2004 Biennial Assessment of Ohio River Water Quality Conditions

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The Ohio River Valley Water Sanitation Commission
5735 Kellogg Avenue
Cincinnati, Ohio 45228-1112

EXECUTIVE SUMMARY

The Ohio River is one of the nation's great natural resources. It provides drinking water to nearly three million people; is a warm water habitat for aquatic life; provides numerous recreational opportunities; is used as a major transportation route; and is a source of water for manufacturing and power generation. The Ohio River forms in Pittsburgh, Pennsylvania at the confluence of the Allegheny and Monongahela rivers and flows in a southwesterly direction for 981 miles to join the Mississippi River near Cairo, Illinois. The first 40 miles of the Ohio River lie within the state of Pennsylvania. The remaining 941 miles form the state boundaries between Illinois, Indiana, and Ohio to the north, and Kentucky and West Virginia to the south.

The Ohio River Valley Water Sanitation Commission (ORSANCO; the Commission) is an interstate agency charged with abating existing pollution in the Ohio River Basin, and preventing future degradation of its waters. ORSANCO was created in 1948 with the signing of the Ohio River Valley Water Sanitation Compact. This report fulfills the following requirements of the Ohio River Valley Water Sanitation Compact:

1. To survey the district to determine water pollution problems.
2. To identify instances in which pollution from a state(s) injuriously affects waters of another state(s).

This report is a biennial assessment of Ohio River water quality conditions in terms of the degree to which the river supports each of its four designated uses: warm water aquatic life; public water supply; contact recreation; and fish consumption. The Ohio River Valley Water Sanitation Compact commits "...each state to place and maintain the waters of the basin in a satisfactory sanitary condition, available for safe and satisfactory use by public and industrial water supplies after reasonable treatment, suitable for recreation, capable of maintaining fish and other aquatic life.…"

This assessment uses three classifications to describe the attainment of Ohio River designated uses: fully supporting (good water quality), partially supporting (fair water quality), and not supporting (poor water quality). ORSANCO conducts water quality monitoring and assessments on behalf of the Ohio River main stem states (Illinois, Indiana, Kentucky, Ohio, Pennsylvania and West Virginia). This report provides a status water quality for water years 2002-2003 even though in some cases data outside that range is utilized in assessments. In addition, an Integrated List containing waters indicating a need for total maximum Daily Loads (TMDLs) was completed in an effort to promote interstate consistency for Ohio River TMDLs.

Warm Water Aquatic Life Use Support

Ohio River warm water aquatic life use support was assessed based on chemical water quality data collected from ORSANCO's nine dissolved metals sampling stations located on the mainstem, data generated from 17 bimonthly sampling sites on the mainstem, as well as direct measurements of fish communities from a large number of stream bank sites. In October 2000, the Commission adopted dissolved metals criteria. Dissolved metals sampling and analyses measure the portion of metals that are dissolved in the water column. Recent findings demonstrate that widely accepted field sampling methods and laboratory techniques are responsible for significant contamination of total recoverable metals data, and have prompted the

development of "clean techniques" for both sample collection and analysis. ORSANCO utilizes a modified Virginia Division of Environmental Quality grab sample collection technique. Low-level metals analyses are performed by the Virginia Department of General Services, Division of Consolidated Laboratory Services (Virginia DGSDCLS). This sampling, which occurs every other month at 17 mainstem locations, detected no violations of ORSANCO's dissolved metals criteria during this reporting period, therefore no impairment resulted from this data.

The Bimonthly Manual Sampling Program entails the collection of water column grab samples from 17 Ohio River stations once every other month. Samples are collected by contract samplers and analyzed for certain physical and chemical parameters by a contract laboratory. No impairment was indicated from this data.

Fish communities were assessed using ORSANCO's Ohio River Fish Index (ORFIn) for evaluating fish population data. Although numeric criteria have not yet been adopted into ORSANCO Pollution Control Standards, use of ORFIn allows for the comprehensive assessment of Ohio River fish conditions. Sixteen miles of the Ohio River were listed as impaired due to biological data. Multiple ORFIn scores below expected values at a particular site indicates impairment. Pollutants causing these impairments are unknown.

Seven hundred seventy-nine miles (almost 80 percent) of the Ohio River are classified as fully supporting the aquatic life use and 16 miles (less than two percent) are classified as partially supporting. One hundred eighty-six miles (nineteen percent) were unassessed.

Public Water Supply Use Support

Ohio River public water supply use support was assessed based on chemical water quality data collected from the Bimonthly Sampling Program, bacteria monitoring, and impacts on Ohio River drinking water utilities caused by source water conditions as determined by questionnaires sent to water utilities.

Nine hundred forty-nine miles (almost 97 percent) of the Ohio River are classified as fully supporting the public water supply use, and 32.4 miles (three percent) are classified as partially supporting. Ohio River mile points 161.7 through 172.2 are classified as partially supporting because the criterion for phenolics was exceeded in greater than ten percent of samples at the Bimonthly Sampling station in Willow Island, West Virginia. These samples indicate impairment of Ohio River source water and do not necessarily indicate finished drinking water problems. Surveys were received from 22 water utilities that use the Ohio River as a source for drinking water. None indicated violations of the Safe Drinking Water Act for maximum contaminant levels in finished water that could be attributable to Ohio River source water quality. Results of bacteria monitoring indicated approximately twenty-two miles of impairment based on violations of stream criteria for the protection of public water supplies.

Contact Recreation Use Support

Data from ORSANCO's Recreation Season Monitoring Program and Watershed longitudinal bacteria surveys were used to perform the contact recreation use support assessment. ORSANCO conducted recreation season monitoring at six urban centers with large combined sewer systems. Monitoring is conducted during the recreation period of May through October.

In 2003, ORSANCO also sampled the Ohio River approximately every five miles from Pittsburgh to river mile 630.

There are approximately 52 combined sewer systems located along the Ohio. Combined sewer overflows and other nonpoint sources have been identified as significant causes of bacteria problems in the Ohio River, particularly during heavy rain events.

Approximately three hundred sixty-seven miles (over one-third) of the Ohio River are classified as impaired for the contact recreation use and 345.3 miles (thirty-five percent) were unassessed. Impairments are based on exceedances of ORSANCO's stream criterion for bacteria.

Fish Consumption Use Support

Fish consumption use support was assessed based primarily on the states' issuance of fish consumption advisories and ORSANCO fish tissue contaminants data. In addition, dioxin water quality for the entire Ohio River is covered by a restricted fish consumption advisory based on PCBs. Some states have statewide advisories for mercury. In the case of these statewide mercury advisories, the Commission's fish tissue contaminants data was compared to ORSANCO's criterion contained in its 2003 Pollution Control Standards. No impairments based on mercury were indicated.

Through the Ohio River Watershed Pollutant Reduction Program, ORSANCO collects "high volume" Ohio River water samples that are analyzed for dioxin. These data were compared to applicable ambient water quality criteria established for the protection of human health due to water and fish ingestion. Dioxin monitoring exceeded the applicable water quality criterion in every sample. Because of the widespread sampling for dioxin, the entire river was assessed as impaired due to dioxin.

The entire 981 miles (100 percent) of the Ohio River are classified as partially supporting fish consumption use due to advisories for PCBs and widespread dioxin violations.

Table E-1 is an overall summary of impaired uses of the Ohio River state-by-state.

Table E-1: State By State Use Support Summary-Number of Ohio River Miles Impaired

		Aquatic Life Use Support	Contact Recreation Use Support	Public Water Supply Use Support	Fish Consumption Use Support
PA	0.0-40.2	0	40.2	4.0	40.2
OH-WV	40.2-317.1	1.8	163.5	13.5	276.9
OH-KY	317.1-491.1	0	106.5	0	174
IN-KY	491.1-848.0	11.6	57.0	14.9	356.9
IL-KY	848.0-981.0	2.6	0	0	133
TOTAL		16.0	367.2	32.4	981

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CHAPTER 1: INTRODUCTION

The Ohio River Valley Water Sanitation Commission (ORSANCO; the Commission) is an interstate water pollution control agency. ORSANCO was established in 1948 through the signing of the Ohio River Valley Water Sanitation Compact (the Compact) by representatives of the eight member states: Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia and West Virginia, and approved by Congress. Under the terms of the Compact, the states pledged to cooperate in the control of water pollution within the Ohio River Basin. Article VI of the Compact states that the guiding principal shall be that pollution by sewage or industrial wastes originating in one signatory state shall not injuriously affect the various uses of the interstate waters. ORSANCO carries out a variety of programs that primarily focus on the Ohio River main stem. General program areas include water quality monitoring and assessment, emergency response, pollution control standards, and public information and education. The Commission also provides an excellent forum for information exchange and technology transfer among the states' water pollution control and natural resources agencies.

The Compact designates the Ohio River to be 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, and adaptable to such other uses as may be legitimate. No degradation of the water quality of the Ohio River, which would interfere with or become injurious to these uses, shall be permitted.

This report focuses on the water quality of the main stem of the Ohio River. The Ohio River forms in Pittsburgh, Pennsylvania, at the confluence of the Allegheny and Monongahela rivers. The river is 981 miles long and generally flows southwest to join the Mississippi River near Cairo, Illinois. The first 40 miles of the Ohio River are within Pennsylvania. The remaining 941 miles form the state boundaries between Illinois, Indiana and Ohio to the north, and Kentucky and West Virginia to the south.

This report covers water years 2002 and 2003 (October 1, 2001 - September 30, 2003). ORSANCO monitors and assesses the Ohio River on behalf of the compact states. The assessment methodologies and supporting data used to generate this assessment are contained within this report and its appendices.

Ohio River water quality is evaluated in terms of the degree of support for each of the following designated uses: warm water aquatic life habitat; public water supply; contact recreation; and fish consumption. Each designated use is evaluated using specific numerical water quality criteria, other factors such as the existence of advisories against consuming fish, and the direct measure of biological communities within the Ohio River. Based on water quality conditions, the Ohio River is classified as fully, partially or not supporting each of the designated uses. Fully supporting indicates minor or no water quality problems; partially supporting indicates that the use is precluded at times; and not supporting indicates that the use is precluded much of the time.

Contained in this report are assessments of attainment of the designated uses of the Ohio River, as well as an "Integrated List" of waters requiring Total Maximum Daily Loads (TMDLs). The primary purpose of ORSANCO completing Ohio River use attainment assessments and "Integrated List" is to facilitate interstate consistency. However, the states' are not obligated to incorporate any or all of this assessment into their own reports. The United States Environmental Protection Agency (US EPA) has prepared "Guidance for 2004 Assessment, Listing, and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act." This guidance states that "Data and information in an Interstate Commission 305(b) report should be considered by the states as one source of readily available data and information when they prepare their Integrated Report and make decisions on waters to be placed in Category 5; however, data in a 305(b) Interstate Commission Report should not be automatically entered in a State Integrated Report or 303(d) list."

