basin-wide mercury mass balance is completed in 2019, the outcome from all of these efforts will provide an estimate of how much mercury in the Ohio River is coming from the tributaries, from point sources within those

tributaries, and from atmospheric deposition. Project results 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.

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A new round of proposals from farmers have been awarded. This round of funding brings 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, Cannelton, Newburgh, Meldahl, and New Cumberland pools in the Ohio River. 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, and early indications are promising that defensible nutrient criteria can be developed from this approach. This study is scheduled to continue during the 2018 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, 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 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.

Since 2015, ORSANCO has responded to numerous reports of algal blooms (both on the Ohio River and on tributaries). These incidents have been reported by citizens, by the U.S. Army Corps of Engineers (USACE), and by ORSANCO staff. ORSANCO has coordinated with five States and two Federal Agencies to respond to these reports. Although these blooms were reported, no HABs were identified on the Ohio River.

*ORSANCO Meeting with USACE*





## 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.

In 2018, the aquarium is scheduled to be displayed at the following events in the Ohio River Watershed and beyond:

### Event/Location

- Ohio State Biological Museum Open House/ Columbus, OH
- Children's Water Festival/Dayton, OH
- Hug the Earth Festival/Covington, OH
- River Festival/Bellbrook, OH
- Multiple Shedd Aquarium Events/Chicago, IL
- New Richmond River Days/New Richmond, OH
- ALCOSAN Open House/Pittsburgh, PA
- 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.

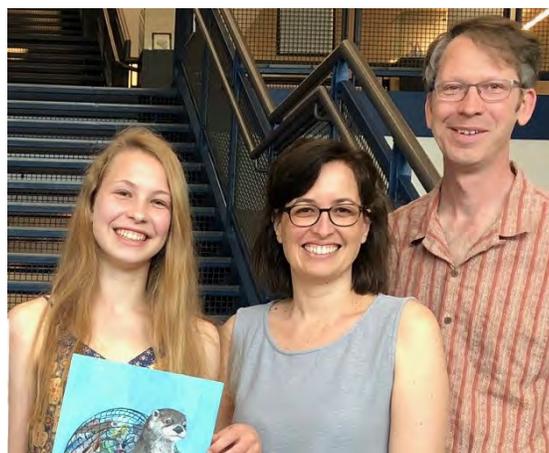
The Ohio River Sweep is an important event to remove litter from the Ohio River. Litter continues to be a problem in the Ohio River, and the Ohio River Sweep provides an opportunity for volunteers to remove tons of litter, especially single-use plastics, from the watershed. The Ohio River Sweep coordinates communities to help a global problem, such as plastics in the ocean, on a local level. Ohio River Sweep volunteers remove plastics from rivers before they travel downstream and reach the coast.

Volunteers from six states, 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, local event.

In conjunction with the Ohio River Sweep, a student poster contest is held to promote awareness of the event and the need for volunteers. 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 2018 Ohio River Sweep poster winner was Hannah Jones from Pittsburgh, PA, and the T-shirt design winner was Landon Reid from Covington, KY. Student artwork depicted on both the poster and T-shirt are created in an effort to encourage young people to understand the importance of their role in managing a great resource such as the great Ohio River.





## **The Foundation for Ohio River Education**

The Foundation for Ohio River Education (FORE) is ORSANCO's non-profit education foundation. Since 2004, FORE has taught 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.

In 2017, FORE delivered 79 river education programs to 8,493 people in the Ohio River watershed. Roughly half of the programs FORE conducts each year are River Research, Education and Adventure CHarters (River REACH) programs. The River REACH program is FORE's unique floating classroom program that takes place on the Ohio River aboard a vessel operated by Queen City Riverboats.

Each year, the River REACH program continues to grow, and in 2017, the program reached over 1,700 students in 20 schools in the Cincinnati-Northern Kentucky area. The program also travelled to Vevay, Indiana for a special river program that took place in conjunction with the Swiss Wine Festival.

FORE has designed the River REACH program with pre-voyage lessons that help students not only understand the science of water monitoring, but the "street to stream" connection with many common non-point sources of pollution. Last year, FORE program surveys indicated that 85% of students who participated in the River REACH program had an improved image of the Ohio River, and 79% of participating students were willing to change their personal habits to protect waterways as a result of participating in the program. Best of all, River REACH participants had fun. A student even commented,

"You should know your job is amazing and lots of kids like me love what you do!"

