

ORSANCO



**Ohio River Valley Water
Sanitation Commission
Annual Report 2015**

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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 2015 to:

The Honorable Bruce Rauner
Governor of Illinois

The Honorable Mike Pence
Governor of Indiana

The Honorable Steven L. Beshear
Governor of Kentucky

The Honorable Andrew M. Cuomo
Governor of New York

The Honorable John R. Kasich
Governor of Ohio

The Honorable Tom Wolf
Governor of Pennsylvania

The Honorable Terry McAuliffe
Governor of Virginia

The Honorable Earl Ray Tomblin
Governor of West Virginia

and

The Honorable Barack Obama
President of the United States

*As of June 30, 2015



Chairman's Message

Almost eighty years ago on June 8, 1936, the United States Congress authorized the states along the Ohio River to work together to develop the Ohio River Valley Water Sanitation Compact. This work resulted in the formation of the Ohio River Valley Water Sanitation Commission (ORSANCO) on June 30, 1948.

Article I of the compact established a mutual pledge by each state to work:

"to enable each such State to place and maintain the waters of said basin in a satisfactory sanitary condition, available for safe and satisfactory use as public and industrial water supplies after reasonable treatment, suitable for recreational usage, capable of maintaining fish and other aquatic life, free from unsightly or malodorous nuisances due to floating solids or sludge deposits, and adaptable to such other uses as may be legitimate."

As stated in Article VI:

"The guiding principle of this Compact shall be that pollution by sewage or industrial wastes originating within a signatory State shall not injuriously affect the various uses of the interstate waters as hereinbefore defined."

The immensity of the challenge in 1936 was clear:

"WHEREAS, The rapid increase in the population of the various metropolitan areas situated within the Ohio drainage basin, and the growth in industrial activity within that area, have resulted in recent years in an increasingly serious pollution of the waters and streams within the said drainage basin, constituting a grave menace to the health, welfare and recreational facilities of the people living in such basin, and occasioning great economic loss; and WHEREAS, The control of future pollution and the abatement of existing pollution in the waters of said basin are of prime importance to the people thereof, and can best be accomplished through the cooperation of the States situated therein, by and through a joint or common agency..."

I am happy to report that through the combined efforts of everyone in the Ohio River Valley, we have made great progress and the actual challenges that were known in 1936 have been satisfactorily addressed. For example, during 2015, ORSANCO completed the biological assessments of four Ohio River pools, and all four were in passing condition. However, the framers of the Compact had great vision, and

the Compact is just as relevant now as science continues to identify environmental concerns that were not recognized when the document was developed.

ORSANCO, with the support of the eight member states and our federal partners, is a leader in the development of science that identifies and satisfactorily addresses emerging environmental concerns.

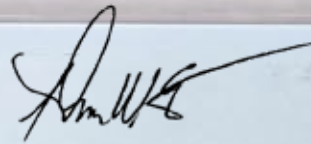
Examples of issues that were not fully recognized when the Compact was developed include mercury concentrations in fish, nutrients, and the contamination of drinking water from chemical spills. During the past year, ORSANCO has completed a number of activities to address these issues:

- To address mercury in fish, ORSANCO developed a report on temporal trends of mercury in Ohio River fish tissue and completed a one-year scientific study of how mercury in the Ohio River bioaccumulates in fish tissue. This study will lay the groundwork for additional scientific studies to set appropriate regulations for the Ohio River.
- To address nutrients, ORSANCO completed a three-year study of the Wabash River to quantify nutrient loadings and to investigate causes of low dissolved oxygen in the Ohio River. The Ohio River Basin Water Quality Trading Project for nutrients was one of three recipients of the U.S. Water Prize for 2015 and held its first auction of stewardship credits for nutrients in the Ohio River Basin. These stewardship credits will not be available to offset future permit requirements, but will lay the groundwork for future interstate nutrients trades. Such trading will allow businesses and communities to meet regulatory requirements in the most efficient manner while in the process providing a higher level of environmental improvement than would be achieved by conventional pollution control.
- To address the contamination of drinking water from chemical spills, ORSANCO completed the renovation of the Organics

Detection System, vastly improving our capabilities of detecting unexpected chemicals in the River so that drinking water providers can take appropriate action to continue to deliver safe drinking water. The Ohio River is the only major water supply with real time monitoring to alert water suppliers of organic chemical contaminants in the untreated water.

ORSANCO's success is a direct result of the high quality of its personnel. During 2015, Peter Tennant, our Executive Director since 2012, retired after 39 years of dedicated service with ORSANCO. I speak for all of the Commissioners in thanking Peter for his long and dedicated service.

Looking forward, ORSANCO has selected Richard Harrison as Executive Director to lead us into the future. Please join me in welcoming Richard into our organization.



Thomas W. Easterly, Chairman



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

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

At the heart of the program is communication; communication among and between drinking water utilities, communication among and between industries, and communication among and between the multiple states and 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 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. It is one of the oldest committees of the Commission, starting in 1952, and its members 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 chemicals. Many of these same utilities participate in other water quality monitoring programs undertaken or sponsored by the Commission.

Industry Outreach

Part of ORSANCO's mission is to communicate the programs and experiences of the Commission with a wide range of industry groups. This past year, source water protection staff

provided presentations to numerous industry and regulatory groups. This communication educates others and promotes the source water protection programs operated by ORSANCO. These presentations provide an insight into the experiences the Commission has in successfully dealing with water quality issues that could compromise drinking water use along the entire length of the Ohio River.

Focus Group Meetings

The Commission has developed and participated in several Ohio River focus groups. These meetings provide a forum for water quality and emergency response agency personnel to meet and discuss Ohio River issues, activities, and concerns. Participants represent a variety of state and federal agencies with local and regional jurisdictions. The meetings are hailed as some of the best and most productive meetings attended by the participants. The additional value lies in providing the opportunity for individuals that work on a common resource, but for different organizations, to meet and discuss common issues and learn about each other's interests, authorities, and capabilities. Once these relationships and understandings are formed, inter-state or inter-agency activities on the common resource such as the Ohio River are accomplished in a much more coordinated manner.