CHAPTER 2: BACKGROUND

2.1 Basin Characteristics

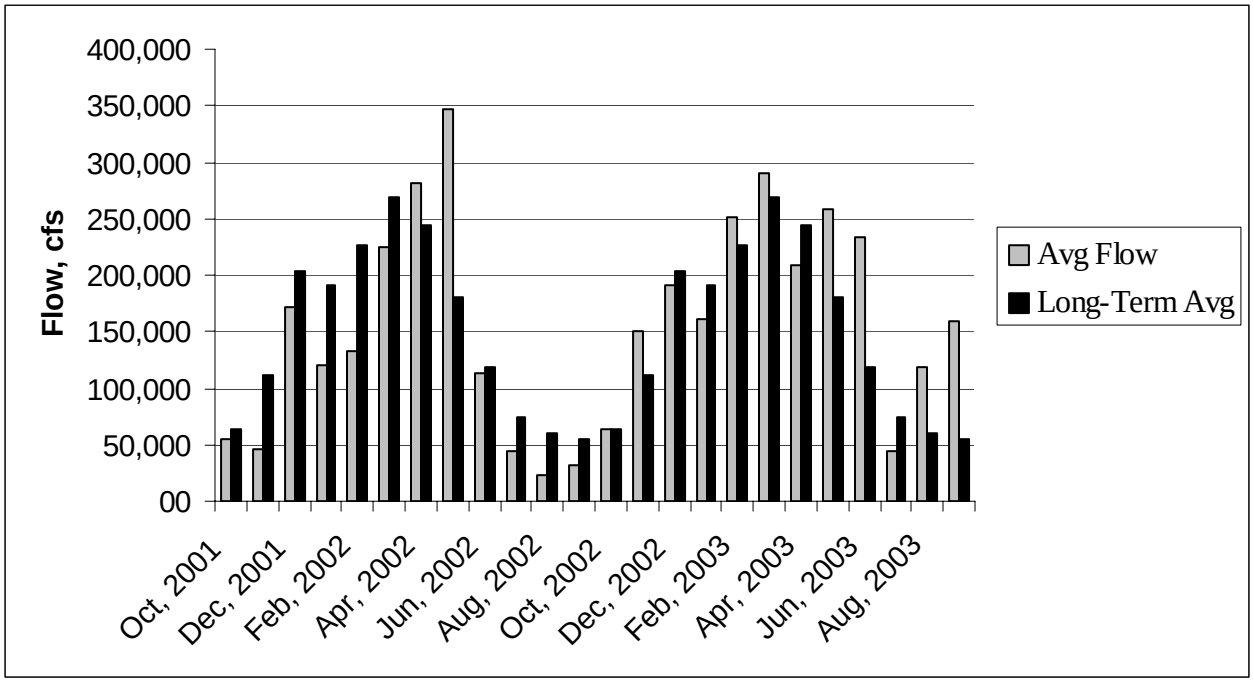
The Ohio River drains 203,940 square miles, which is approximately five percent of the contiguous United States. Figure 2-1 shows the Ohio River Basin and selected tributaries. Over 25 million people reside in the Ohio River Basin, which is approximately 10% of the United States population. An estimated 3.6 million people live in cities and towns adjacent to the Ohio River. In addition, the river provides drinking water to approximately three million people. Electric power-generating facilities located along the river provide more than 5% of the United States power generating capacity. In addition, the river is used extensively for commercial navigation. Appendix A contains additional data on basin characteristics including locations of locks and dams, locations of tributaries, and hydrologic data for water years 2002 and 2003.

Figure 2-1: Ohio River Basin

2.2 Flows

A series of locks and dams, operated and maintained by the United States Army Corps of Engineers, regulates pool elevation on the Ohio River. These dams create 20 pools with regulated flows and guaranteed minimum flows to assure continued commercial navigation during droughts. Long-term average flows in the Ohio River, depending on location and time of year, range from 14,000 to 497,000 cubic feet per second (cfs). Hydrologic conditions varied considerably over the reporting period. Flow data, reported on a monthly basis by the National Weather Service, are contained in Appendix A. Figure 2-2 provides a comparison of flow over the reporting period compared to long-term average flows at Evansville, IN, which is downstream of most major tributaries with the exception of the Wabash, Cumberland and Tennessee rivers. Monthly average flows tended to be below long-term averages during 2002 and above long-term averages in 2003.

Figure 2-2: Monthly Avg. Flows Compared to Long-Term Averages at Evansville, IN.



2.3 Description of Water Bodies

The Ohio River is broken down into a series of water bodies for assessment and reporting purposes. The segments were generally selected using dams and major tributary confluences as dividing points. The degree of use support is assessed for each water body regarding the above-defined uses. The following descriptions include the boundaries of each water body as well as other relative information.

Point-Emsworth (mile point 0-6.2; OVWB1). This water body is bounded by the confluence of the Allegheny and Monongahela rivers (the origin of the Ohio River) on the upstream end and by the Emsworth Locks & Dam on the downstream end. Chartiers Creek, with a drainage area of

277 square miles, intersects this water body at mile point 2.5.

Emsworth-Dashields (mile point 6.2-13.3; OVWB2). This 7.1-mile long water body encompasses the entire Dashields Pool and is bounded by Emsworth Locks & Dam upstream and Dashields Locks & Dam on the downstream end.

Dashields-Beaver (mile point 13.3-25.4; OVWB3). This 12.1-mile long water body is bounded by Dashields Locks & Dam upstream and the confluence of the Beaver River on the downstream end.

Beaver-Montgomery (mile point 25.4-31.7; OVWB4). This 6.3-mile long water body is bounded by Beaver River upstream and Montgomery Locks & Dam on the downstream end. Raccoon Creek, with a drainage area of 200 square miles, intersects this water body at mile point 29.6.

Montgomery-Pennsylvania State Line (mile point 31.7-40.2; OVWB5). This 8.5-mile long water body is bounded by Montgomery Locks & Dam upstream and the Pennsylvania/Ohio/West Virginia state borders on the downstream end. The Little Beaver River, with a drainage area of 510 square miles, intersects this water body at mile point 39.5.

Pennsylvania State Line-New Cumberland (mile point 40.2-54.4; OVWB6). This 14.2-mile long water body is bounded by the Pennsylvania state line upstream and New Cumberland Locks & Dam on the downstream end. Yellow Creek, with a drainage area of 240 square miles, intersects this water body at mile point 50.4.

New Cumberland-Pike Island (mile point 54.4-84.2; OVWB7). This 29.8 mile-long water body encompasses the entire Pike Island Pool and is bounded by New Cumberland Locks & Dam upstream and the Pike Island Locks & Dam on the downstream end. The following tributaries intersect this water body: Cross Creek at mile point 71.6 with a drainage area of 128 square miles; Buffalo Creek at mile point 74.7 with a drainage area of 160 square miles; Short Creek at mile point 81.4 with a drainage area of 147 square miles.

Pike Island-Hannibal (mile point 84.2-126.4; OVWB8). This 42.2 mile-long water body encompasses the entire Hannibal Pool and is bounded by Pike Island Locks & Dam upstream and Hannibal Locks & Dam on the downstream end. The following tributaries intersect this water body: Wheeling Creek in Ohio at mile point 91.0 with a drainage area of 108 square miles; Wheeling Creek in West Virginia at mile point 91.0 with a drainage area of 300 square miles; McMahon Creek at mile point 94.7 with a drainage area of 91 square miles; Grave Creek at mile point 102.5 with a drainage area of 75 square miles; Captina Creek at mile point 109.6 with a drainage area of 181 square miles; Fish Creek at mile point 113.8 with a drainage area of 250 square miles; and Sunfish Creek at mile point 118.0 with a drainage area of 114 square miles.

Hannibal-Willow Island (mile point 126.4-161.7; OVWB9). This 35.3 mile-long water body encompasses the entire Willow Island Pool and is bounded by Hannibal Locks & Dam upstream and Willow Island Locks & Dam on the downstream end. The following tributaries intersect this water body: Fishing Creek at mile point 128.3 with a drainage area of 220 square miles; Middle Island Creek at mile point 154.0 with a drainage area of 560 square miles; and Little Muskingum River at mile point 168.3 with a drainage area of 315 square miles.

Willow Island-Muskingum (mile point 161.7-172.2; OVWB10). This 10.5 mile-long water body is bounded by Willow Island Locks & Dam on the upstream side and the confluence of the Muskingum River on the downstream end. Duck Creek, with a drainage area of 228 square miles, intersects this water body at mile point 170.7.

Muskingum-Belleville (mile point 172.2-203.9; OVWB11). This 31.7 mile-long water body is bounded by the Muskingum River upstream and Belleville Locks & Dam on the downstream end. The Muskingum River has a drainage area of 8,040 square miles. The following tributaries intersect this water body: Little Kanawha River at mile point 184.6 with a drainage area of 2,320 square miles; Little Hocking River at mile point 191.8 with a drainage area of 103 square miles; and Hocking River at mile point 199.3 with a drainage area of 1,190 square miles.

Belleville-Racine (mile point 203.9-237.5; OVWB12). This 33.6 mile-long water body encompasses the entire Racine Pool and is bounded by Belleville Locks & Dam upstream and Racine Locks & Dam on the downstream end. The following tributaries intersect this water body: Shade River at mile point 210.6 with a drainage area of 221 square miles; Shady Creek at mile point 220.6 with a drainage area of 115 square miles; and Mill Creek at mile point 231.5 with a drainage area of 230 square miles.

Racine-Kanawha (mile point 237.5-265.7; OVWB13). This 28.2 mile-long water body is bounded by Racine Locks & Dam upstream and Kanawha River on the downstream end. Leading Creek, with a drainage area of 151 square miles, intersects this water body at mile point 254.2.

Kanawha-Gallipolis (mile point 265.7-279.2; OVWB14). This 13.5 mile-long water body is bounded by the Kanawha River upstream and Gallipolis (Robert C. Byrd) Locks and Dam on the downstream end. The Kanawha River has a drainage area of 12,200 square miles. Raccoon Creek, with a drainage area of 684 square miles, intersects this water body at mile point 276.0.

Gallipolis-Big Sandy (mile point 279.2-317.1; OVWB15). This 37.9 mile-long water body is bounded by Gallipolis (Robert C. Byrd) Locks & Dam on the upstream and the Big Sandy River on the downstream end. The following tributaries intersect this water body: Guyandotte River at mile point 305.2 with a drainage area of 1,670 square miles; Symmes Creek at mile point 308.7 with a drainage area of 356 square miles; and Twelvepole Creek at mile point 313.2 with a drainage area of 440 square miles.

Big Sandy-Greenup (mile point 317.1-341.0; OVWB16). This 23.9 mile-long water body is bounded by the Big Sandy River upstream and Greenup Locks & Dam on the downstream end. The Big Sandy River forms the border between West Virginia and Kentucky. The Little Sandy River, with a drainage area of 724 square miles, intersects this water body at mile point 336.4.