FORE also helped over 6,000 people throughout the watershed connect to the river through its OutREACH programs. These included summer camp programs, hands-on classroom presentations, parks programs, and festivals. One of FORE's favorite festivals is the "Who Works the Rivers" program, a river career fair and water monitoring program organized in conjunction with RiverWorks Discovery. The program is held in General James Taylor Park each year at the confluence of the Ohio and Licking Rivers.

In addition to working with students and the general public, FORE helps water quality and education professionals develop training programs focused on emerging water quality issues, such as Harmful Algal Blooms (HABs). In August 2017, FORE partnered with the University of Kentucky Extension service to offer a HAB identification and management workshop

for county extension agents, conservation district staff, and volunteer monitoring program organizers. Workshop participants were able to collect samples and learn how cyanobacterial blooms can affect farming activities and livestock. Participants also learned best management practices for controlling algal blooms, as well as how to identify common species of algae in lakes and farm ponds.

FORE's most rewarding project in 2017 was working with Oak Hills High School student Matt Murphy, who designed a simple but effective program for his school to reduce water consumption. Matt's program, called "Aeration Modification", entailed installing faucet aerators in the bathroom sinks throughout his school. The project won first place in the "Caring for Our Watersheds" contest, sponsored by Nutrien and the Hamilton County Soil and Water Conservation District.

*continued on page 21*



FORE also supports the RiverWatchers volunteer monitoring program for the Ohio River and selected tributaries throughout the Ohio River Basin. The program was originally founded in 1992 by the Ohio River Valley Water Sanitation Commission (ORSANCO), but it is now supported by FORE.

The program includes groups in five Ohio River Basin states. These groups are comprised of students and citizens who are concerned about water quality issues.

Since the program began, thousands of volunteers have collected samples from the Ohio River and its tributaries to test for water quality. Outfitted with chemical test kits, a basic knowledge of water quality, and a desire to learn more about the effects of pollution on rivers and streams, participants collect

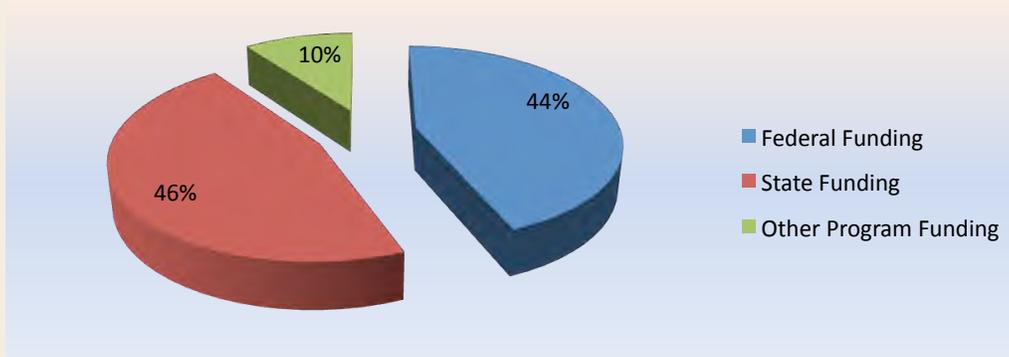
samples and conduct tests to evaluate the health of local waterways in the Ohio River Basin. Data collected during testing are sent to ORSANCO where they are evaluated and entered into a database.

### **2018 Participating RiverWatchers:**

- Warren Co. Conservation District (PA)
- Woodland Hills School District (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)