ORSANCO's Source Water Protection Team is frequently asked to participate as guest speakers, panel advisors, and educators in different sectors of the community. As advocates in source water protection, with expertise gained through active involvement in situations and events that threaten Ohio River drinking water use, the Commission has a strong foundation and knowledge base to share with others and welcomes the opportunity to facilitate, partner, and present information whenever possible.

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This past year, ORSANCO's Source Water Protection Team presented to the following groups:

Emergency Response Groups:

- EPA Region 4 Regional Response Team
- Ohio River Emergency Response Coordinators Group
- Ohio-West Virginia-Kentucky Tri-State Spill Response Workgroup
- Cincinnati Area Ohio River Focus Group
- Local Emergency Planning Committees (Clermont Co., Hamilton Co., Brown Co.)
- Ohio-West Virginia Ohio River Focus Group
- Duke Energy Emergency Response Debriefing Workgroup
- Cincinnati Area Maritime Security Committee
- WVDEP/EPA Region 3/WV American Water

Public Health Departments:

- Indiana Environmental Health Department
- Brown County Environmental Terrorism and All Hazards Committee
- Ohio Environmental Health Association
- Northeast Ohio Water Environment Association - Industrial Waste Committee

Science, Technology, Engineering and Math:

- Lloyd Memorial High School
- Greater Cincinnati Water Works
- Young Women Engineers
- Thomas More College Biology Field Station

Other Organizations:

- American Water Works Association
- Northern Kentucky Society of Professional Engineers
- International Water Association
- Interstate Council for Water Policy
- Greater Cincinnati and NKY Drinking Water Utility - Source Water Protection Workgroup
- Association of State Drinking Water Administrators
- Greater Cincinnati Hazardous Materials Control Committee



ORSANCO's Source Water Protection Team members were also able to participate in US Coast Guard Training exercises and spill response debriefing meetings held by Clermont County LEPC and Duke Energy. In addition, staff's river knowledge and expertise supported efforts of US EPA and Ohio EPA in conducting an on-river inventory of available support locations for inclusion in a tactical spill response plan for the Cincinnati area.

Additionally, the team assisted in the development of an informational video, which details ORSANCO's unique and one-of-a-kind volatiles monitoring system, the Organics Detection System (ODS). A link to this video can be found at www.orsanco.org and at ORSANCOchannel on YouTube. A banner was also created highlighting the mission of the ODS for environmental events and conferences. Other unique videos produced by ORSANCO staff are featured on the ORSANCOchannel, including a time lapse video covering 15 miles of the Ohio River through Cincinnati.

Guarding Against Contaminants

Spill Reporting

ORSANCO provides notification of spills, releases, and other incidents that could adversely affect water quality to state agencies and drinking water utilities. ORSANCO staff manages this notification program around the clock. Incident reports from spill events are required, by law, to be reported to the US Coast Guard's National Response Center (NRC). NRC Incident Reports are received by ORSANCO from every county along the Ohio River and selected counties on industrialized tributaries. These reports are evaluated upon receipt for their potential to impact Ohio River water quality and the drinking

water use. In 2014, staff reviewed 689 Incident Reports and communicated necessary information to state agencies and drinking water utilities.

Spill Modeling

The Ohio River is heavily used for a wide variety of activities including transportation, recreation, public and industrial water supplies, and wastewater disposal. With significant amount of activity on the river comes the potential for accidental releases of contaminants into the river. ORSANCO plays a vital role in responding to these incidents to provide water users with timely information regarding the location and concentrations of the spilled materials. In addition to providing on-river monitoring support to state and federal emergency response agencies and water utilities, the Commission utilizes a computer spill model to predict the time-of-arrival and concentrations of spilled contaminants at key points downstream of the incident location.

Recent spill events, however, highlighted some limitations of the Commission's spill tracking model. Particularly, the model was geographically limited to modeling short reaches of the river and lacked the ability to simulate spill plumes on tributaries to the Ohio River. Fortunately, US EPA graciously stepped in to provide funding and support to upgrade the spill model. Additional technical support and guidance was also provided by the US Army Corps of Engineers and the National Weather Service. Phase I of the model upgrade is complete, which includes enhancements that allow modeling of extended reaches of the Ohio River and simulation of spill movement on a number of major tributaries. The second and final phase of the effort will include further model refinements and linking the spill tracking model to geospatial databases to improve ORSANCO's spill response capabilities.

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Duke Oil Spill

In August 2014, a release of approximately 10,000 gallons of diesel fuel occurred from Duke Energy's Beckjord Electric Generating station, located at Ohio River mile 453 in Ohio. Greater Cincinnati and Northern Kentucky drinking water intakes are located at Ohio River mile 463 in Kentucky. The spill occurred sometime before midnight on August 17th, and ORSANCO staff immediately notified both drinking water utilities of the event.

The following day, ORSANCO staff conducted on-river sampling to protect the drinking water utilities. River water samples were collected for analysis by the ORSANCO

Organics Detection System (ODS). Fortunately, due to calm weather conditions, warm temperatures, and sunny skies, no volatile organic compounds were detected in the water samples collected between the spill site and the drinking water intakes. Cleanup contractors worked to collect, contain, and remove oil from the surface of the river in selected locations downstream of the spill site. During this event, ORSANCO staff participated in the Unified Command headquartered at the Beckjord Power plant. The Unified Command is responsible for overall management of the incident. In addition, staff arranged for Northern Kentucky Water District and Greater Cincinnati Water Works plant personnel to participate in the

Unified Command as well. This opportunity provided valuable insight into the workings of the Incident Command System and allowed for Unified Command members to interact with the drinking water utilities as a team to protect public health.

Harmful Algal Blooms

The Ohio River collects the drainage from a watershed of approximately 204,000 square miles. Contributions from every activity within that watershed have the opportunity to ultimately end up in the Ohio. Arguably the most common and abundant watershed-based contaminants that reach the Ohio River are nutrients. Nutrients, including nitrogen and phosphorus compounds, come from a

variety of sources, most of which are uncontrolled. As such, nutrients have the ability to impact water quality on the Ohio River by supporting algal populations, some of which can grow rapidly and uncontrollably. Termed "algal blooms," the overabundance of certain types of algae can wreck havoc on drinking water treatment. Some algal blooms can cause significant taste and odor problems and increase treatment costs significantly. 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.

