

The State of the Ohio River

A Report of the
Ohio River Valley
Water Sanitation
Commission

ORSANCO





Water Quality Today

One of the most common questions people ask about the Ohio River is “How bad is the water?” Because of the industrial and agricultural nature of the Ohio River Valley, many people have the impression that the river suffers from poor water quality. There are also common misconceptions about which types of pollutants have the greatest impact on water quality. Just how *is* Ohio River water quality, and how has the water quality changed over time?

The Ohio River Valley Water Sanitation Commission (ORSANCO) was created in 1948 to control and abate interstate water pollution in the Ohio River Basin. ORSANCO monitors and evaluates Ohio River water quality on behalf of its member states (Illinois, Indiana, Kentucky, Ohio, New York, Pennsylvania, Virginia, and West Virginia). Every two years, ORSANCO performs a comprehensive assessment of Ohio River water quality called the [Biennial Assessment of Ohio River Water Quality Conditions](#). This assessment evaluates Ohio

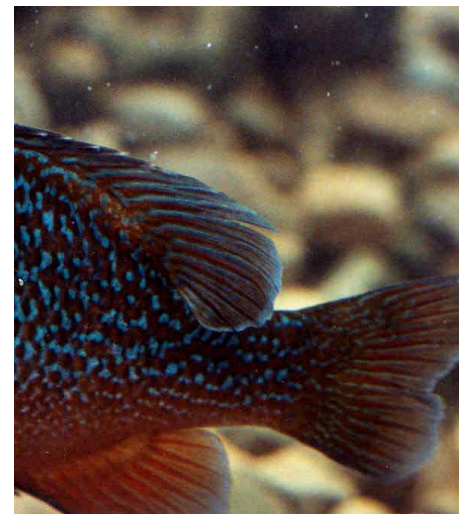
River water quality with respect to four *designated uses*:

- **warm water aquatic life** (fish and invertebrates)
- **public water supply** (the water we drink)
- **contact recreation** (swimming, water skiing)
- **fish consumption** (are the fish safe to eat?)

The water quality of the Ohio River certainly has improved over time. Until the 1950s, the river was virtually an open sewer used to dispose untreated human waste and industrial process water. Today, thanks to the work of ORSANCO, the states, the U.S. Environmental Protection Agency (US EPA), and various utilities and industries, all sewage treatment plants along the Ohio River have primary and secondary treatment, resulting in a dramatic decrease in cases of waterborne illness. In addition, all industry discharges are regulated through a permit compliance system. This system regulates discharges from industrial and municipal wastewater facilities to ensure suitable water quality is maintained in the Ohio River. While combined sewer overflows (CSOs), spills, and accidental releases of harmful substances to the river remain a concern, today’s water quality issues also include “nonpoint” sources such as runoff from agricultural and urban areas.

Today, Ohio River water quality is defined by a set of Pollution Control Standards established by the states and ORSANCO. Even though certain aspects of water quality may not always meet these stringent standards, the Ohio River has greatly improved in absolute terms since the 1950’s.

The following are some of the most frequently asked questions about the Ohio River:



Is It Safe to Swim in the River?

From a water quality standpoint, having safe contact with the water depends largely on where you are and whether it has rained recently. A good rule of thumb is that bacteria levels tend to rise immediately after it rains and usually fall a few days afterward. These bacteria come from urban stormwater runoff, animal waste, and combined sewer systems, which bypass sewage treatment plants and discharge directly to the river during heavy rains.

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 since 2008. Using these data provides a more accurate picture of water quality because bacteria levels fluctuate frequently depending on local or regional weather conditions.

Based on these data, ORSANCO is able to classify sections of the Ohio River as either impaired or suitable for contact recreation caused by *E. coli* or fecal coliform bacteria. However, all sections of the river may be unsafe for contact recreation at times.

How Safe is My Drinking Water?

Numerous public water utilities in the Ohio River Basin use the Ohio River as their source, supplying drinking water to over five million people. These people depend on the river to provide safe water for all their needs. ORSANCO does not test drinking water; rather, it assesses the suitability of the Ohio River as a *source* of drinking water after reasonable treatment. Using chemical data collected from its sampling programs, ORSANCO compares results to water quality standards established under its Pollution Control Standards. Additionally, since 1978, ORSANCO has jointly operated the Organics Detection System (ODS) with drinking water utilities and select industries. ODS instruments detect volatile organic chemicals in river water that could threaten drinking water quality. Every year, approximately 18,000 river water samples are analyzed by the ODS to help assure the quality and safety of the Ohio River as a source for drinking water.



Based on past data, the entire river is designated as fully supporting the public water supply use. Occasionally, ORSANCO's monitoring stations show violations of ORSANCO's bacteria criterion for contact recreation; however, none of these issues affect the quality of *finished* drinking water. For information on drinking water quality, check with your local public water utility.