Greenup-Scioto (mile point 341.0-356.5; OVWB17). This 15.5 mile-long water body is bounded by Greenup Locks & Dam upstream and the Scioto River on the downstream end. The following tributaries intersect this water body: Pine Creek at mile point 346.9 with a drainage area of 185 square miles; Little Scioto River at mile point 349.0 with a drainage area of 233 square miles; and Tygarts Creek at mile point 353.3 with a drainage area of 336 square miles.

Scioto-Meldahl (mile point 356.5-436.2; OVWB18). This 79.7 mile-long water body is bounded by the Scioto River upstream and Meldahl Locks & Dam on the downstream end. The Scioto River has a drainage area of 6,510 square miles. The following tributaries intersect this water body: Kinniconnick Creek at mile point 368.1 with a drainage area of 253 square miles; Ohio Brush Creek at mile point 388.0 with a drainage area of 435 square miles; Eagle Creek at mile point 415.7 with a drainage area of 154 square miles; and White Oak Creek at mile point 423.9 with a drainage area of 234 square miles.

Meldahl-Little Miami (mile point 436.2-464.1; OVWB19). This 27.9 mile-long water body is bounded by Meldahl Locks & Dam upstream and the Little Miami River on the downstream end.

Little Miami-Licking (mile point 464.1-470.2; OVWB20). This 6.1 mile-long water body is bounded by the Little Miami River upstream and the Licking River on the downstream end. The Little Miami River has a drainage area of 1,670 square miles.

Licking-Great Miami (mile point 470.2-491.1; OVWB21). This 20.9 mile-long water body is bounded by the Licking River upstream and the Great Miami River on the downstream end. The Licking River has a drainage area of 3,670 square miles. Mill Creek, with a drainage area of 166 square miles, intersects this water body at mile point 472.5.

Great Miami-Markland (mile point 491.1-531.5; OVWB22). This 40.4 mile-long water body is bounded by the Great Miami River upstream and Markland Locks & Dam on the downstream end. The Great Miami River has a drainage area of 5,400 square miles. Tanners Creek, with a drainage area of 136 square miles, intersects this water body at mile point 494.8. Laughery Creek, with a drainage area of 350 square miles, intersects this water body at mile point 498.7.

Markland-Kentucky (mile point 531.5-545.8; OVWB23). This 14.3 mile-long water body is bounded by Markland Locks & Dam upstream and the Kentucky River on the downstream end.

Kentucky-McAlpine (mile point 545.8-606.8; OVWB24). This 61 mile-long water body is bounded by the Kentucky River upstream and McAlpine Locks & Dam on the downstream end. The Kentucky River has a drainage area of 6,970 square miles. The following tributaries intersect this water body: Little Kentucky River at mile point 546.5 with a drainage area of 147 square

miles; Indian Kentucky River at mile point 550.5 with a drainage area of 150 square miles; and Silver Creek at mile point 606.5 with a drainage area of 225 square miles.

McAlpine-Salt (mile point 606.8-629.9; OVWB25). This 23.1 mile-long water body is bounded by McAlpine Locks & Dam upstream and the Salt River on the downstream end.

Salt-Cannelton (mile point 629.9-720.7; OVWB26). This 90.8 mile-long water body is bounded by the Salt River upstream and Cannelton Locks & Dam on the downstream end. The Salt River has a drainage area of 2,890 square miles. The following tributaries intersect this water body: Big Indiana Creek at mile point 657 with a drainage area of 249 square miles; Blue River at mile point 663 with a drainage area of 466 square miles; and Sinking Creek at mile point 700.9 with a drainage area of 276 square miles.

Cannelton-Newburgh (mile point 720.7-776.1; OVWB27). This 55.4 mile-long water body is bounded by Cannelton Locks & Dam upstream and Newburgh Locks & Dam on the downstream end. The following tributaries intersect this water body: Anderson River at mile point 731.5 with a drainage area of 276 square miles; Blackford Creek at mile point 742.2 with a drainage area of 124 square miles; and Little Pigeon Creek at mile point 773 with a drainage area of 415 square miles.

Newburgh-Green (mile point 776.1-784.2; OVWB28). This 8.1 mile-long water body is bounded by Newburgh Locks & Dam upstream and the Green River on the downstream end.

Green-Uniontown (mile point 784.2-846.0; OVWB29). This 61.8 mile-long water body is bounded by the Green River upstream and Uniontown (John T. Myers) Locks & Dam on the downstream end. The Green River has a drainage area of 9,230 square miles. Pigeon Creek, with a drainage area of 375 square miles, intersects this water body at mile point 792.9.

Uniontown-Wabash (mile point 846.0-848.0; OVWB30). This two mile-long water body is bounded by Uniontown (John T. Myers) Locks & Dam upstream and the Wabash River on the downstream end.

Wabash-Smithland (mile point 848.0-918.5; OVWB31). This 70.5 mile-long water body is bounded by the Wabash River upstream and Smithland Locks & Dam on the downstream end. The Wabash River has a drainage area of 33,100 square miles. The Saline River, with a drainage area of 1,170 square miles, intersects this water body at mile point 867.3. The Tradewater River, with a drainage area of 1,000 square miles, intersects this water body at mile point 873.5.

Smithland-Cumberland (mile point 918.5-920.4; OVWB32). This 1.9 mile-long water body is bounded by Smithland Locks & Dam upstream and the Cumberland River on the downstream end.

Cumberland-Tennessee (mile point 920.4-934.5; OVWB33). This 14.1 mile-long water body is bounded by the Cumberland River upstream and the Tennessee River on the downstream end. The Cumberland River has a drainage area of 17,920 square miles.

Tennessee-Cairo (mile point 934.5-981; OVWB34). This 46.5 mile-long water body is bounded by the Tennessee River upstream and the Mississippi River on the downstream end (the endpoint of the Ohio River). The Tennessee River has a drainage area of 40,910 square miles. The Cache River, with a drainage area of 720 square miles, intersects this water body at mile point 975.7.

CHAPTER 3: MONITORING PROGRAMS TO ASSESS OHIO RIVER DESIGNATED USE ATTAINMENT

The Ohio River Valley Water Sanitation Compact requires that the Ohio River be capable of maintaining fish and other aquatic life, that it be suitable for recreational usage, and that it be safe and satisfactory for public and industrial water supply. The Commission operates a number of monitoring programs to assess the degree of support of these uses, including: Fish Population surveys, Bimonthly Sampling, Clean Metals sampling, Contact Recreation Bacteria Monitoring, Fish Tissue sampling, and High Volume dioxin sampling. The latter two are indirect, chemical measures of biological health, while fish population surveys directly monitor biological integrity of one component (fish) of the aquatic community. Each of these monitoring programs has its strong and weak points, particularly regarding indicator representativeness and spatial and temporal coverage, but together, they provide a reasonable picture of the attainment status of the Ohio River designated uses.

3.1. Bimonthly & Clean Metals Sampling

The Bimonthly Sampling and Clean Metals Sampling programs are used to assess aquatic life and public water supply uses. They entail collection of water column grab samples from 17 Ohio River stations once every other month. The samples are collected by contract samplers and ORSANCO staff and analyzed for certain physical and chemical parameters by contract laboratory. In October 2000, ORSANCO changed from total recoverable metals to dissolved metals criteria, concluding that dissolved metals data is much more accurate and representative of metals dissolved in the water column, and therefore available to aquatic life. Every sample is analyzed for both total recoverable and dissolved metals. Dissolved metals criteria for the protection of aquatic life have very low concentrations, some in the single parts per billion range. Therefore, collection of uncontaminated samples and low-level analyses utilizing "clean techniques" is essential. The Commonwealth of Virginia state laboratory provides the clean metals sampling equipment and analyses.

Nonmetal parameters monitored in the Bimonthly Sampling Program are also used to determine the degree of support for aquatic life. Applicable results from Ohio River stations are compared to established stream criteria. Tables 3-2 through 3-4 provide summaries of the Bimonthly Sampling/Clean Metals network and parameters used in this assessment.

Table 3-2: Bimonthly/Clean Metals Sampling Stations

Station Name	River	River Mile Point	Bordering States	STORET Code
New Cumberland	Ohio	54.4	OH – WV	OR926.6M
Pike Island	Ohio	84.2	OH – WV	OR896.8M
Hannibal	Ohio	126.4	OH – WV	OR8546M
Willow Island	Ohio	161.7	OH – WV	OR8192M
Belleville	Ohio	203.9	OH – WV	OR7771M
R.C. Byrd	Ohio	279.2	OH – WV	OR7018M
Greenup	Ohio	341.0	OH – KY	OR640M
Meldahl	Ohio	436.2	OH – KY	OR5448M
Anderson Ferry	Ohio	477.5	OH – KY	OR502.2M
Markland	Ohio	531.5	IN – KY	OR4495M

Table 3-2: Bimonthly/Clean Metals Sampling Stations –continued.

Station Name	River	River Mile Point	Bordering States	STORET Code
Louisville	Ohio	600.6	IN – KY	OR374.2M
West Point	Ohio	625.9	IN – KY	OR3551M
Cannelton	Ohio	720.7	IN – KY	OR2603M
Newburgh	Ohio	776.1	IN – KY	OR204.9M
J.T. Myers	Ohio	846.0	IN – KY	OR1350M
Smithland	Ohio	918.5	IL – KY	OR62.5M
Lock & Dam 52	Ohio	938.9	IL – KY	OR42.1M

Table 3-3: Clean Metals Sampling Parameters – dissolved & total recoverable.

Element	Analysis	Detection Limit (ug/L)
Aluminum	EPA 1638	1.0
Antimony	EPA 1638	0.1
Arsenic	EPA 1638	0.5
Barium	EPA 1638	10
Cadmium	EPA 1638	0.1
Calcium	EPA 1638	1,000
Copper	EPA 1638	0.1
Chromium	EPA 1638	0.1
Iron	EPA 1638	100
Lead	EPA 1638	0.1
Magnesium	EPA 1638	1,000
Manganese	EPA 1638	0.1
Mercury	EPA 1631	0.0002
Nickel	EPA 1638	0.1
Selenium	EPA 1638	0.5
Silver	EPA 1638	0.1
Thallium	EPA 1638	0.2
Zinc	EPA 1638	1.0

Table 3-4: Analytical Parameters, Methods and Reporting Levels

Parameters	Analytical Method	Detection Limit
Routine Bimonthly		
Ammonia Nitrogen	350.3	0.03 mg/L
Chloride	325.3	1.0 mg/L
Hardness	SM 2340C	1.0 mg/L
Nitrate + Nitrite	353.3	0.02 mg/L
Phenolics	420.1	0.005 mg/L
Total Kjeldahl Nitrogen	4500-N	0.20 mg/L
Sulfate	HACH 8051	1.0 mg/L
Total Suspended Solids	160.2	1.0 mg/L
Total Phosphorus	365.3	0.01 mg/L
Total Organic Carbon	415.1	0.5 mg/L
Cyanide (1)	335.2	5.0 ug/L

3.2. Fish Population Monitoring

Fish population data from 2001 and 2002 is used to assess aquatic life use. The Commission conducts fish population studies annually from July through October, during which time usually between 100 and 200 samples are collected. Samples consist of 500-meter shoreline zones that are electrofished by boat at night. The fish are netted, weighed, measured, species recorded, any unusual abnormalities such as growths or lesions are noted and habitats within the zone recorded. Work is usually conducted over several pools in a season. To date, the sampling effort has focused on the development of a numeric index for use in determining the integrity of fish communities. That index has been completed and includes a number of important factors such as number of fish, fish biomass, species diversity, abundance of pollution tolerant and intolerant species, etc… It has been customized to the Ohio River, with expected values developed for the different habitats. Aquatic life use support is assessed by comparing measured, numeric index values to expected values. Locations with multiple index scores below expected values were assessed as impaired.

