

The State of the Ohio River

**A Report of the
Ohio River Valley
Water Sanitation
Commission**

2009





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. This assessment evaluates Ohio River water quality with respect to four *designated uses*:

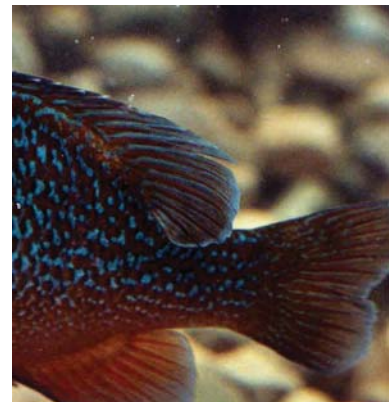
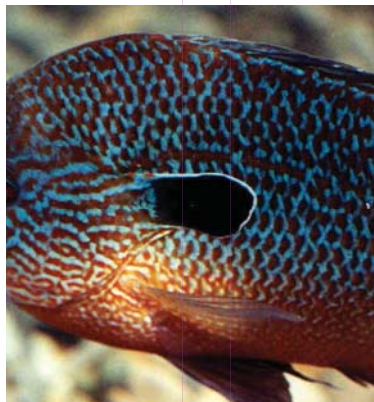
- **warm water aquatic life** (fish and invertebrates),
- **public water supply** (the water we drink),
- **contact recreation** (swimming, water skiing), and
- **fish consumption** (which fish are safe to eat).

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, and the U.S. Environmental Protection Agency (EPA) 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 system. 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 over the past 60 years.

Following are some of the most frequently asked questions about the Ohio River, and answers based on ORSANCO’s most recent water quality assessment report (2006-2007).*

*ORSANCO’s monitoring programs are described on the back cover.



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 are designed to bypass sewage treatment plants and discharge directly to the river during heavy rains.

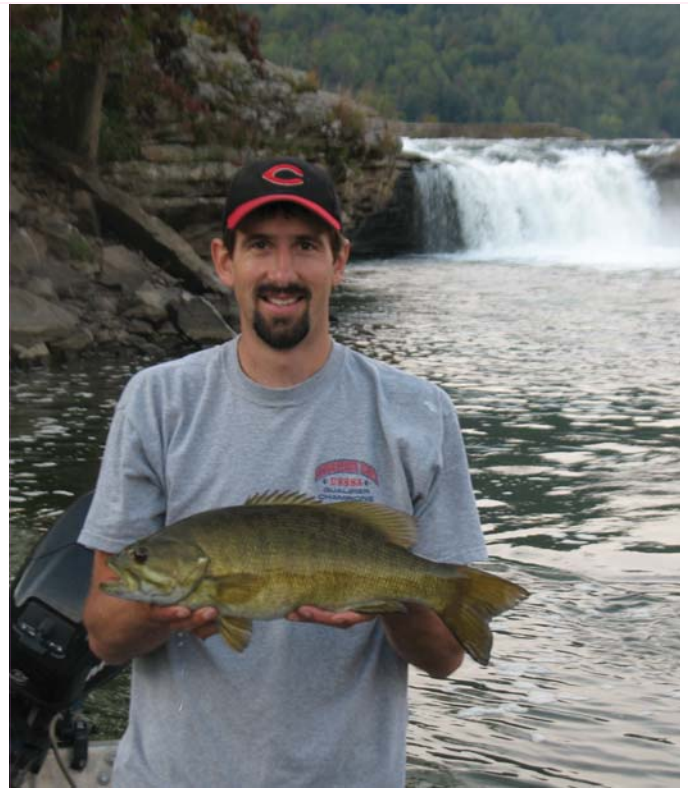
ORSANCO assesses whether the river is suitable for contact recreation based on bacteria data collected from the six largest urban areas with combined sewer systems. It also uses bacteria data from longitudinal surveys conducted since 2003. Using data from the past five years provides a more accurate picture of water quality, because bacteria levels fluctuate frequently depending on local or regional weather conditions.

Based on these data, 484 miles (approximately fifty percent) of the Ohio River are classified as having fair or poor water quality for contact recreation. The other fifty percent of the Ohio River is classified as suitable for contact recreation. However, all sections of the river may be unsafe for contact recreation at times.

How Safe is My Drinking Water?

Twenty-nine public water utilities 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 bi-monthly sampling program, and bacteria monitoring data, ORSANCO compares results to water quality standards established under its Pollution Control Standards.