How is the Fishing?

Approximately 160 native fish species have been recorded from the Ohio River. These include lamprey, paddlefish, gar, eels, bowfin, herring and shad, minnows, suckers, catfish, pike, bass, sunfish, darters, perch, and drum, among others.

ORSANCO monitors fish populations annually from July through October. Fish are shocked and netted, identified to species, measured, and released unharmed. Habitat types are also recorded. These data are compared against benchmark values to determine if impairments exist. Data from ORSANCO's macroinvertebrates and bimonthly and clean metals sampling programs are also used to assess the ability of the river to support the aquatic community.

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Based on ORSANCO's biological data, the entire river fully supports aquatic life based on direct measures of the biological community. Most parameters assessed through ORSANCO's clean metals and bimonthly sampling programs are also at levels that support aquatic life. However, there are instances when areas of the river have decreased levels of dissolved oxygen or elevated water temperature, conditions which can cause stress in fish.

Can I Eat the Fish?

While most fish in the Ohio River can be eaten in moderation, the states issue fish consumption advisories to the public for certain species of fish based on certain contaminants. Consumption advisories provide guidance to individuals or segments of the population that are at greater risk from exposure to contaminants in fish. Advisories are not regulatory standards, but are recommendations intended to provide additional information of particular interest to high-risk groups. These advisories apply only to recreationally caught sport fish in the Ohio River, not commercial fish. State-issued fish consumption advisories for the Ohio River recommend limiting the consumption of certain species of fish based on PCBs and mercury. Please visit ORSANCO's web site at www.orsanco.org for specific details on all of the [fish consumption advisories](#). In addition to these

advisories, ORSANCO has designated the Ohio River as impaired for the consumption of fish based on levels of dioxins and PCBs found in river water.

A workgroup consisting of six main stem states (Illinois, Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia), as well as US EPA and ORSANCO, is responsible for issuing advisories on what species of fish are safe to eat and how often they can be consumed from the Ohio River.

Fish consumption advisories are developed according to four sections of the Ohio River:

Unit 1-Pittsburgh, PA to Montgomery Locks & Dam (PA)

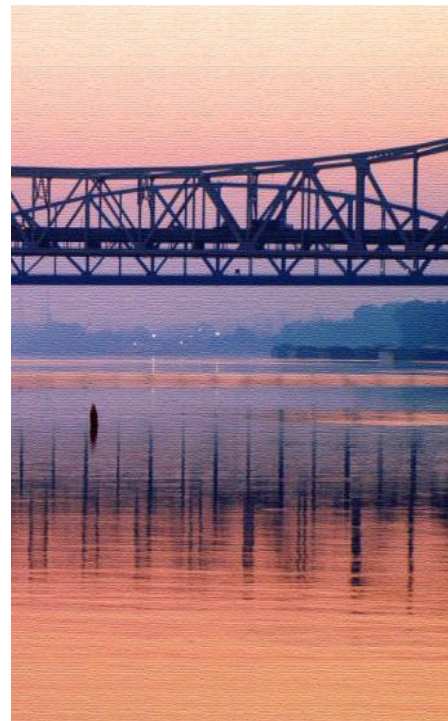
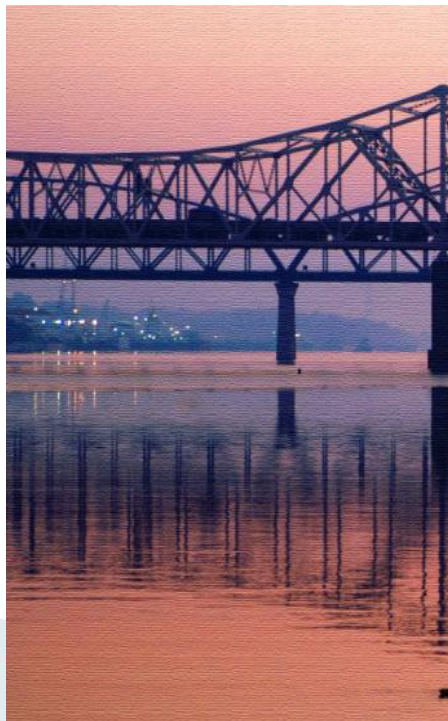
Unit 2-Montgomery Locks & Dam to Belleville Locks & Dam (PA, OH, & WV)

Unit 3-Belleville Locks & Dam to J.T. Myers Locks & Dam (OH, WV, IN, & KY)

Unit 4-J.T. Myers Locks & Dam to the Mississippi River (KY & IL)

Additionally, it is recommended to limit consumption of any Ohio River fish to no more than a meal per week due to mercury and PCBs.





Is Water Quality Improving?