3.3. Contact Recreation Bacteria Sampling

The Commission collects bacteria samples from May through October in six large urban communities with combined sewer systems to evaluate the degree of support of the contact recreational use. Five samples are collected monthly from three locations in five of the urban areas (four locations in Pittsburgh) and analyzed for Fecal coliform and E. coli. Table 3-5 contains a list of bacteria sampling locations.

Table 3-5. Contact Recreation Bacteria Sampling Locations

Metropolitan Area	Location Description
Pittsburgh	**Site 1 Mile point 1.4L, above Brunot Island** **A left descending bank sample is collected by boat at this location** **Site 2 Mile point 1.4M, above Brunot Island** **A midstream sample is collected by boat at this location** **Site 3 Mile point 1.4R, above Brunot Island** **A right descending bank sample is collected by boat at this location** **Site 4 Mile point 4.3, above Davis and Neville Islands** **A midstream surface grab is collected by boat at this location**
Wheeling	**Site 1 Mile point 86.8, at the Wheeling Water Dept. intake** **A grab is collected from the raw water intake at the water dept.** **Site 2 Mile point 91.4, below Wheeling Island** **A surface grab is collected from the right descending bank** **Site 3 Mile point 92.8, at the 48th Street Boat Club** **A surface grab is collected from a dock on the left descending bank**
Huntington	**Site 1 Mile point 305.1, at the Guyan Marina** **A surface grab is collected from a dock on the left descending bank** **Site 2 Mile point 308.1, at the Riverfront Public Launching Ramp** **A surface grab is collected from a dock on the left descending bank** **Site 3 Mile point 314.8, at the Kosmos Cement Company** **A bailer is lowered from a barge mooring on the left descending bank**
Cincinnati	**Site 1 Mile point 462.6, at the California Yacht Club** **A surface grab is collected from a dock on the right descending bank** **Site 2 Mile point 470.0, at the Serpentine Wall** **A surface grab sample is collected on the right descending bank** **Site 3 Mile point 477.5 at the Anderson Ferry** **A midstream surface grab is collected by boat at this location**
Louisville	**Site 1 Mile point 594.0, at the Upper Louisville Water Co. intake** **A grab is collected from the raw water intake at the water co.** **Site 2 Mile point 608.7, at the Jaycee's Boat Ramp** **A surface grab collected from a dock on the right descending bank** **Site 3 Mile point 619.3 at the Greenwood Road Public Access Site** **A surface grab is collected from a dock on the left descending bank**
Evansville	**Site 1 Mile point 791.5, at the Evansville Water Plant** **A grab is collected from the raw water intake at the water plant** **Site 2 Mile point 793.7, at the Bristol-Myers parking lot** **A surface grab is collected on the right descending bank** **Site 3 Mile point 797.3 at the U.S. Army Corps of Engineers ramp** **A surface grab is collected from a dock on the right descending bank**

In addition to routine bacteria sampling, the Commission conducted longitudinal surveys for bacteria in 2003 under the Ohio River Watershed Pollutant Reduction Program. This work involved collection of five rounds of samples, one round each week, from Pittsburgh (Ohio River Mile 0) to Louisville (Ohio River Mile 630) with one river cross-section sample collected approximately every five miles. Samples were analyzed for E.coli by the ORSANCO staff utilizing Colilert (a Most Probable Number method). A minimum of 10% duplicate samples was sent to contact laboratory for analyses by the membrane filtration method for E. coli and Fecal coliform. Appendix B contains a list of those sites.

3.4. Fish Tissue Sampling

The Commission collects fish tissue samples an analyses them for certain contaminants to assess the degree of support of the fish consumption use. Approximately 45 to 60 fish tissue samples are analyzed annually from various Ohio River locations that change each year. Tissue contaminants analyzed include PCBs, chlordane, mercury, cadmium, lead and certain pesticides. The states use the data in developing fish consumption public advisories.

3.5. High Volume Dioxin Sampling

The Commission conducts “high volume” sampling for dioxin (2,3,7,8-TCDD) to evaluate the Fish Consumption Use. High volume sampling is a method that concentrates 1000 liters of water into a single sample therefore lowering the detection level approximately 1000 times. This achieves detection levels necessary to measure concentrations in the parts per quadrillion range. At least three rounds of sampling were completed at each of 35 Ohio River stations, or approximately one site every 28 miles on average.

CHAPTER 4: AQUATIC LIFE USE SUPPORT ASSESSMENT

The Ohio River Valley Water Sanitation Compact calls for the Ohio River to be in a satisfactory sanitary condition capable of maintaining fish and other aquatic life. The Commission assesses the degree of support of this designated use every two years as the states are required to do by section 305(b) of the federal Clean Water Act. Data from a number of monitoring programs is utilized in making use attainment assessments, including Bimonthly Sampling, Clean Metals Sampling, and biological data. Aquatic life use attainment is assessed as "Fully Supporting" indicating no problems, "Partially Supporting" meaning few violations of chemical water quality criteria for the protection of aquatic life, and "Not Supporting" meaning biological data indicate impairment or a relatively high frequency of chemical water quality criteria violations.

4.1. Use Attainment Assessment Methodology Summary

- Fully Supporting: No pollutant exceeds the criteria in as much as 10% of the samples and biological data does not indicate aquatic life impairment.
- Partially Supporting: One or more pollutants exceed the criteria in 11-25% of the samples and biological data do not indicate impairment.
- Not Supporting: One or more pollutants exceed the criteria in 11-25% of the samples or biological data indicate impairment.
- Use of biological data: Impairment is identified when the Ohio River Fish Index (ORFIn) has recurring ORFIn values below the 25th percentile of reference sites within a particular habitat type.

The Ohio River Fish Index as noted above is a method of generating a numerical value of fish population data, which can then be compared against other numerical values with known, good water quality. The ORFIn considers such fish community characteristics as number of individuals, number of species (species diversity), number of pollution tolerant and pollution intolerant fish, number of "Great River" fish, etc…

4.2. Aquatic Life Use Assessment

Table 4-6 contains the aquatic life use assessment. Sixteen miles, or 1.6% of the total Ohio River miles are assessed as not supporting the aquatic life use. Impairments are soley based on biological data (ORFIn scores). There were no dissolved metals criteria violations. Appendix C contains the clean metals sampling data and water quality criteria used in the assessment (3 years of data where available from October, 2000 through September, 2003). Bimonthly Sampling data and criteria are contained in Appendix D. Pollutants monitored under the Bimonthly Sampling program with aquatic life criteria include ammonia, cyanide, and chloride. There was one violation of the water quality criterion for cyanide at one location over the reporting period. As a result, there were no impairments based on Bimonthly Sampling data.

Ohio River Fish Index (ORFIn) scores are located in appendix C. This table contains individual ORFIn scores by river mile location and date, habitat type, and expected values, which represent good conditions for each habitat type (referred to as Criteria in the table). The last column, Above-Below, is the difference between ORFIn scores and expected values (Criteria). A

negative score is indicative of ORFIn scores less than expected values. When multiple negative Above-Below values exist, the water was assessed as Not Supporting (Impaired). Sixteen miles of the Ohio River were assessed as Not Supporting based on this analysis as indicated in Table 4-6.

Table 4-6. 2004 Warm Water Aquatic Life Use Support Assessment

Waterbody ID	States	River Miles	Total Miles in Waterbody	No. Miles Full Support	Fully Supporting Segments	No. Miles Not Supporting	Not Supporting Segments	No. Miles Unassessed	Unmonitored/Unassessed Segments
OVWB 01	PA	0.0 - 6.2	6.2	6.2	0-6.2				
OVWB 02	PA	6.2 - 13.3	7.1	7.1	6.2 - 13.3				
OVWB 03	PA	13.3 - 25.4	12.1	12.1	13.3 - 25.4				
OVWB 04	PA	25.4 - 31.7	6.3	6.3	25.4 - 31.7				
OVWB 05	PA	31.7 - 40.2	8.5	8.5	31.7 - 40.2				
OVWB 06	0H-WV	40.2 - 54.4	14.2	14.2	40.2 - 54.4				
OVWB 07	0H-WV	54.5 - 84.2	29.8	29.8	54.5 - 84.2				
OVWB 08	0H-WV	84.2 - 126.4	42.2	42.2	84.2-126.4				
OVWB 09	0H-WV	126.4 - 161.7	35.3	35.3	126.4-161.7				
OVWB 10	0H-WV	161.7 - 172.2	10.5	5.0	161.7 - 166.7			5.5	166.7-172.2
OVWB 11	0H-WV	172.2 - 203.9	31.7	28.4	175.5-203.9			3.3	172.2-175.5
OVWB 12	0H-WV	203.9 - 237.5	33.6	33.6	203.9-237.5				
OVWB 13	0H-WV	237.5 - 265.7	28.2	26.4	237.5-260.3, 262.1-265.7	1.8	260.3-262.1		
OVWB 14	0H-WV	265.7 - 279.2	13.5	13.5	265.7 - 279.2				
OVWB 15	0H-WV	279.2 - 317.1	37.9	37.9	279.2 - 317.1				
OVWB 16	OH-KY	317.1 - 341.0	23.9	20.8	317.1-319.5, 322.6-341.0			3.1	319.5-322.6
OVWB 17	OH-KY	341.0 - 356.5	15.5	15.5	341-356.5				
OVWB 18	OH-KY	356.5 - 436.2	79.7	20.1	356.5-357.8, 396.7-398, 418.7-436.2			59.6	357.8-396.7, 398-418.7
OVWB 19	OH-KY	436.2 - 464.1	27.9	23.3	436.2-458.7, 463.3-464.1			4.6	458.7-463.3
OVWB 20	OH-KY	464.1 - 470.2	6.1	6.1	464.1-470.2				
OVWB 21	OH-KY	470.2 - 491.1	20.9	20.9	470.2-491.1				
OVWB 22	IN-KY	491.1 - 531.5	40.4	40.4	491.1-531.5				
OVWB 23	IN-KY	531.5 - 545.8	14.3	14.3	531.5-545.8				
OVWB 24	IN-KY	545.8 - 606.8	61.0	61.0	545.8-606.8				
OVWB 25	IN-KY	606.8 - 629.9	23.1	23.1	606.8-629.9				
OVWB 26	IN-KY	629.9 - 720.7	90.8	65.7	629.9-664.5, 665.8-676.2, 700-720.7			25.1	664.5-665.8, 676.2-700
OVWB 27	IN-KY	720.7 - 776.1	55.4	28.1	720.7-730.2, 757.5-776.1	1.3	730.2-731.5	26.0	731.5-757.5
OVWB 28	IN-KY	776.1 - 784.2	8.1	8.1	776.1-784.2				
OVWB 29	IN-KY	784.2 - 846.0	61.8	17.6	784.2-788.1, 832.3-846	10.3	788.1-798.4	33.9	798.4-832.3
OVWB 30	IN-KY	846.0 - 848.0	2.0	2.0	846-848				
OVWB 31	IL-KY	848.0 - 918.5	70.5	70.5	848.0 - 918.5				
OVWB 32	IL-KY	918.5 - 920.4	1.9	1.9	918.5-920.4				
OVWB 33	IL-KY	920.4 - 934.5	14.1	14.1	920.4 - 934.5				
OVWB 34	IL-KY	934.5 - 981.0	46.5	19.2	941.1-960.3	2.6	939.8-941.1, 976.8-978.1	24.7	934.5-939.8, 960.3-976.8, 978.1-981
Totals			**981.0**	**779.2**		**16.0**		**185.8**	