Based on data from 2005-2007, 112 miles of the Ohio River had water quality issues leading them to be classified as not fully supporting use as a public water supply. Portions of the river in Kentucky, Indiana and Illinois totaling 108 miles had phenol levels that exceeded water quality criteria. A four-mile section of the river in Pennsylvania had several exceedances of ORSANCO's bacteria criterion. However, none of these issues affected the quality of *finished* drinking water. For information on drinking water quality, check with your local public water utility.



How is the Fishing?

As the water quality of the Ohio River has improved, pollution-sensitive species native to the river have returned. The decrease in pollution-tolerant species and the increase in the diversity of fish species indicate that pollution control measures have improved water quality. To date, ORSANCO has collected and identified 134 species of fish from the Ohio River. These include gizzard shad, skipjack herring, minnows, freshwater drum, channel, flathead and blue catfish, smallmouth, largemouth and spotted bass, sauger, walleye and darters.

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

Based on ORSANCO's biological data from 2005-2007, the entire river fully supports aquatic life. Parameters assessed through ORSANCO's clean metals and bimonthly sampling programs were also found at levels that support aquatic life. However, several areas in the lower river had low levels of dissolved oxygen or elevated water temperature, conditions which can cause stress in fish.

Can I Eat the Fish?

While most Ohio River fish can be eaten in moderation, chemicals such as PCBs, dioxin and mercury have been found in fish tissue, or in river water at levels exceeding ORSANCO'S criteria for human health. These chemicals could prove a health risk to sensitive populations, such as pregnant and breast-feeding women, women of childbearing age, children, and individuals whose diet consists of a high percentage of fish.

Each state along the Ohio River is responsible for issuing advisories on what species of fish are safe to eat and how often they can be consumed. These advisories provide guidance to individuals or groups at greater risk from exposure to contaminants in fish. Advisories are not regulatory standards, but are recommendations intended to provide information of particular interest to high-risk groups. Following these advisories can minimize exposure and reduce health risks associated with contaminants found in fish.

Following is a *current* list of state fish consumption advisories. Links to individual state advisory web pages can be found on the ORSANCO website (www.orsanco.org).

Pennsylvania: limit consumption of walleye, sauger, white bass, hybrid striped bass, flathead catfish, drum, and channel catfish under 17"; do not eat carp or channel catfish over 17". Contaminant: PCBs

West Virginia: limit consumption of flathead catfish, smallmouth buffalo, drum, black bass, sauger, walleye, sauger, saugeye, channel catfish under 17"; do not eat carp or channel catfish over 17".

Contaminants: PCBs, mercury, dioxin

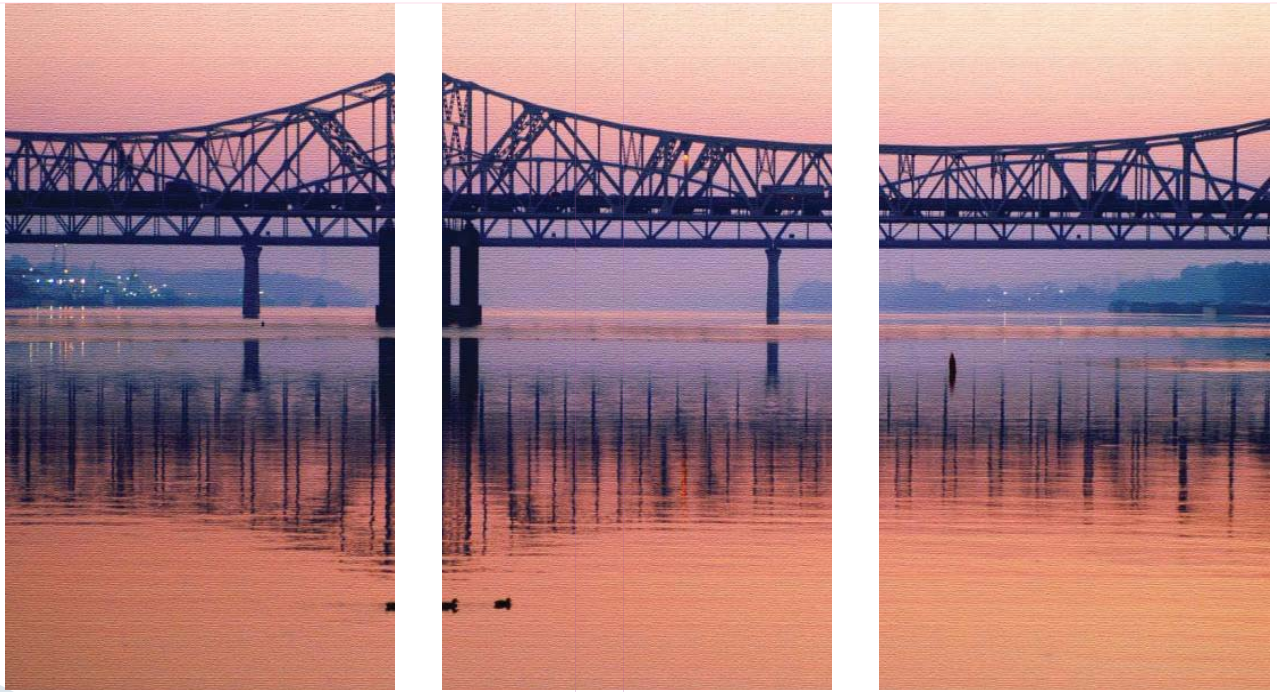
Ohio: limit consumption of channel catfish, flathead catfish, smallmouth buffalo, carp, drum, smallmouth bass, hybrid striped bass, white bass, sauger, walleye, and black crappie. Contaminant: PCBs