Wheeling Drinking Water Plant

In June 2015, the Wheeling Water Department brought their new Ohio River drinking water plant online. It is the first membrane filtration drinking water plant on the Ohio River. Construction began in July 2013, with the city electing to continue their use of the Ohio River as their primary drinking water source. Costing approximately \$31 million, it is the single largest drinking water plant project in West Virginia. Wheeling will retire its former Ohio River drinking water plant after 90 years of service.



A Water Monitoring Pioneer: In Memoriam of Bill Klein

Bill Klein began his ORSANCO career in 1957 as a chemist-biologist who helped design the Robot Monitor, ORSANCO's first electronic monitoring system to analyze water quality and pollution data at 14 stations along the Ohio River. The Robot served as an early warning system to help detect hazardous chemical spills. Bill retired from ORSANCO in 1987 after 30 years of service, including serving his last six months with the Commission as Executive Director. Even after his retirement, Bill maintained a close relationship with ORSANCO and its activities; in 2008, he and his wife generously donated a wall fountain to celebrate ORSANCO's 60th anniversary. The fountain is displayed at the entrance of ORSANCO's headquarters in Cincinnati, Ohio. He will be greatly missed and fondly remembered for his dedication to the Commission and to water quality in the entire Ohio River Watershed.





Protecting Aquatic Life

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 Index

In 1993, ORSANCO developed and implemented an assessment technique to compare fish and environmental data sampled from the various navigational pools of the Ohio River. In 2003, ORSANCO developed the Ohio River Fish Index, which was subsequently modified in 2008 to become the mORFin (modified Ohio River Fish Index). Using the collected data, the index assigns scores to rate the relative condition of fish communities among the pools. Each year, ORSANCO Biological Crews collect data from

up to four navigational pools using a random, probability-based design that selects 15 sampling locations within each pool. Fish are captured, identified, measured, and inspected prior to release. The data obtained are converted into multiple metrics (e.g. diversity, abundance, pollution tolerance, etc.) that are added together for each site and compared to previous results in order to calculate mORFin scores.

In 2014, ORSANCO Biological Crews assessed Belleville, Markland, McAlpine, and Olmsted pools and will be sampling Montgomery, Racine, and John T. Myers pools in 2015. Of the four pools sampled in 2014, Belleville was found to be in "fair" condition, Markland and Olmsted pools were found to be in "good" condition, and McAlpine was found to be in "very good" condition. Over the years, the various pools have generally ranked from "fair" to "very good." To date, after two complete cycles, no pools have ranked as "poor" or "very poor."

Ohio River Macroinvertebrate Index

ORSANCO biologists have collaborated extensively with outside agencies on the development of a macroinvertebrate (macro) index since 2004. In 2007, ORSANCO was awarded a US EPA Environmental Monitoring and Assessment Program (EMAP) cooperative agreement to enhance the work on the development of the index. The agreement allowed for additional environmental data (e.g. water quality, sediment quality, and nutrient levels) to be collected alongside routine macro samples. With these data, ORSANCO was able to better identify and classify the environmental stressors affecting macro assemblages in the Ohio River, which was an essential first step in developing a biological index. After the EMAP co-op concluded, the Ohio River Macroinvertebrate Index (ORMIn) was created and tested in ORSANCO's annual pool assessments. In addition, an ongoing partnership with the United States Army Corps of Engineers, Louisville District, has enabled ORSANCO to continue collecting the essential environmental data from several pools within their jurisdiction in the last few years. This information has given ORSANCO the opportunity

to test and validate the newly developed ORMIn before its incorporation in annual assessments. After the past several years of successful testing, ORSANCO's Technical Committee approved the use of the ORMIn, combined with the already existing mORFIn, in future 305(b) assessments beginning in 2016. Any future pool assessments will therefore be dependent on the observed condition of both the macroinvertebrate and fish assemblages.

Ohio River Invasive Species Updates

The Ohio River has been subject to invasions from exotic aquatic species since at least the mid to late 1800's when common carp were first encountered in the basin. Since that time, numerous other aquatic animals and plants that have the potential to have dramatic negative impacts on native aquatic species have made their way into the river. In addition to common carp, the most notable animals to become established in the Ohio River include zebra mussels, Asiatic clams, rusty crayfish, striped bass and their hybrids, white perch, goldfish, and grass carp. More recently (since the late 1990's), two additional carp species, bighead carp and silver carp, and

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a submerged aquatic plant, hydrilla, have all been currently experiencing population explosions in the river at the expense of native species. In addition, another exotic fish species, round goby, was collected in 2014 from the Ohio River Basin for the first time.

Bighead and Silver Carp

Genetic material suggesting the presence of both silver and bighead carp has been regularly collected from the uppermost reaches of the Ohio River main stem over the past year. In addition, several bighead carp specimens were observed in a pay lake within the Ohio River Basin portion of Pennsylvania. Despite these

findings, ORSANCO crews did not observe any records of either carp species above Meldahl Locks and Dam, which represents the furthest upstream collection site to date. Furthermore, in limited sampling of direct tributaries in May 2015 in the lower Markland pool, very few adult silver carp were encountered, and no bighead or juvenile silver carp were observed.

Round Goby

In 1990, this diminutive Eurasian fish species was recorded for the first time from North America in the St. Clair River along the Michigan-Ontario border. Since that time, it has spread dramatically throughout the



Great Lakes and their tributaries, directly causing decline of native fish species where they become abundant. Round gobies are aggressive feeders known or suspected to consume many species of small fish and eggs of various species including walleye and lake trout. In August of 2014, the first known records of this species in the Ohio River Basin were encountered in a tributary to French Creek in the Allegheny River system of western Pennsylvania. State and federal agencies will continue to closely monitor the region to determine if the species has become established in the basin.



A Special Aquatic Event: Electrofishing with Kentucky Congressman Thomas Massie & Seiko Ito

On November 7, 2014, ORSANCO staff had an opportunity to conduct an electrofishing demonstration for Kentucky Congressman Thomas Massie, his two sons, and staff member Bob Porter, as well as Kentucky Commissioner Ron Lovan, and Seiko Ito, an employee from the Tokyo Metropolitan Government Waterworks in Japan. Seiko was on tour to review water management practices in various cities, including Cincinnati, New Orleans, and London. The demonstration was conducted at Thomas More College's Ohio River Biological Field Station near California, KY on an unseasonably cold day. After a brief introduction to ORSANCO, the Ohio River, its fish fauna, and stressors to the river, our guests bundled up and loaded onto our electrofishing boats. The biologists then conducted a quick hands-on demonstration of what they do on a regular basis, enabling our guests to a first-hand introduction of a small sampling of the biodiversity in one segment of the Ohio River.