*Potential sources include municipal point sources, industrial point sources, CSOs, SSOs, agricultural activities and overland runoff sources, unless otherwise indicated.

CHAPTER 5: PUBLIC WATER SUPPLY USE SUPPORT ASSESSMENT

The Ohio River Valley Water Sanitation Compact requires that the Ohio River be available for safe & satisfactory use as public and industrial water supplies after reasonable treatment. In order to assess this use, the Commission operates a number of monitoring programs including Bimonthly Sampling, Clean Metals, and Contact Recreation Bacteria Sampling. In addition, the Commission surveyed all Ohio River water utilities concerning their source water quality, of which, responses were received from 22 utilities (about two-thirds of all utilities utilizing the Ohio River as a source). Questionaires asked utilities if there were frequent intake closures due to spills, whether violations of finished drinking water maximum contaminant levels (MCLs) occurred due to source water quality, or whether "special" treatment was necessary to meet finished water MCLs due to source water quality.

5.1 Assessment Methodology

- Fully Supporting: No pollutant exceeds criteria in as much as 10% of the samples collected.
- Partially Supporting: One or more pollutants exceed the criteria in 11 to 25% of the samples collected, frequent intake closures are necessary to protect water supplies, or frequent "non-routine" additional treatment is necessary to protect water supplies due to instream concentrations exceeding finished water MCLs.
- Not Supporting: One or more pollutants exceed the criteria in greater than 25% of the samples collected or source water quality causes MCL violations which result in noncompliance with provisions of the SDWA.

5.2 Public Water Supply Use Assessment

Table 5-7 contains the Public Water Supply Use assessment. There were 32.4 miles of the Ohio River assessed as partially supporting the Public Water Supply Use. Of the total, 10.5 miles near Willow Island, West Virginia were impaired due to recurring phenol violations. The remainder, four miles in Pittsburgh, three miles in Wheeling, and 14.9 miles in Louisville, were impaired due to bacteria levels. There was no indication of impairment based on the questionnaire surveys completed by water utilities, or due to dissolved metals data.

It should be noted that public water supply use impairments do not necessarily indicate problems with finished drinking water quality (tap water). In fact, a survey of public water utilities conducted by ORSANCO identified no violations of finished drinking water standards (maximum contaminant levels) for those Ohio River water utilities responding. Impairments do indicate instream water quality conditions, which could pose problems for water utilities, such as spills, instream water quality conditions necessitating special treatment, or violations of instream water quality standards for protection of public water supplies.

Contact Recreation Monitoring Program bacteria data supporting this assessment is contained in Appendix E. The water quality criterion for protection of the public water supply use for Fecal coliform is 2000 colonies/100 mL as a monthly geometric mean. Pittsburgh, Wheeling, and Louisville each had three months in which this value was exceeded. This is the first time that the Ohio River public water supply use has been classified as impaired due to bacteria levels, which may be a result of better monitoring practices.

Appendix D contains clean metals data for which no values exceeded stream criteria for public water supply protection. Appendix E contains bimonthly sampling data for October 2000 through September 2003. Four of 18 total phenol samples at the Willow Island monitoring station were in violation with a high concentration of 29 ug/L. This resulted in impairment.

Table 5-7: 2004 Public Water Supply Use Support Assessment Summary

Waterbody ID	States	River Miles	Total Miles in Waterbody	Miles Not Assessed	Miles Fully Supporting	Miles Partially Supporting	Miles Not Supporting	Impaired Segment Description	Causes of Impairment
OVWB 01	PA	0.0 - 6.2	6.2		2.2	4		0.0-4.0	Bacteria
OVWB 02	PA	6.2 - 13.3	7.1		7.1				
OVWB 03	PA	13.3 - 25.4	12.1		12.1				
OVWB 04	PA	25.4 - 31.7	6.3		6.3				
OVWB 05	PA	31.7 - 40.2	8.5		8.5				
OVWB 06	0H-WV	40.2 - 54.4	14.2		14.2				
OVWB 07	0H-WV	54.5 - 84.2	29.8		29.8				
OVWB 08	0H-WV	84.2 - 126.4	42.2		39.2	3		90.0-93.0	Bacteria
OVWB 09	0H-WV	126.4 - 161.7	35.3		35.3				
OVWB 10	0H-WV	161.7 - 172.2	10.5		0.0	10.5		161.7-172.2	Phenol
OVWB 11	0H-WV	172.2 - 203.9	31.7		31.7				
OVWB 12	0H-WV	203.9 - 237.5	33.6		33.6				
OVWB 13	0H-WV	237.5 - 265.7	28.2		28.2				
OVWB 14	0H-WV	265.7 - 279.2	13.5		13.5				
OVWB 15	0H-WV	279.2 - 317.1	37.9		37.9				
OVWB 16	OH-KY	317.1 - 341.0	23.9		23.9				
OVWB 17	OH-KY	341.0 - 356.5	15.5		15.5				
OVWB 18	OH-KY	356.5 - 436.2	79.7		79.7				
OVWB 19	OH-KY	436.2 - 464.1	27.9		27.9				
OVWB 20	OH-KY	464.1 - 470.2	6.1		6.1				
OVWB 21	OH-KY	470.2 - 491.1	20.9		20.9				
OVWB 22	IN-KY	491.1 - 531.5	40.4		40.4				
OVWB 23	IN-KY	531.5 - 545.8	14.3		14.3				
OVWB 24	IN-KY	545.8 - 606.8	61.0		61.0				
OVWB 25	IN-KY	606.8 - 629.9	23.1		18.2	14.9		615-629.9	Bacteria
OVWB 26	IN-KY	629.9 - 720.7	90.8		90.8				
OVWB 27	IN-KY	720.7 - 776.1	55.4		55.4				
OVWB 28	IN-KY	776.1 - 784.2	8.1		8.1				
OVWB 29	IN-KY	784.2 - 846.0	61.8		61.8				
OVWB 30	IN-KY	846.0 - 848.0	2.0		2.0				
OVWB 31	IL-KY	848.0 - 918.5	70.5		70.5				
OVWB 32	IL-KY	918.5 - 920.4	1.9		1.9				
OVWB 33	IL-KY	920.4 - 934.5	14.1		14.1				
OVWB 34	IL-KY	934.5 - 981.0	46.5		46.5				
Totals			**981.0**		**948.6**	**32.4**	**0.0**		

CHAPTER 6: CONTACT RECREATION USE SUPPORT ASSESSMENT

The Compact requires that the Ohio River remains in a satisfactory sanitary condition suitable for swimming. The Commission operates two bacteria monitoring programs to assess the degree of contact recreational use support, including contact recreation bacteria sampling and Watershed Pollutant Reduction Program longitudinal bacteria surveys. Contact recreation season data from 2001 and 2002 was used in making assessments and Watershed longitudinal bacteria surveys conducted only during 2002 were also used.

6.1 Contact Recreation Use Assessment Methodology

Utilizing Contact Recreation Ambient Monitoring Data:

- Fully Supporting: Monthly geometric mean or instantaneous maximum bacteria criteria are exceeded not more than 10% of the recreation season months.
- Partially Supporting: Monthly geometric mean or instantaneous maximum bacteria criteria are exceeded during 11 to 25 percent of the recreation season months.
- Not Supporting: Monthly geometric mean or instantaneous maximum bacteria criteria are exceeded during greater than 25 percent of the recreation season months.

Utilizing the Watershed Longitudinal Survey Data, multiple violations or high bacteria concentrations in segments were assessed as "Not Supporting", while few violations were assessed as "Partially Supporting". Assessment of segments with one violation or two low violations may have been assessed either way depending on conditions in adjacent waters.

6.1.1 Contact Recreation Use Assessment

Table 6-8 contains the 2004 contact recreation use support assessment results. One hundred thirteen miles are classified as "Not Supporting", two hundred fifty-four miles are "Partially Supporting", and three hundred forty five miles were not assessed. The upper two thirds of the river has been assessed along with a segment in the Evansville, IN/Henderson, KY area. Appendix F contains the 2002-2003 Contact Recreation ambient monitoring data and Appendix G contains the Watershed longitudinal E. coli data. Figure 6-3 presents ambient bacteria monitoring data from the Contact Recreation Season Monitoring Program for 2001 through 2003. There are 30 samples collected at each sampling station in each community. The graph depicts the number of events out of 30 that an exceedance of the stream criterion occurred. Pittsburg, Wheeling, and Louisville exceeded the stream criterion for the protection of contact recreation in at least half the samples in all three years, while Cincinnati and Evansville have tended to experience fewer violations than the other municipalities. The year 2003 tended to have more violations than 2001 or 2002, presumably due to increased precipitation in that year.