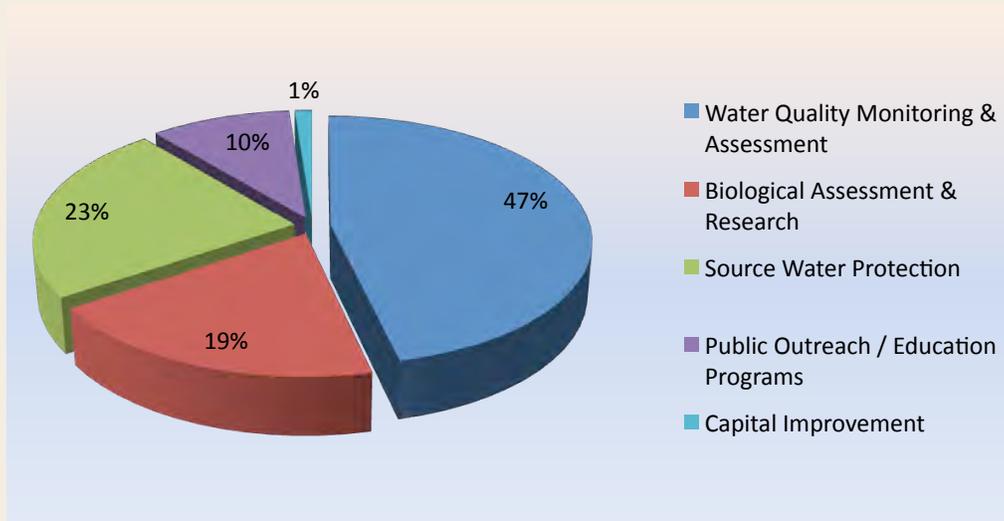


# 2018 Resources Overview



## 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 2018 will be available in February 2019.



# ORSANCO Staff



Richard Harrison,  
P.E., Executive  
Director & Chief  
Engineer



Tracey Edmonds,  
Administrative  
Assistant

## Technical Programs



Jason Heath, P.E.,  
BCEE  
Technical Programs  
Director



Sam Dinkins,  
Technical  
Programs  
Manager



Ryan Argo,  
Technical  
Programs  
Manager



Stacey Cochran,  
Environmental  
Scientist III



Eben Hobbins,  
Environmental  
Scientist III



☀️  
Greg Youngstrom,  
Environmental  
Scientist III



Travis Luncan,  
Environmental  
Chemist/Organics  
Detection System



☀️  
Lila Xepoleas  
Ziolkowski,  
Analytical Chemist,  
Quality Assurance



☀️  
Rob Tewes,  
Senior Biologist



Bridget  
Borrowdale,  
Aquatic Biologist



Daniel Cleves,  
Aquatic Biologist

## Administrative Programs & Human Resources



David Bailey,  
Director of  
Administration &  
Human Resources



Adam Scott,  
Data Systems  
Administrator



☀️  
Donna Beatsch,  
Data Processing/  
Accounting  
Specialist, Part-time



Joe Gilligan,  
Comptroller



Lisa Cochran,  
Communications  
Coordinator



Melissa Mann,  
Public  
Information/  
Education  
Specialist



Matt Glazer,  
Building  
Maintenance,  
Part-time

## FORE



Heather Mayfield,  
Executive Director



## ☀️ Staff Milestones

Donna Beatsch - 45 years

Greg Youngstrom - 15 years

Lila Xepoleas Ziolkowski - 15 years

Rob Tewes - 10 years



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Ronald R. Potesta  
President, Potesta  
and Associates  
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**Executive Director  
and Chief  
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Richard Harrison,  
P.E.



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Alec Messina  
Director,  
Illinois EPA



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Indiana Dept. of  
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Environmental  
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Austin Caperton  
Cabinet Secretary,  
Department of  
Environmental  
Protection



West Virginia  
David Flannery  
Steptoe &  
Johnson, PLLC



Federal  
George  
Elmaraghy



Federal  
Tom FitzGerald  
Director, Kentucky  
Resources Council

\*As of June 30, 2018. A current list of ORSANCO's Commissioners is available at [www.orsanco.org](http://www.orsanco.org).





### ***Special Recognition***

Ross Wales, Taft Stettinius & Hollister LLP, was honored at the October 2017 Commission Meeting for 10 years of service as legal counsel to ORSANCO. Ross started with Taft in 1974 and most recently served as chair of the firm's International practice. In 2015, he was honored as "Lawyer of the Year" by Cincinnati International Trade and Finance Law. We congratulate Ross on his retirement and commend his commitment to the environment and cleaner streams in the Ohio River Basin, and we welcome Aaron Herzig as his replacement to ORSANCO's legal counsel in 2018.



# **ORSANCO**

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