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

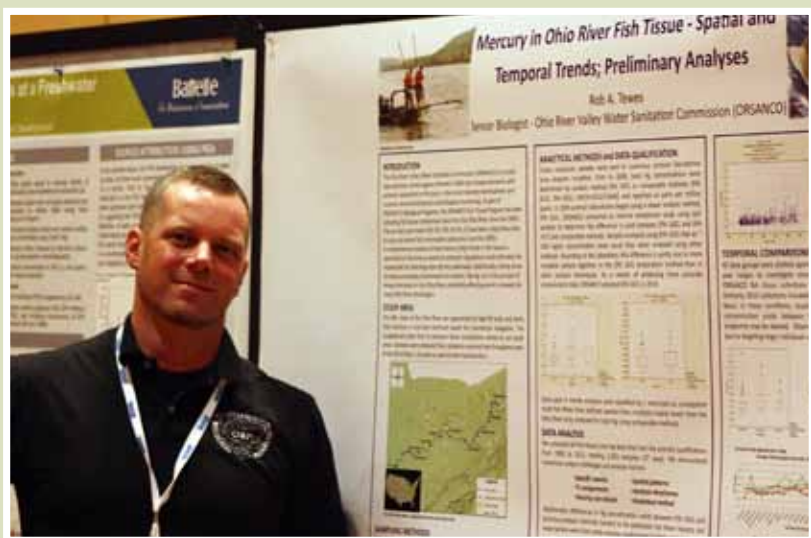
includes links to individual state pages and provides information on the health benefits of consuming fish as well as tips on how to properly prepare fillets. The site details information about the FCAW, specific contaminants, and how to follow issued advisories.

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 based on 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.

Mercury Trends over Time

A draft report titled *Mercury Temporal Trends in Ohio River Fish Tissue* has been completed and is currently under review. This report details changes in total mercury concentrations in fish tissue from 11 taxa from 1983 to 2010. Results indicated possibly increased mercury levels for some top predator species. Findings were consistent with other studies analyzing temporal trends in Ohio River fish tissue as well as other studies from North America. Downward trends in some omnivorous species were consistent with other studies and may be due to effective reductions of mercury emissions from coal-fired power plants through tightened regulations in the United States. Closer examination of why trends may be evident in some species and trophic groups, but not others, is warranted. An important next step will be to investigate temporal trends in total mercury and methylmercury in surrounding water.



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 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.

In 2015, ORSANCO monitored for the following events:

The Great Ohio River Swim (Cincinnati, OH)
Cincinnati Triathlon (OH)
Louisville Triathlon (KY)
Ironman Louisville (KY)

Bacteria monitoring data and updates regarding water quality are available to the public on ORSANCO's website at www.orsanco.org. ORSANCO also collaborated with the Cincinnati Metropolitan Sewer District (MSD) and Sanitation District No. 1 of Northern Kentucky (SD1) to develop the Recr8OhioRiver application to help the public make informed decisions about recreating on the Ohio River. They worked with local water quality experts and water sports enthusiasts to help fine-tune and test both the application and website. Recr8OhioRiver is a free wireless device application, and the information is also available online at www.recr8ohioriver.org.

Recr8OhioRiver helps recreational users make informed decisions about where and when to boat, fish, paddle and engage in other water sports on the Ohio River. The application not only focuses on water quality, river conditions, and weather, but it also provides information about local marinas, fish advisories, and boat traffic.