Table 6-8: 2004 Contact Recreation Use Support Assessment Summary

Waterbody ID	States	River Miles	Total Miles in Waterbody	*Monitoring Station at River Mile Point (MP)	Miles Not Assessed	Miles Fully Supporting	Miles Partially Supporting	Miles Not Supporting	Impaired Segment Description	Causes of Impairment
OVWB 01	PA	0.0 - 6.2	6.2	*1.4R,1.4M,1.4L,4.3*				6.2	ALL	Pathogen
OVWB 02	PA	6.2 - 13.3	7.1	*Special Survey*			7.1		ALL	Pathogen
OVWB 03	PA	13.3 - 25.4	12.1	*Special Survey*			12.1		ALL	Pathogen
OVWB 04	PA	25.4 - 31.7	6.3	*Special Survey*			6.3		ALL	Pathogen
OVWB 05	PA	31.7 - 40.2	8.5	*Special Survey*			8.5		ALL	Pathogen
OVWB 06	OH - WV	40.2 - 54.4	14.2	*Special Survey*			14.2		ALL	Pathogen
OVWB 07	OH - WV	54.4 - 84.2	29.8	*Special Survey*			29.8		ALL	Pathogen
OVWB 08	OH - WV	84.2 - 126.4	42.2	*86.8, 91.4, 92.8*				42.2	ALL	Pathogen
OVWB 09	OH - WV	126.4 - 161.7	35.3	*Special Survey*			35.3		ALL	Pathogen
OVWB 10	OH - WV	161.7 - 172.2	10.5	*Special Survey*			10.5		161.7-172.2	Pathogen
OVWB 11	OH - WV	172.2 - 203.9	31.7	*Special Survey*		20.4	11.3		172.2-183.5	Pathogen
OVWB 12	OH - WV	203.9 - 237.5	33.6	*Special Survey*		33.6				
OVWB 13	OH - WV	237.5 - 265.7	28.2	*Special Survey*		23.1	5.1		250.4-255.5	Pathogen
OVWB 14	OH - WV	265.7 - 279.2	13.5	*Special Survey*		13.5				
OVWB 15	OH - WV	279.2 - 317.1	37.9	*305.1,308.1,314.8*		22.8		15.1 (302-317.1)	302-317.1	Pathogen
OVWB 16	OH - KY	317.1 - 341.0	23.9	*Special Survey*			23.9		ALL	Pathogen
OVWB 17	OH - KY	341.0 - 356.5	15.5	*Special Survey*			15.5		ALL	Pathogen
OVWB 18	OH - KY	356.5 - 436.2	79.7	*Special Survey*		41.1	38.6		356.5-395.1	Pathogen
OVWB 19	OH - KY	436.2 - 464.1	27.9	*462.6*		26.4		1.5	462.6-464.1	Pathogen
OVWB 20	OH - KY	464.1 - 470.2	6.1	*470*				6.1	ALL	Pathogen
OVWB 21	OH - KY	470.2 - 491.1	20.9	*477.5*				20.9	ALL	Pathogen
OVWB 22	IN - KY	491.1 - 531.5	40.4	*Special Survey*		25.4	15.0 (491.1-498, 523.4-531.5)		491.1-498	Pathogen
OVWB 23	IN - KY	531.5 - 545.8	14.3	*Special Survey*		7.3	7 (531.5-538.5)		531.5-538.5	Pathogen
OVWB 24	IN - KY	545.8 - 606.8	61.0	*594.0*		47.0	14 (553.6-567.6)		553.6-567.6	Pathogen
OVWB 25	IN - KY	606.8 - 629.9	23.1	*608.7, 619.3*		7.9		15.2 (606.8-609.7; 617.6-629.9)	606.8-609.7; 617.6-629.9	Pathogen
OVWB 26	IN - KY	629.9 - 720.7	90.8		90.8					
OVWB 27	IN - KY	720.7 - 776.1	55.4		55.4					
OVWB 28	IN - KY	776.1 - 784.2	8.1		8.1					
OVWB 29	IN - KY	784.2 - 846.0	61.8	*791.5, 793.7,797.3*	56.0			5.8 (791.5-797.3)	791.5-797.3	Pathogen
OVWB 30	IN - KY	846.0 - 848.0	2.0		2.0					
OVWB 31	IL - KY	848.0 - 918.5	70.5		70.5					
OVWB 32	IL - KY	918.5 - 920.4	1.9		1.9					
OVWB 33	IL - KY	920.4 - 934.5	14.1		14.1					
OVWB 34	IL - KY	934.5 - 981.0	46.5		46.5					
Totals			**981.0**		**345.3**	**268.5**	**254.2**	**113.0**		

Figure 6-3. Contact Recreation Season Violations of Criteria

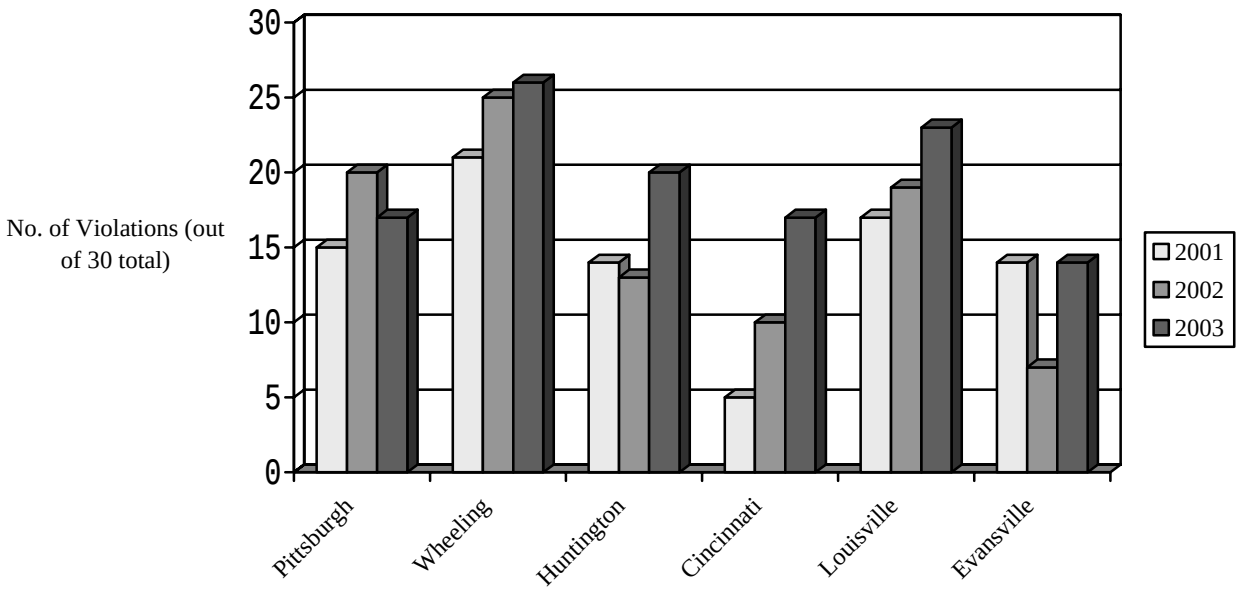


Figure 6-4 and figure 6-5 present the Watershed longitudinal E. coli data. Each survey includes five rounds of sampling, one longitudinal survey each week. Data points represent the arithmetic mean of a three-point cross-section. In the upper-river surveys, a decreasing trend in the downstream direction is noted. There is also a decreasing trend with time due to the large amount of rainfall just before the surveys began. Concentrations in the mid-river survey tend to be significantly less than the upper river bacteria concentrations. The same is true for the number of water quality criteria violations. Most of the mid-river criteria violations occur in the Huntington, Portsmouth and Cincinnati areas.

Figure 6-4. Upper River Bacteria Survey Cross-Sectional Means, July 28-August 28, 2003

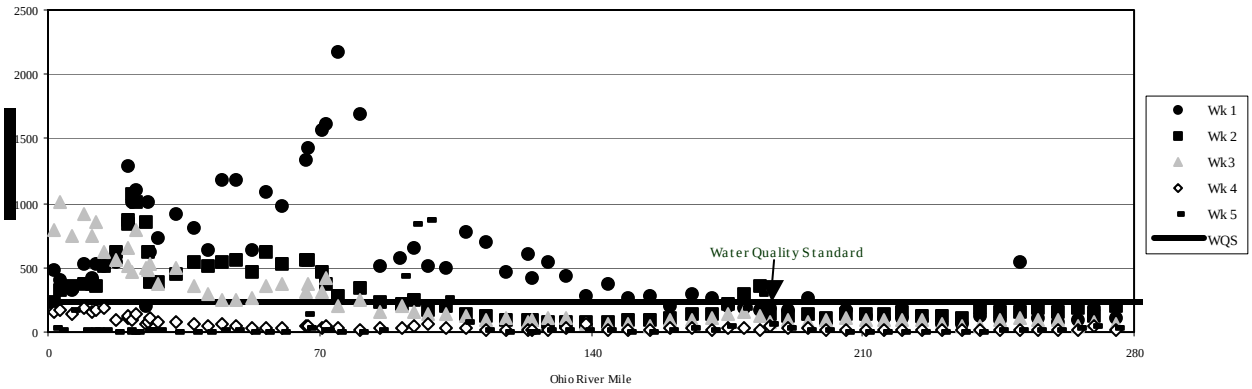
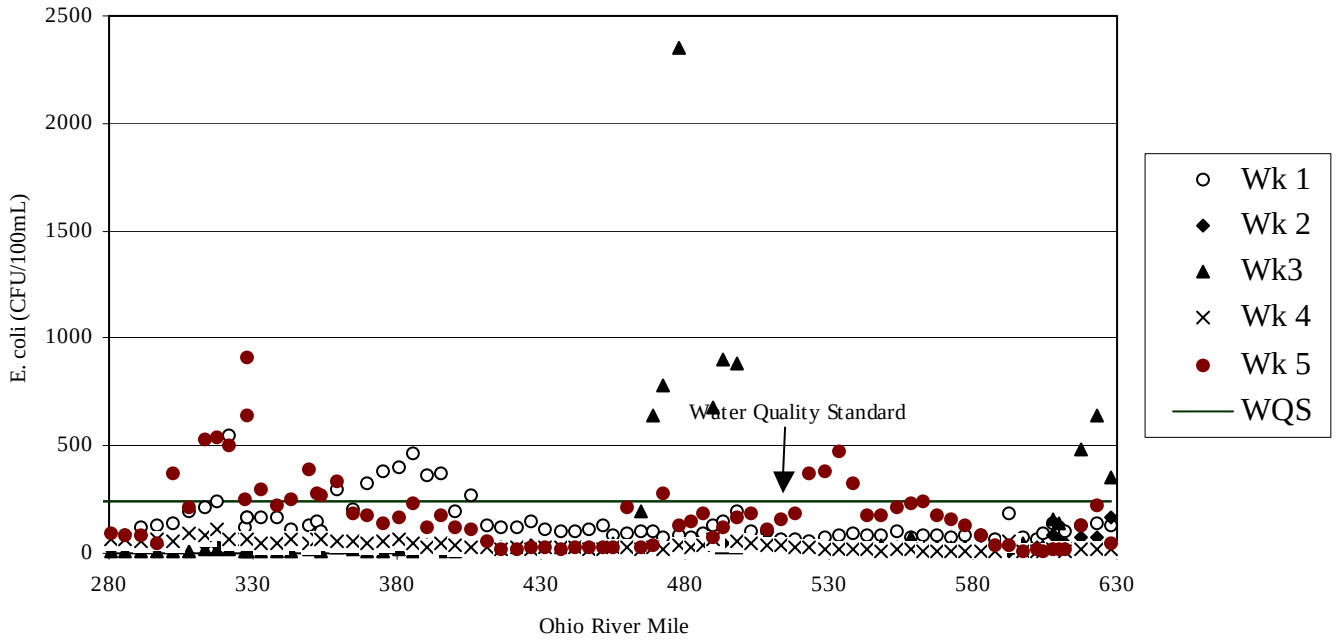