Ohio River water quality has vastly improved since the 1950's; however, due to the nature of this waterway and its many uses, there will always be water quality challenges.

Stringent water quality standards now in place mean that in certain locations and due to certain circumstances, the river may be evaluated as *not fully supporting* its designated uses.

Those sections of the river that do not meet the water quality standards set by ORSANCO are designated as *impaired*. The Federal Clean Water Act requires TMDLs be developed for waterbodies that do not meet such standards. A TMDL, or total maximum daily load, determines how much of a pollutant a waterbody can assimilate and still meet its water quality goals. TMDLs can be thought of as a clean-up plan for polluted waterbodies and are tools that help regulators abate water pollution.

ORSANCO surveys the entire 981-mile length of the Ohio River for each of its designated uses to assess how much of the river fully supports:

- **Warm water aquatic life**
- **Contact recreation**
- **Public water supply**
- **Fish consumption**

ORSANCO also looks for long-term trends in Ohio River water quality. The Commission collects water quality samples at numerous locations on the Ohio River including the main stem and near the mouth of several tributaries.

Since 1990, ORSANCO has maintained a minimum of six sample events per year at each location. While the vast majority (94%) of trends discovered in studies from 1997-1999 were decreasing, 1999-2007 studies indicated 54% increasing trends. In other words, water quality showed steady improvement through the 1980s and then leveled off. Important trends include increasing phosphorus concentrations at most Ohio River monitoring stations and increases in chloride concentrations at nearly all stations, including tributaries. Although very small in magnitude, the concern is that numerous trends show an increasing direction.



The Ohio River Basin at a Glance

The Ohio River is one of the nation's great natural resources. Over 30 million people, or about ten percent of the U.S. population, live in the Ohio River Basin. With numerous public drinking water intakes and industries, the river provides drinking water to approximately five million people. Electric power-generating facilities located along the river provide over five percent of the United States' power generating capacity. In addition, the river serves as a transportation artery for commercial navigation. Each year, barges carry in excess of 280 million tons of cargo, primarily coal, oil, and petroleum, along the Ohio River. Finally, the Ohio River serves as a source of recreation for many people throughout the basin. The river provides warm water habitat for approximately 160 native fish species, drawing fishermen and nature enthusiasts to the banks of the river. It also provides recreational opportunities for boaters and a natural setting for dining and festivals.

The Ohio River forms in Pittsburgh, Pennsylvania at the confluence of the Allegheny and Monongahela rivers and flows generally southwest for 981 miles to join the Mississippi River near Cairo, Illinois. The river drains 203,940 square miles, approximately five percent of the contiguous United States (Figure 1). Its drainage basin encompasses parts of 14 states. Although the river is 981 miles long and flows through or borders 6 states, only five percent of the basin actually drains directly into the Ohio River. Instead, the river is fed by numerous tributaries, including the Allegheny, Monongahela, Kanawha, Kentucky, Muskingum, Wabash, Green, Cumberland, and Tennessee rivers. These are only a few of the watersheds that make up the entire Ohio River Basin.

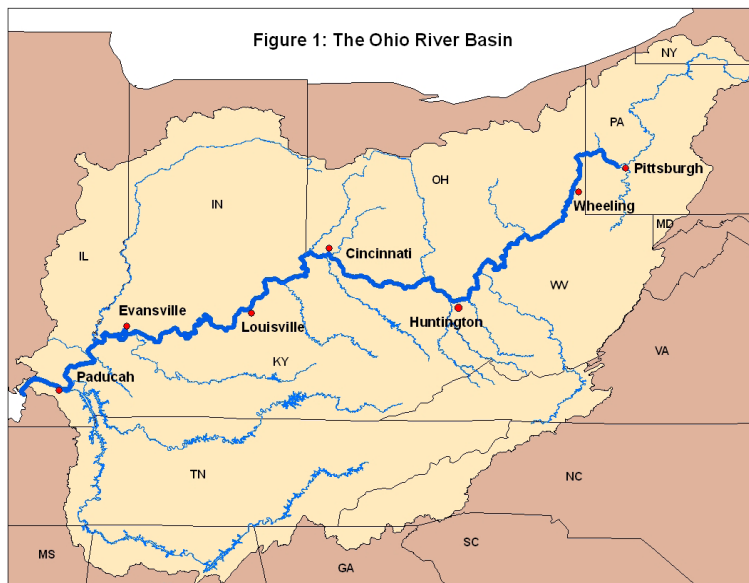
Factors Affecting Water Quality

There are a number of different land uses in the Ohio River watershed, including agricultural, industrial, urban, and forested areas. Land use is important in determining the type of runoff in a drainage basin and the water quality of its streams. Land uses such as agriculture, industry, and mining can impair water quality. Urban runoff from the many large communities in the Ohio River Basin is also a major cause of degraded water quality. For example, paved areas convey water quickly, transporting pollutants directly to streams and rivers. In contrast, forested areas convey water more slowly, allowing it to soak into the soil. Problems on land eventually translate into problems in the river.