Kentucky: limit consumption of paddlefish and eggs, carp, channel catfish, flathead catfish, blue catfish, smallmouth buffalo, bigmouth buffalo, white bass, hybrid striped bass, black bass, freshwater drum, white crappie, and sauger. Sensitive populations should not eat paddlefish or their eggs, or channel catfish over 21".

Indiana: limit consumption of carp, channel catfish, flathead catfish, freshwater drum, largemouth bass, paddlefish, sauger, walleye, saugeye, spotted bass, white/striped/hybrid bass, and smallmouth bass; sensitive populations should not eat channel catfish over 25" or smallmouth bass over 15". Contaminant: PCBs

Illinois: limit consumption of channel catfish, blue catfish, freshwater drum, carp, sauger, and largemouth bass. Contaminants: PCBs and mercury.





Is Water Quality Improving?

Ohio River water quality has vastly improved over the past 60 years; however, due to the nature of this waterway and its many uses, there will always be water quality issues. 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 assessed the entire 981-mile length of the Ohio River for each of its designated uses. In summary, for the period from 2005 through 2007:

- 839 miles have water quality that fully supports **warm water aquatic life**.
- Although over half the river fully supports **contact recreation**, episodic violations occurred along the entire length. A bacteria TMDL is currently being developed for the entire river to address this issue.
- Based on exceedances of the bacteria and phenol criterion for **public water supply**, 112 miles are impaired. The remaining 869 miles fully support public water supply.

- The full length of the river has been designated as impaired for **fish consumption** and requires a TMDL for PCBs and dioxins. A TMDL for PCBs has been completed for the first 238 miles of the Ohio River, including the entire Pennsylvania segment, and sections of the River bordering West Virginia and Ohio. TMDLs for both PCBs and dioxins have been completed for river miles 238 to 317.

ORSANCO also looks for long-term trends in Ohio River water quality. The Commission first examined trends of numerous water quality parameters from 1977 to 1990. It recently completed another study covering the 18-year period from 1990 to 2007, picking up where the previous trends analysis ended.

The Commission collects water quality samples at 17 locations on the Ohio River and near the mouth of 14 major 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 the 1997-1990 studies were decreasing, the 1990-2007 studies indicated 54% increasing trends. In other words, water quality showed steady improvement through the 1980s, but since then those improvements have 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 25 million people, or about eight percent of the U.S. population, live in the Ohio River Basin. Through 29 public drinking water utilities and numerous industries, the river provides drinking water to approximately five million people. Forty-nine 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 over 150 million tons of cargo, primarily coal, 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 over 130 species of fish, 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).