Figure 6-5. Mid River Bacteria Survey Cross-Sectional Means, Sept. 29 – Oct. 30, 2003



CHAPTER 7: FISH CONSUMPTION USE SUPPORT ASSESSMENT

The Compact requires that the Ohio River in a satisfactory sanitary condition and adaptable to such other uses as may be legitimate. The Commission maintains water quality criteria for the protection of human health from fish consumption, has determined such use to be legitimate, and therefore evaluates that use in the 305b Report. The Commission generally collects and analyzes between 45 and 60 samples annually. Samples are five-fish composites and analyzed for certain organics, pesticides and metals as described in the monitoring section. These data are then used by various agencies in each of the states to issue fish consumption advisories to the public. Fish consumption advisories specific to the Ohio River are utilized in making impairment decisions. Statewide advisories that are not specific to the Ohio River are not used to classify the river as impaired. Mercury and dioxin data were also assessed against criteria for the protection of human health for fish consumption.

7.1 Fish Consumption Use Assessment Methodology

Fully Supporting: No fish consumption advisories are in effect
Partially Supporting: Restricted fish consumption advisories are in effect or Hg fish tissue data greater than 0.3 mg/kg or dioxin high volume data exceeds criteria.
Not Supporting: "No Consumption" advisories are in effect for all commonly consumed species

In addition, two special cases involve mercury and dioxin. Because of the prevalence of statewide consumption advisories for mercury and the differences in states' procedures for issuing fish consumption advisories, the Commission compared mercury fish tissue data against its criterion (0.3 mg/kg) in making impairment decisions. Dioxin water concentration data was compared against the Commission's water quality criterion (5 fg/L) to make impairment decisions.

7.2 Fish Consumption Use Assessment

Fish consumption use was assessed based primarily on the states' issuance of fish consumption advisories, but also used Hg fish tissue data and dioxin high volume water column data. Table 7-9 contains the fish consumption use assessment summary. Appendix H contains the most recent fish consumption advisories. Appendix I contains high volume dioxin data used in the assessment. The entire Ohio River has been classified as Partially Supporting based on PCB fish consumption advisories as well as exceedances of water quality criteria for dioxin. The dioxin stream criterion was recently lowered such that a violation is measured every time and everywhere a sample is collected (see figure 7-7 to 7-6). As such, the entire river is listed for dioxin as well as PCBs. Dioxin water concentration data was compared against the Commission's water quality criterion (0.000000005 ug/L). Because every dioxin sample, river-wide, is above the water quality criterion, the entire river was assessed as Partially Supporting for dioxin.

Regarding mercury, no Ohio River fish tissue data exceeded 0.3 mg/kg, and as such, no impairment due to Hg is indicated (see figure 7-7). Because of the prevalence of statewide consumption advisories for mercury and the differences in states' procedures for issuing fish consumption advisories, the Commission compared mercury fish tissue data against its criterion (0.3 mg/kg) in making impairment decisions.

Table 7-9: 2004 Fish Consumption Use Support Assessment Summary

Waterbody ID	States	River Miles	Total Miles in Waterbody	Miles Not Assessed	Miles Fully Supporting	Miles Partially Supporting	Miles Not Supporting	Causes of Impairment
OVWB 01	PA	0.0 - 6.2	6.2			ALL		PCBs, Dioxin
OVWB 02	PA	6.2 - 13.3	7.1			ALL		PCBs, Dioxin
OVWB 03	PA	13.3 - 25.4	12.1			ALL		PCBs, Dioxin
OVWB 04	PA	25.4 - 31.7	6.3			ALL		PCBs, Dioxin
OVWB 05	PA	31.7 - 40.2	8.5			ALL		PCBs, Dioxin
OVWB 06	0H-WV	40.2 - 54.4	14.2			ALL		PCBs, Dioxin
OVWB 07	0H-WV	54.5 - 84.2	29.8			ALL		PCBs, Dioxin
OVWB 08	0H-WV	84.2 - 126.4	42.2			ALL		PCBs, Dioxin
OVWB 09	0H-WV	126.4 - 161.7	35.3			ALL		PCBs, Dioxin
OVWB 10	0H-WV	161.7 - 172.2	10.5			ALL		PCBs, Dioxin
OVWB 11	0H-WV	172.2 - 203.9	31.7			ALL		PCBs, Dioxin
OVWB 12	0H-WV	203.9 - 237.5	33.6			ALL		PCBs, Dioxin
OVWB 13	0H-WV	237.5 - 265.7	28.2			ALL		PCBs, Dioxin
OVWB 14	0H-WV	265.7 - 279.2	13.5			ALL		PCBs, Dioxin
OVWB 15	0H-WV	279.2 - 317.1	37.9			ALL		PCBs, Dioxin
OVWB 16	OH-KY	317.1 - 341.0	23.9			ALL		PCBs, Dioxin
OVWB 17	OH-KY	341.0 - 356.5	15.5			ALL		PCBs, Dioxin
OVWB 18	OH-KY	356.5 - 436.2	79.7			ALL		PCBs, Dioxin
OVWB 19	OH-KY	436.2 - 464.1	27.9			ALL		PCBs, Dioxin
OVWB 20	OH-KY	464.1 - 470.2	6.1			ALL		PCBs, Dioxin
OVWB 21	OH-KY	470.2 - 491.1	20.9			ALL		PCBs, Dioxin
OVWB 22	IN-KY	491.1 - 531.5	40.4			ALL		PCBs, Dioxin
OVWB 23	IN-KY	531.5 - 545.8	14.3			ALL		PCBs, Dioxin
OVWB 24	IN-KY	545.8 - 606.8	61.0			ALL		PCBs, Dioxin
OVWB 25	IN-KY	606.8 - 629.9	23.1			ALL		PCBs, Dioxin
OVWB 26	IN-KY	629.9 - 720.7	90.8			ALL		PCBs, Dioxin
OVWB 27	IN-KY	720.7 - 776.1	55.4			ALL		PCBs, Dioxin
OVWB 28	IN-KY	776.1 - 784.2	8.1			ALL		PCBs, Dioxin
OVWB 29	IN-KY	784.2 - 846.0	61.8			ALL		PCBs, Dioxin
OVWB 30	IN-KY	846.0 - 848.0	2.0			ALL		PCBs, Dioxin
OVWB 31	IL-KY	848.0 - 918.5	70.5			ALL		PCBs, Dioxin
OVWB 32	IL-KY	918.5 - 920.4	1.9			ALL		PCBs, Dioxin
OVWB 33	IL-KY	920.4 - 934.5	14.1			ALL		PCBs, Dioxin
OVWB 34	IL-KY	934.5 - 981.0	46.5			ALL		PCBs, Dioxin
Totals			**981.0**			**981.0**		

*Potential sources include municipal point sources, industrial point sources, CSOs, SSOs, agricultural activities and overland runoff sources, unless othe

**These waterbodies were not monitored for Hg

Figure 7-6. Dioxin TEQ concentrations in the Ohio River (1997-2003).

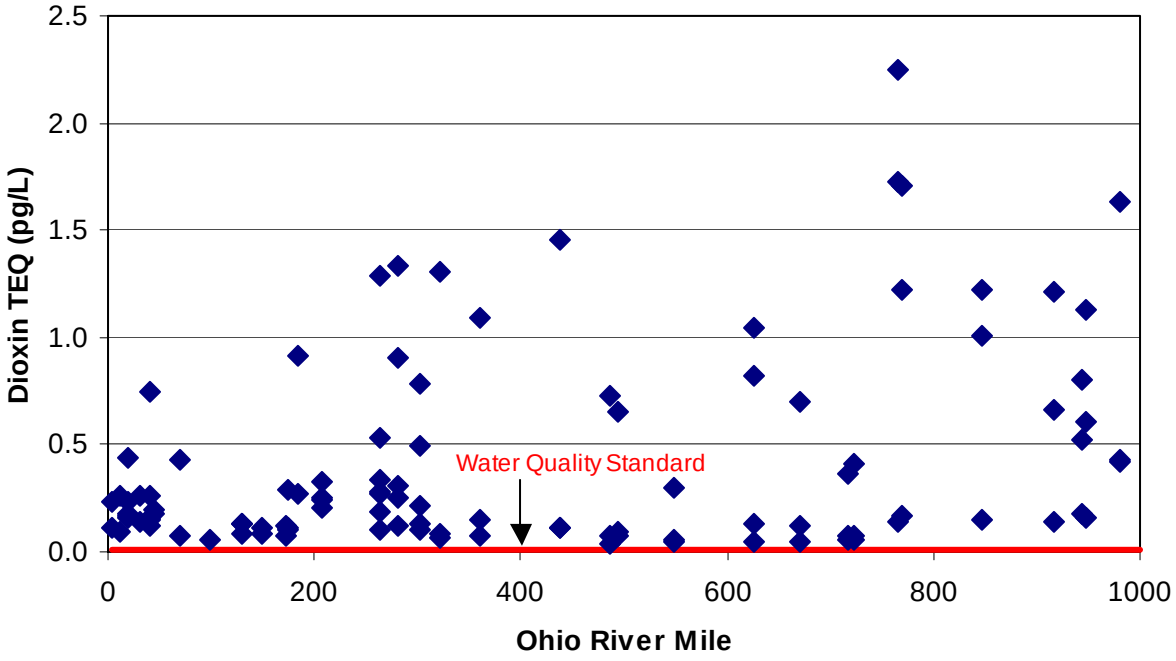
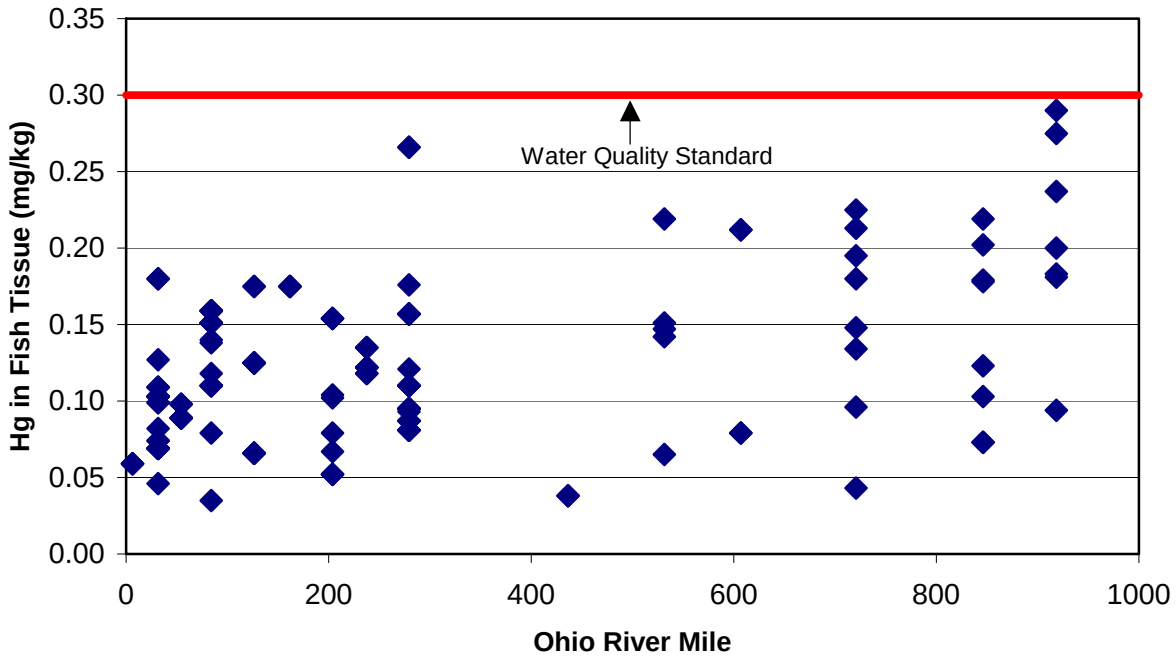