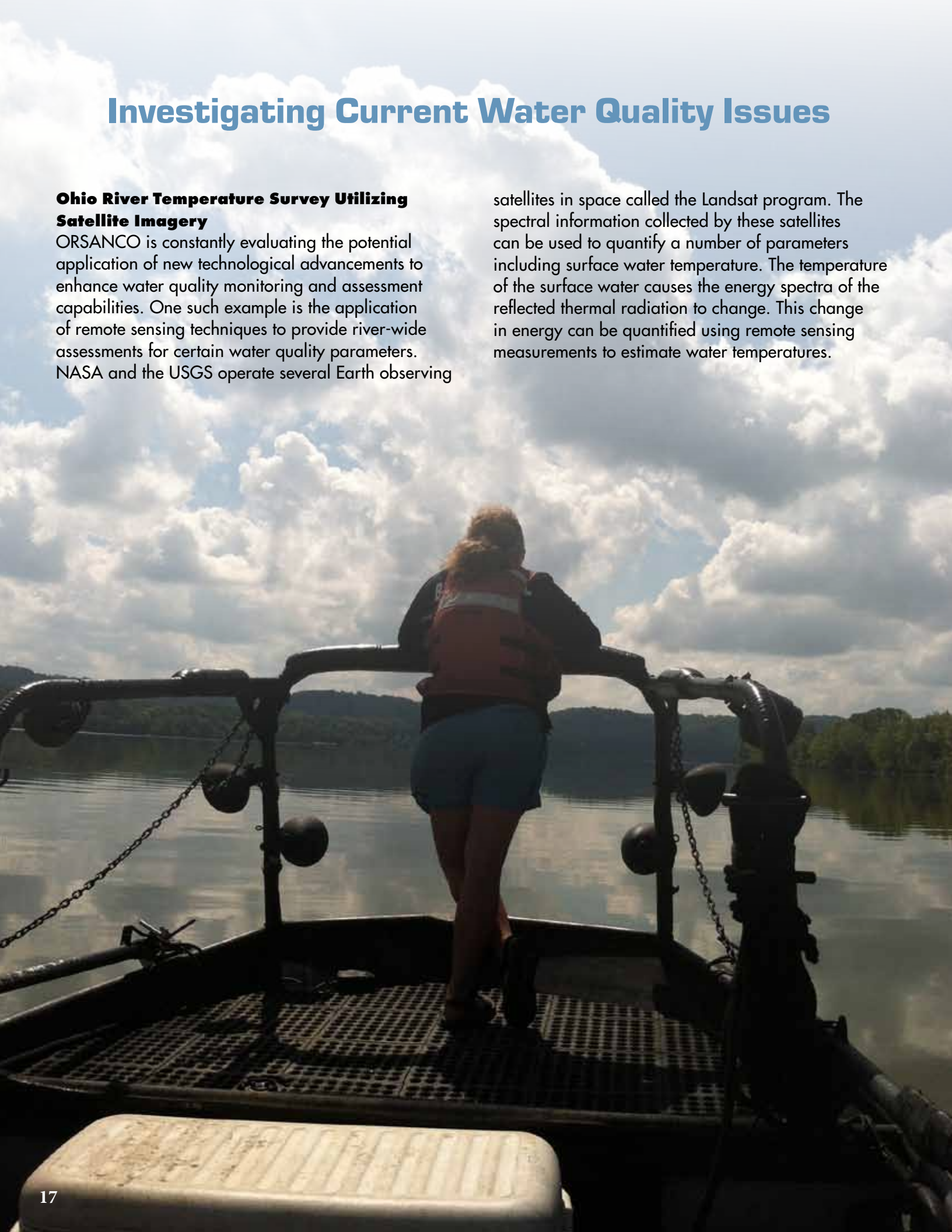


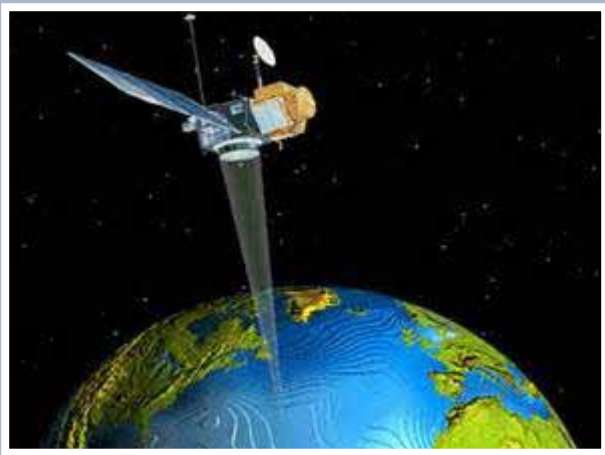
Investigating Current Water Quality Issues

Ohio River Temperature Survey Utilizing Satellite Imagery

ORSANCO is constantly evaluating the potential application of new technological advancements to enhance water quality monitoring and assessment capabilities. One such example is the application of remote sensing techniques to provide river-wide assessments for certain water quality parameters. NASA and the USGS operate several Earth observing

satellites in space called the Landsat program. The spectral information collected by these satellites can be used to quantify a number of parameters including surface water temperature. The temperature of the surface water causes the energy spectra of the reflected thermal radiation to change. This change in energy can be quantified using remote sensing measurements to estimate water temperatures.





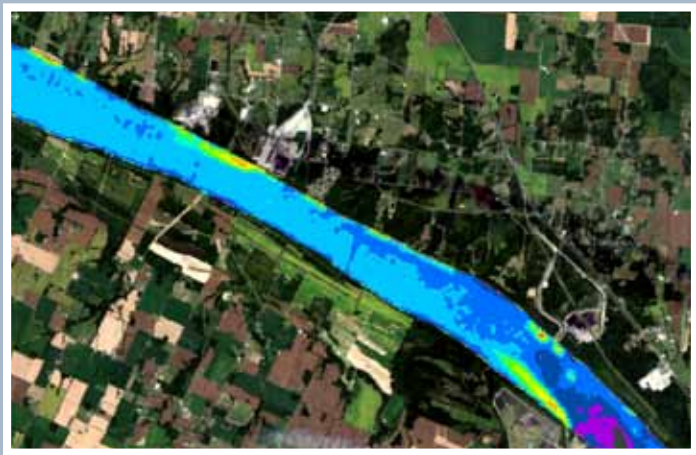
All of the information is available online to the public for free. Landsat 7 and 8 offers eight-day repetitive earth coverage at a 30 meter spatial resolution. On days when there is little cloud coverage, these satellites can determine the surface temperature of the Ohio River to within a couple of degrees, which can be verified through ground truthing. This method allows ORSANCO and other researchers to view the river holistically, rather than from a limited number of monitoring locations.

ORSANCO recently used this approach to evaluate the river in comparison to the Commission's Ohio River temperature criteria. Results from 2014 indicated there were no exceedances of the human health temperature criterion, and there was only one instance where the aquatic life temperature criterion was exceeded. ORSANCO will continue to explore other potential applications of remote sensing technology to enhance the Commission's monitoring and assessment programs.

Water Resources Initiative

A growing understanding of the interconnectedness of water quality and water quantity led the Commission to establish the Water Resources Committee in 2010 to guide the development of water resources programs and to recommend appropriate action to the Commission with respect to water resources management and policy issues. Through the committee's leadership, ORSANCO developed the Water Resources Initiative in 2012; a three-year, externally funded effort to characterize key water resource issues in the Ohio River Basin and to explore the potential role the Commission could play in addressing these issues in the future.

In this final year of the Water Resources Initiative, several water resource characterization reports were completed. These reports include an inventory of state



and federal water resource laws and regulations, an historical look at how water is used in the basin, and a review of existing inter-basin water transfers and the policies in place to manage these transfers across watershed boundaries. The fourth and final report of the initiative, which characterizes water resource aspects of shale gas development in the Marcellus and Utica Shale plays, will be finalized in the second half of 2015. Though the three-year effort of the Water Resources Initiative is coming to an end, the Commission will continue to explore opportunities to facilitate discussions among state and federal water resource agencies to promote effective management of the water resources in the Ohio River Basin.

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

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

In April, the Ohio River Basin Trading Project was awarded the U.S. Water Prize. The Water Prize honors individuals, institutions, and organizations that have made an outstanding achievement in the advancement of sustainable solutions to our nation's water challenges.



Wabash River Nutrient Monitoring

Under a grant from the Indiana Department of Environmental Protection (IDEM), ORSANCO engaged in a study of the nutrient output from the Wabash River. The initial period of this project began in July 2010 and ended in September 2011. The project was reauthorized beginning in January 2012 and was completed in January 2015.