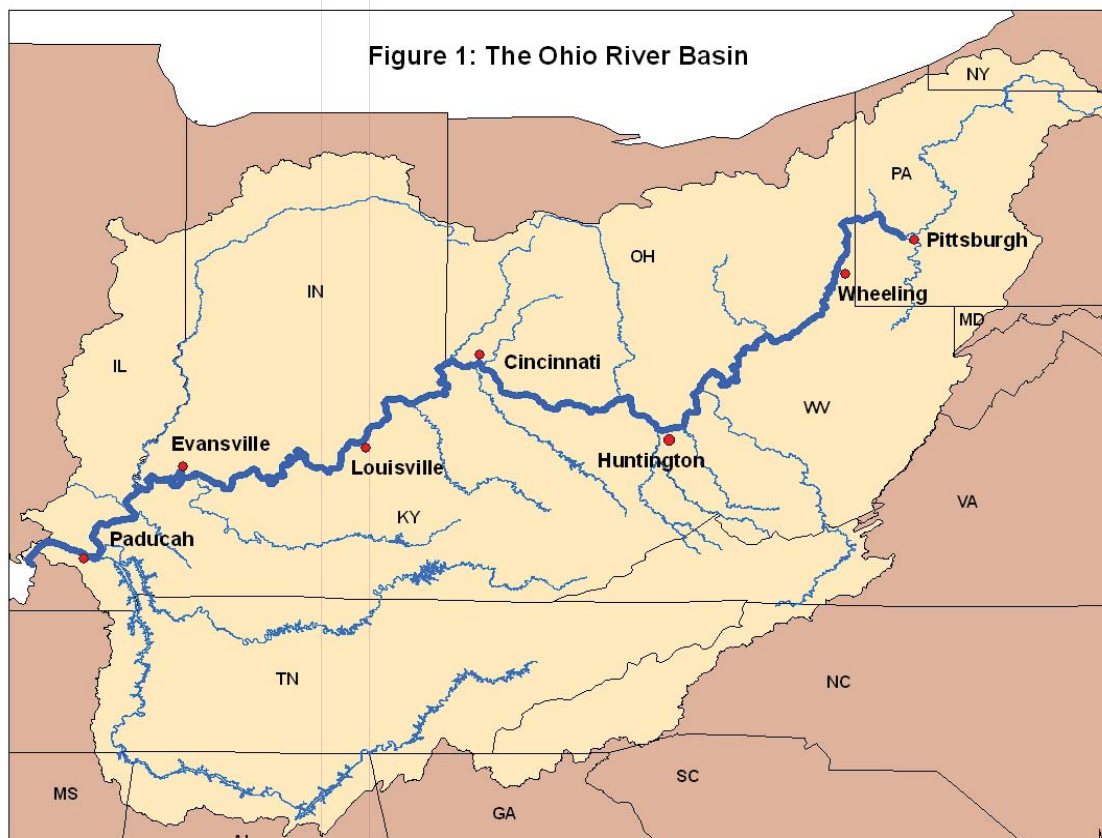
Its drainage basin encompasses parts of 15 states. Although the river is 981 miles long and flows through or borders 6 states, only five percent of the basin actually drains directly into the Ohio River. Instead the river is fed by numerous tributaries, including the Allegheny, Monongahela, Kanawha, 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 causes of bacteria problems near urban areas, especially after heavy rains. There are 49 CSO communities along the Ohio River with a total of 1045 CSO outfalls, representing over ten percent of the total CSOs in the nation. All of the largest CSO communities are under

Figure 1: The Ohio River Basin





federal consent decrees to complete long-term control plans (LTCPs). Through the development of LTCPs, sewage treatment plants will begin to 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, current 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.

Emerging Challenges

As we move through the twenty-first century, ORSANCO is working 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 touched on here.

Emerging Contaminants

As analytical methods have advanced, scientists can now detect compounds in water at increasingly lower levels. Substances such as pharmaceuticals and industrial by-products 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 algae blooms. Algae blooms in the Ohio River appear to be increasing in frequency. Better detection is needed, as these blooms cannot be adequately forecast with existing technology. Research may lead to a future where nutrients are put to creative uses such as growing biomass for fuel.

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 17 Ohio River stations once every other month and analyzed for certain physical and chemical parameters.
- **Fish Population Monitoring:** ORSANCO monitors the fish population annually from July through October, conducting between 100 and 200 surveys of the fish community. The monitoring strategy includes both fixed-station and probability-based sampling.
- **Contact Recreation Bacteria Monitoring:** ORSANCO collects bacteria samples from May through October in six large urban communities with combined sewer systems (Pittsburgh, Wheeling, Huntington, Cincinnati, Louisville, and Evansville) to evaluate the river's suitability for contact recreation.
- **Longitudinal Bacteria Sampling:** Through intensive longitudinal surveys, in which samples are collected every five miles multiple times over consecutive weeks, ORSANCO has been able to monitor the entire river for bacteria and assess suitability for contact recreation.
- **Fish Tissue Sampling:** ORSANCO collects fish tissue samples between July and October and analyzes them for certain contaminants to assess whether fish are safe to eat. Fish tissue is analyzed for PCBs, chlor-dane, mercury, cadmium, lead and certain pesticides. The states use this data to develop public fish consumption advisories.
- **High Volume PCB and Dioxin Sampling:** ORSANCO conducted high volume sampling for dioxin and PCBs to evaluate fish for human consumption. These chemicals have been known to bioaccumulate in fish tissue.



ORSANCO
5735 Kellogg Avenue
Cincinnati, OH 45228
Phone: (513) 231-7719
Fax: (513) 231-7761
www.orsanco.org