Major metropolitan areas often exceed the bacteria criterion for contact recreation. Nonpoint sources of bacteria include human waste from septic systems, urban stormwater runoff, and animal waste. Combined sewer overflows (CSOs) have been identified as significant sources of bacteria problems near urban areas, especially after heavy rains. The CSO communities and outfalls along the Ohio River represent ten percent of the total CSOs in the nation. All of the largest CSO communities are under federal consent decrees to complete long-term control plans (LTCPs). Through the development of LTCPs, sewage treatment plants will characterize, model, and monitor the combined sewer system, identify sensitive areas, and develop alternative plans to meet Clean Water Act requirements. Although treatment plants will continue

to improve their practices of treating or storing wastewater, evidence suggests that even after the requirements of the National CSO Control Policy are met by these CSO communities, there may still be bacteria problems in the Ohio River due in part to the many nonpoint sources of human and animal waste. For this reason, there may continue to be a corresponding health risk for swimming during and after wet weather.

Figure 1: The Ohio River Basin





Emerging Challenges

ORSANCO works to achieve continued improvement for the Ohio River. Some of the water quality issues described here have largely been addressed, while others present more difficult challenges. New issues also continue to emerge as population grows, demands on resources increase, and technologies evolve. A few such emerging issues are highlighted below.

Emerging Contaminants

As analytical methods have advanced, scientists can now detect compounds in water at increasingly lower levels. Substances such as pharmaceuticals and industrial byproducts that were undetectable just a few years ago can now be “seen” using new technologies. While their impacts are still unknown, these compounds could pose a threat to human health and the environment. These emerging contaminants will present new challenges for wastewater treatment plants, drinking water treatment utilities, and regulators alike.

Allocation

As water utilities supply more outlying areas, their need to draw water from the Ohio River will increase. As energy needs rise, more power plants may be constructed, leading to increased use

of water for cooling towers. Extracting natural gas from vast deposits in the Ohio River Valley involves withdrawing large volumes of fresh water. These and other factors could take us from a situation where we have more than enough water to one where we have to be more judicious in our allocation and use of Ohio River water.

Nutrients and Algae

Nutrients are found in all natural waters. In excess quantities, however, nutrients like nitrogen and phosphorus can cause problems such as algal blooms. In 2015, the Ohio River experienced a bloom of the cyanobacteria (blue-green algae) *Microcystis aureginosa*. Because *Microcystis* produces toxins, this was classified as a Harmful Algae Bloom (HAB). The bloom covered about 650 miles of the River and resulted in recreation advisories being issued by Ohio, West Virginia, Kentucky, Indiana, and Illinois. ORSANCO works with its partner states and US EPA to reduce nutrient inputs to the Ohio River and is developing an HAB early warning and monitoring system.

Public Education

Knowledge is essential to building support for water quality programs and developing personal responsibility for how our actions affect the environment. ORSANCO continues to reach out, especially to our youth, through hands-on education, public displays, and volunteer water quality monitoring programs.



ORSANCO Monitoring Programs

ORSANCO operates a number of monitoring programs to assess different aspects of Ohio River water quality. These include:

- **Bimonthly and Clean Metals Sampling:** These programs are used to assess public water supply and are an indirect chemical measure of the health of aquatic life. Water column grab samples are collected from Ohio River main stem and tributary stations once every other month and analyzed for certain physical and chemical parameters.
- **Fish and Macroinvertebrate Population Monitoring:** ORSANCO monitors fish and macroinvertebrate populations annually from July through October, conducting numerous surveys throughout the river. The monitoring strategy includes both fixed-station and probability-based sampling, with the goal of determining the condition of the aquatic life use of the Ohio River.
- **Contact Recreation Bacteria Monitoring:** ORSANCO collects bacteria samples from April through October in large urban communities with combined sewer systems (Pittsburgh, Wheeling, Huntington, Cincinnati, Louisville, and Evansville) to evaluate the river's suitability for contact recreation.
- **Fish Tissue Sampling:** ORSANCO collects fish tissue samples between April and November and analyzes them for certain contaminants to assess whether fish are safe to eat. Fish tissue is analyzed for mercury, methylmercury, and other metals, PCBs and chlordanes, DDT, and other pesticides. The states use these data to develop public fish consumption advisories and to determine condition of the fish consumption use of the Ohio River.
- **High Volume PCB and Dioxin Sampling:** ORSANCO conducts high volume sampling for dioxin and PCBs to evaluate fish for human consumption. These chemicals have been known to bioaccumulate in fish tissue.



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