The data from this project was used to demonstrate that the Wabash River is a major contributor of nutrients to the Ohio River and contributes to the hypoxic zone in the Gulf of Mexico. The data collected were also used to identify the causes of low dissolved oxygen in the Ohio River. ORSANCO will work with the State of Indiana to see how this

information can be used in conjunction with their statewide nutrient reduction plan.

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 has 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. These loggers were placed alongside macroinvertebrate samplers in the Belleville pool and the three lower river pools

thanks to contributions from the Louisville District of the US Army Corp of Engineers. Additionally, water samples were obtained for nutrient and chlorophyll-a analysis at each of these sites.

ORSANCO staff is currently analyzing the 2014 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 in the 2015 field season.



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

From 2002 to 2014, ORSANCO's 2,200 gallon mobile aquarium has put local fish species on display at approximately 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 various other local waterways support much more diverse and healthy fish populations than perceived by the public and are therefore resources worth protecting.

In particular, ORSANCO staff has striven to convey this message to the youth of the Ohio River Basin through displays at various events targeting school-aged children. Some of these events since 2002 are listed below. From July 2014 to June 2015, the aquarium was displayed at three of these events (Adventures in Water Festival, Kids Expo, and AEP's Earth Day Celebration).

*Kids Environmental Awareness
Lawrenceburg, IN*

*Earth Day at YMCA Camp
Princeton, IN*

*Elementary School Display
Ashland, KY*

*Adventures in Water Festival
Louisville, KY*

*Paddlefest Kids Outdoor Adventure
Expo Cincinnati, OH*

*AEP's Earth Day Celebration
Conesville, OH*

*Brown County 4-H Week
Georgetown, OH*

*School Environmental Days
Moundsville, WV*



In addition to events targeting school children, the aquarium is often displayed at various festivals and other celebrations, often located in cities situated on the banks of the Ohio River. One of the largest events where the aquarium is displayed is at the BBQ on the River festival in Paducah, KY held in late September each year, which has an estimated annual attendance of 40,000 people. Thanks to sponsorship of the Jackson Purchase Foundation, the aquarium has been a major presence at the festival annually since 2008. This display is a favorite for ORSANCO biologists, not only for the ribs, but also due to the rare fish encountered while electrofishing for the event. BBQ on the River is the only event at which ORSANCO biologists are regularly able to display bowfin, and sampling has also resulted in ORSANCO's only recorded encounters with Atlantic needlefish (in 2009) and striped mullet (in 2011). In addition, an American eel, another secretive and rare inhabitant of the river, was displayed at the event in 2014.

The aquarium was also displayed in New Richmond, OH for the city's bicentennial celebration in September 2014 and in May 2015 for the annual Evansville Streets Alive! festival.

During the spring of 2015, staff oversaw major renovations to fix aging components of the mobile aquarium. This was a long overdue task that was done to ensure that the aquarium could be displayed prominently at Ohio River Basin events for years to come.

Between July 2015 and June 2016, it is anticipated that the aquarium will be displayed at the following events in the Ohio River Watershed:

ALCOSAN Open House

Pittsburgh, PA

BBQ on the River

Paducah, KY

Covington Bicentennial & MLB All-Star Game

Covington, KY

Water for Life

Newport, KY

Earth Day

Cincinnati, OH

AEP's Earth Day Celebration

Conesville, OH

Paddlefest Kids Outdoor Adventure Expo

Cincinnati, OH

Inland Waterways Festival

Marietta, OH

Rural Heritage Festival

Ripley, OH



RIVER SWEEP

For 26 years, ORSANCO has coordinated the Ohio River Sweep, a volunteer opportunity to collect trash along the shores of the Ohio River and many of its tributaries. Each year, thousands of volunteers from Pittsburgh, PA to Cairo, IL participate in River Sweep. The multistate cleanup promotes environmental stewardship of the Ohio River, and the event is possible due to the support of many state and county coordinators throughout the Ohio River Basin.

Prior to the cleanup event, ORSANCO coordinates an Ohio River Sweep art contest. Students in grades kindergarten through twelfth grade submit artwork which will be used to promote the Ohio River Sweep. The winning artwork is printed on Ohio River Sweep posters, brochures, and T-Shirts.

The 2015 poster winner was Brooke King from Ripley, WV, and the T-Shirt design winner was Lilah Gagne from Athens, OH. Both students are pictured with their art teachers. In addition, an Ohio River Sweep



photo by Jerry Schulte (left) was selected by popular vote as the American Rivers' National River Cleanup Photo Contest winner for 2015. Photos are submitted from cleanup locations and volunteers of any cleanup registered with the American Rivers' National Cleanup program throughout the United States.

**A Coordinator of Distinction:
Stephanie Hellman,
Jefferson County, Indiana**

Stephanie has been involved with the Ohio River Sweep since its inception. In 1989, she became known in Madison as the Recycling Queen. Not wanting to wait for the state to mandate recycling, she began a newspaper drop-off on the site of an empty tobacco warehouse.



That led to R-Days in Madison and finally a curb-side pick up program. Because of her environmental awareness, she was asked to coordinate the first River Sweep in Jefferson County, Indiana.

Stephanie has a dedicated group of volunteers who gather each year to clean the riverbanks. Two of Stephanie's friends show up every year to help sign in volunteers. Indiana-Kentucky Electric Corporation (IKEC) donates funds for fruit, donuts, and water, and the head of their Environmental Department participates with a truck to move trashbags from the curb onto city trucks. Approximately 70 volunteers work at her site every year, including scout and church groups from the area. When June rolls around every year, folks in Madison who want to clean up the river know exactly who to call!

2014-2015 RiverWatchers

- Clymer Central School (NY)
- Warren Co. Conservation Dist. (PA)
- Woodland Hills School Dist. (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)

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; since that time, the program has expanded to include groups in six states throughout the Ohio River Watershed. These groups, which include many schools, collect water quality data throughout the year and submit these results to ORSANCO. RiverWatchers data are available on ORSANCO's website.



**A RiverWatchers Star:
Cincinnati State Technical
and Community College**

Dr. Ann Gunkel and her students in the Environmental Engineering Technologies (EVT) Program at Cincinnati State Technical & Community College have been sampling water for 22 years. The curriculum prepares students to work in the environmental field including water treatment and management. Many of the courses include hands-on field experiences, so it was a natural fit to join ORSANCO's RiverWatchers Program. Students in the Environmental Club decided it would be a good opportunity to begin volunteering to test the Ohio River water at the mouth of the Licking River. They decided to meet on Saturday mornings or after classes during the week. As time progressed, the students and faculty saw RiverWatchers as a very important learning experience and incorporated the testing into several of the EVT courses. Testing is done throughout the year, in all types of weather, providing students with real life situations that may be encountered once they are actively working in the environmental field.



HACH water testing kits are used with the RiverWatchers Program, as well as in many of the EVT courses, to determine water quality. As a result, the EVT Program has developed a relationship with the HACH Company, meeting with representatives during the biennial Environmental Mountain Ecology course. This is a field course held in Colorado where students learn about water issues unique to that area of the country. Part of that experience includes using HACH test kits to analyze waters in mountain lakes and streams under the guidance of the HACH team. It is an invaluable experience to see how lessons learned in the classroom are applied in the real world.

Water quality and testing is a major emphasis throughout the EVT curriculum. Another way it is reinforced is through the annual ASCE (American Society of Civil Engineers) Environmental competition, where teams of college students from across the region create water treatment systems using everyday materials. The goal is to produce an effluent of acceptable water quality within given parameters. Once again, HACH kits are used to determine the effectiveness of the design.

Cincinnati State is typically the only two-year college participating in

these events, yet they have earned first place most years!

It is through experiences like ORSANCO'S RiverWatchers Program that the EVT students become familiar with water testing, develop valuable real world skills, and learn the importance of constant vigilance in protecting our most valuable resource, water.

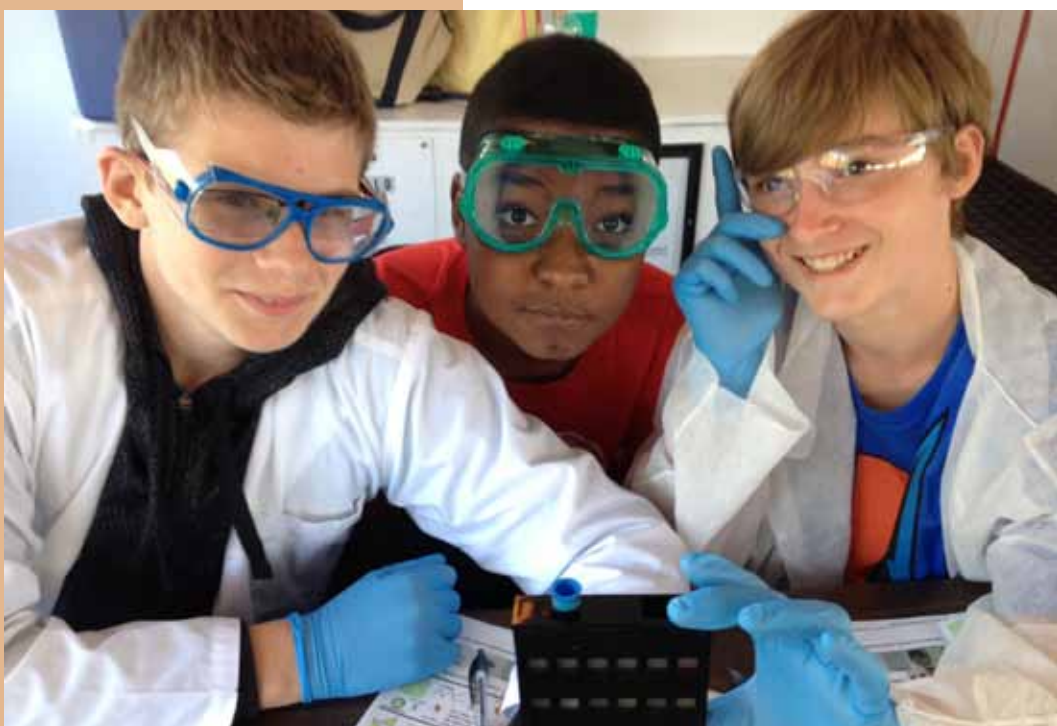
Ann and her students clearly define how successful research is attained through the cooperation of many individuals and organizations... working together to protect our watershed within the Ohio River Basin.



THE FOUNDATION FOR OHIO RIVER EDUCATION

Since 2004, the Foundation for Ohio River Education (FORE), ORSANCO's non-profit education foundation, has reached thousands of teachers, students, and families in the Ohio River Watershed through programs that get people engaged in preserving the cultural, ecological, and economic value of our rivers.

FORE's flagship program is the River REACH program, which stands for River Research, Education and Adventure Charters. The program, operated in conjunction with Queen City Riverboats, is a unique floating classroom experience for elementary through high school students in Southwest Ohio, Northern Kentucky, and Southeast Indiana. Students participating in the program take a hands-on cruise aboard a riverboat and spend the day collecting



water samples and studying aquatic organisms, including fish, plankton, and aquatic invertebrates, that are used to determine water quality in the river. In addition to the river cruise, the program also includes an award-winning classroom curriculum that incorporates professional development training for teachers.

Over 1,425 students and teachers participated in the program over the past year, including a teacher from Connor Middle School, who said: *"I cannot even begin to thank you and your staff for all the hard work you did in preparing, setting up, discussing, and carrying out your plan to accommodate our group. The chaperones told me over and over what a great group you all are and what a fantastic job you did. I wholeheartedly agree!"* Approximately 63% of the schools that participated in the River REACH program over the last year were disadvantaged, and FORE takes great pride in having the opportunity to work directly with some of the most vulnerable children in the Cincinnati area.

FORE reached an additional 3,000 people last year through outreach programs, including festivals, workshops, and professional development workshops for teachers. These events, in addition to promoting river stewardship through fun activities, also help the local community understand ORSANCO's role in protecting water quality in the Ohio River.

ADDITIONAL COMMUNITY OUTREACH EVENTS

In the Fall of 2014, ORSANCO biologists partnered with the University of Cincinnati to host ecology students and University of Cincinnati educators in field exercises. Biologists led two lab sections (~20 students each) focusing on modern field sampling techniques. The outings were a great success, and students were able to participate in a variety of sampling techniques, including water quality testing using hand-held meters, boat electrofishing, navigation, site indexing, and macroinvertebrate kick sampling. Students were shown how each piece of gear is employed to gather a comprehensive suite of data used to characterize the biological condition within a specific river section at the site level. The final message of the course was demonstrating how the equipment, techniques, and protocols used by ORSANCO biologists are all tools necessary for the Commission to meet compact requirements.

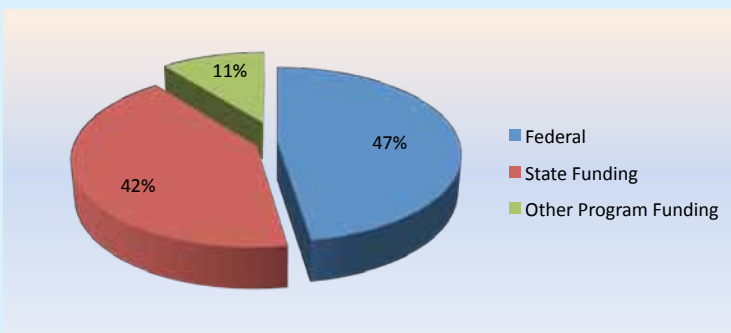
ORSANCO scientists, Stacey Cochran, Rob Tewes, and Lila Ziolkowski, had the opportunity to serve as science fair judges at several local schools in the Cincinnati area, while Jeff Thomas was invited to speak to a sixth grade science club about the importance of mussels in the Ohio River. Additionally, Lila, Stacey, and Travis Luncan represented both ORSANCO and the professional scientific community at career-based events focusing on Science Technology Engineering and Mathematics (STEM). Rob also conducted "Career Chat" sessions with local high school students. These events took place at Cincinnati area schools and were successful in generating interest in science careers as well as bringing awareness to ORSANCO's initiatives within the basin.



2015 Resources Overview

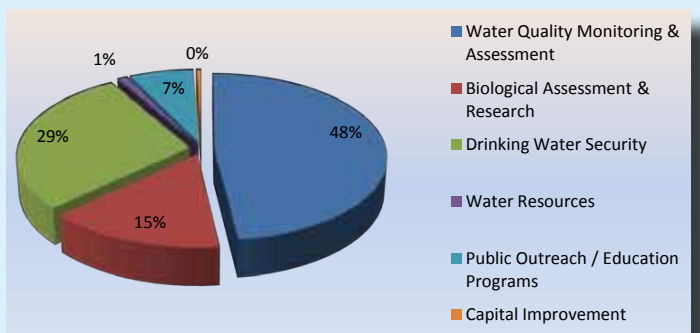
Projected Resources by Major Source

Federal Funding
State Funding
Other Program Funding



Projected Resources by Major Program Area

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



*Audited financial statements for 2015 will be available in February 2016.

ORSANCO Staff

Peter Tennant, P.E., BCEE, Executive Director & Chief Engineer
(July 2014-March 2015)

Richard Harrison, P.E., Executive Director & Chief Engineer
(April 2015-present)

Tracey Edmonds, Administrative Assistant

Technical Programs

Jason Heath, P.E., Technical Programs Manager

Eben Hobbins, Environmental Specialist

Greg Youngstrom, Environmental Specialist



Biological & Research Programs

Jeff Thomas, Manager of Biological Programs

Ryan Argo, Senior Biologist

Rob Tewes, Senior Biologist



Source Water Protection & Emergency Response

Jerry Schulte, Manager of Source Water Protection,
Emergency Response & External Relations

Travis Luncan, Environmental Chemist

Lila Xepoleas Ziolkowski, Analytical & Environmental
Chemist

Water Resources

Sam Dinkins, Water Resources Assessment Manager

Steve Braun, Environmental Specialist

Stacey Cochran, Environmental Specialist



Public Information Programs

Lisa Cochran, Communications Coordinator

Melissa Mann, Public Information/Education Specialist

Administrative Programs & Human Resources

David Bailey, Director of Administration & Human
Resources

Adam Scott, Computer Systems Administrator

Donna Beatsch, Data Processing Specialist, Part-time

Joe Gilligan, Comptroller

Matt Glazer, Head of Maintenance, Part-time



FORE

Heather Mayfield, Executive Director

Staff Milestones

David Bailey – 15 years

Jeff Thomas – 15 years

Members of the Commission

Chairman: Thomas Easterly

Vice-Chairman: Douglas E. Conroe

Secretary/Treasurer: C. Ronald Lovan

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

Illinois

Lisa Bonnett, Director, Illinois EPA

Toby Frevert

Phillip C. Morgan

Indiana

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

Thomas Easterly, Commissioner, Indiana Department of
Environmental Management

John Kupke

Kentucky

Leonard Peters, Kentucky Energy and Environment Cabinet

Crit Luallen, Lieutenant Governor

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

New York

Douglas E. Conroe, President, Chautauqua Lake
Association Inc.

Joe Martens, Commissioner, New York Department of
Environmental Conservation

Michael P. Wilson

Ohio

Craig Butler, Director, Ohio Environmental Protection Agency

Stuart F. Bruny

Paul Tomes

Pennsylvania

John Quigley, Secretary, Pennsylvania Department of
Environmental Protection

Charles Duritsa

Greg Phillips, District Manager/CEO, Westmoreland
Conservation District

Virginia

David Paylor, Director, Virginia Department of Environmental
Quality

West Virginia

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

David Flannery, Steptoe & Johnson, PLLC

Ronald R. Potesta, President, Potesta and Associates

Federal

George Elmaraghy, Senior Project Manager, Stantec
Consulting

Tom FitzGerald, Director, Kentucky Resources Council

Susan Hedman, Administrator, EPA Region 5

Special Recognition

In 2015, two Commissioners from Indiana, Joseph Harrison, Jr. (top left) and John Kupke (top right), were appointed to the Commission, and Greg Phillips (bottom left) and Paul Tomes (bottom right) completed their service on the Commission. ORSANCO would like to thank Greg and Paul for their years of dedicated service to the Commission. The Commission would like to welcome Joe and John to the ORSANCO family. We look forward to working together with Joe and John as they represent Indiana on our team of states in the years ahead.



***As of June 30, 2015. An updated list of ORSANCO's Commissioners is available at www.orsanco.org.**

ORSANCO

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