Figure 7-7. Mercury levels detected in Ohio River fish tissue (2001-2002).



CHAPTER 8: INTEGRATED LIST

The Integrated Report combines requirements of both section 305(b) and 303(d) of the federal Clean Water Act. Each of the states completes an Integrated List, which goes out for public comment and is approved by the US EPA. The Commission, through its 305(b) coordinating committee made up of states' 305(b) Coordinators facilitates interstate consistency in states' Integrated Lists by completing this section for the Ohio River.

The Integrated List contains a list of water requiring Total maximum Daily Loads (TMDLs). The Commission itself is not required to complete an Integrated List or TMDLs, therefore its list does not contain a schedule for establishment of TMDLs as required of the states. The Report is also not subject to the public review process that the official state reports are required to complete.

The Integrated List contains five assessment categories as follows:

Category 1 All applicable water quality standards are met.

Category 2 Some water quality standards are met but there is insufficient data to determine if all standards are met.

Category 3 Insufficient data to determine whether any applicable water quality standards are met.

Category 4 Water is impaired but a TMDL is not needed.
Category 4a A TMDL is not needed because it has already been completed.
Category 4b A TMDL is not needed because other required control measures are expected to result in the support of all designated uses in a reasonable period of time.
Category 4c A TMDL is not needed because the impairment is not caused by a pollutant.

Category 5 The water is impaired and a TMDL is needed.

Table 8-10 contains the 2004 Integrated List. Total maximum daily loads are indicated for phenol (ORM 260.3-262.1) along the Ohio-West Virginia border. Bacteria TMDLs for the protection of public water supplies are indicated in Pittsburgh, Wheeling, and Louisville. Bacteria TMDLs to protect the contact recreational use are indicated for most of the monitored river segments, however much of the lower Ohio River was unmonitored for this reporting period. TMDLs for PCBs and dioxin are indicated along the entire Ohio River except where already completed. TMDLs based on biological data do not as of yet have pollutants identified and will therefore need additional work prior to completion of any TMDLs.

Table 8-10: 2004 Ohio River Integrated Assessment

Waterbody ID/ Assessment Unit	States	River Miles	Total Miles in Waterbody	Warm Water Aquatic Life Use Support	Public Water Supply Use Support	Contact Recreation Use Support	Fish Consumption Use Support
OVWB 01	PA	0.0 - 6.2	6.2	1	5 (0-4.0)	5	5*
OVWB 02	PA	6.2 - 13.3	7.1	1	1	5	5*
OVWB 03	PA	13.3 - 25.4	12.1	1	1	5	5*
OVWB 04	PA	25.4 - 31.7	6.3	1	1	5	5*
OVWB 05	PA	31.7 - 40.2	8.5	1	1	5	5*
OVWB 06	0H-WV	40.2 - 54.4	14.2	1	1	5	5*
OVWB 07	0H-WV	54.5 - 84.2	29.8	1	1	5	5*
OVWB 08	0H-WV	84.2 - 126.4	42.2	1	5 (90.0-93.0)	5	5*
OVWB 09	0H-WV	126.4 - 161.7	35.3	1	1	5	5*
OVWB 10	0H-WV	161.7 - 172.2	10.5	3 (166.7-172.2)	5	5 (161.7-172.2)	5*
OVWB 11	0H-WV	172.2 - 203.9	31.7	3 (172.2-174.2)	1	5 (172.2-183.5)	5*
OVWB 12	0H-WV	203.9 - 237.5	33.6	1	1	1	5*
OVWB 13	0H-WV	237.5 - 265.7	28.2	5 (260.3-262.1)	1	5 (250.4-255.5)	4a
OVWB 14	0H-WV	265.7 - 279.2	13.5	1	1	1	4a
OVWB 15	0H-WV	279.2 - 317.1	37.9	1	1	5 (302-317.1)	4a
OVWB 16	OH-KY	317.1 - 341.0	23.9	3 (319.5-322.6)	1	5 (317.1-341.0)	5
OVWB 17	OH-KY	341.0 - 356.5	15.5	1	1	5 (341.0-356.5)	5
OVWB 18	OH-KY	356.5 - 436.2	79.7	3 (357.8-396.7, 398-418.7)	1	5 (356.5-395.1)	5
OVWB 19	OH-KY	436.2 - 464.1	27.9	3 (458.7-463.3)	1	5 (462.6-464.1)	5
OVWB 20	OH-KY	464.1 - 470.2	6.1	1	1	5	5
OVWB 21	OH-KY	470.2 - 491.1	20.9	1	1	5	5
OVWB 22	IN-KY	491.1 - 531.5	40.4	1	1	5 (491.1-498)	5
OVWB 23	IN-KY	531.5 - 545.8	14.3	1	1	5 (531.5-538.5)	5
OVWB 24	IN-KY	545.8 - 606.8	61.0	1	1	5 (553.6-567.6)	5
OVWB 25	IN-KY	606.8 - 629.9	23.1	1	5 (615.0-629.9	5 (606.8-609.7; 617.6-629.9)	5
OVWB 26	IN-KY	629.9 - 720.7	90.8	3 (664.5-665.8, 676.2-700)	1	3	5
OVWB 27	IN-KY	720.7 - 776.1	55.4	3 (731.5-757.5), 5 (730.2-731.5)	1	3	5
OVWB 28	IN-KY	776.1 - 784.2	8.1	1	1	3	5
OVWB 29	IN-KY	784.2 - 846.0	61.8	3 (798.4-832.3), 5 (788.1-798.4)	1	5 (791.5-797.3)	5
OVWB 30	IN-KY	846.0 - 848.0	2	1	1	3	5
OVWB 31	IL-KY	848.0 - 918.5	70.5	1	1	3	5
OVWB 32	IL-KY	918.5 - 920.4	1.9	1	1	3	5
OVWB 33	IL-KY	920.4 - 934.5	14.1	1	1	3	5
OVWB 34	IL-KY	934.5 - 981.0	46.5	3 (934.5-939.8, 960.3-976.8, 978.1-981), 4C (939.8-941.1, 976.8-978.1)	1	3	5

1: Attaining the water quality standard.

2: Attaining some of the designated uses; and insufficient or no data and information is available to determine if the remaining uses are attained.

3: Insufficient or no data and information to determine if designated use is attained.

4: Impaired for one or more designated uses but does not require the development of a TMDL:

4A: TMDL has been completed

4B: Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.

4C: Impairment is not caused by a pollutant.

5: The water quality standard is not attained. The assessment unit is impaired for one or more designated uses by a pollutant(s), and requires a TMDL.

* A TMDL for PCBs has been completed and approved for these waterbodies; a Dioxin TMDL is still needed.

** TMDLs for PCBs and dioxin has been completed and approved for these waterbodies.

CHAPTER 9: SUMMARY & RECOMMENDATIONS

ORSANCO's biennial assessment was generated through the coordination of the Commission's 305(b) Workgroup, which is composed of representatives from each of the Ohio River states' as well as US EPA Regions 3, 4, and 5. This workgroup met via meetings and teleconferences multiple times during the report preparation process. Through these meetings, the assessment parameters, methodology, and schedule were established. This group, along with ORSANCO staff, reviewed Ohio River monitoring data and provided input into the generation of this report. Monitoring data from ORSANCO's Bimonthly Sampling, Clean Metals Sampling, Bacteria Monitoring, Watershed Protection, Fish Population and Fish Contaminants programs, along with information from public drinking water facilities, provided the information needed to generate this assessment. The involvement of state personnel during the development of this report was essential to promote consistency among the states as they assess Ohio River water quality.

Most Ohio River states incorporate ORSANCO's biennial assessment into their own 305(b) reports. This either occurs directly as an attachment to their reports, or by reference within their reports. Most states do not conduct water quality monitoring on the Ohio River as extensively as ORSANCO, so this opportunity to share resources and promote consistency among the states that border the Ohio River is extremely valuable. ORSANCO also completes an Integrated List of waters requiring TMDLs. The purpose of developing this list is to promote consistency in Ohio River segments listed for TMDL development. The states submit their own Integrated Lists and otherwise have no requirement to complete TMDLs as contained in the Commission's report. However, the states in general are consistent with ORSANCO's 305(b) and Integrated List.

The aquatic life use assessment employed a new methodology for making assessments in 2004. The Ohio River Fish Index (ORFIn) was compared against expected values from sites with good representative fish communities. Locations with multiple ORFIn scores below the 25th percentile of expected scores were assessed as Not Supporting the aquatic life use. For 2004, 16 Ohio River miles within four separate segments were assessed as impaired using biological data, the longest segment being 10 miles long. To date, the fish population-monitoring program has been completed for the purpose of numeric index development (ORFIn). Beginning in the 2004, field season, the fish population-monitoring program will move into development of an ambient monitoring program design for the purpose of future 305(b) assessments. As such, the assessment methodology in future reports will likely change. In addition, there were no impairments indicated by chemical water quality criteria violations.

There are currently 30 water utilities using the Ohio River as a source of drinking water, two of which are non-municipal and two municipals, which use two intakes each. These water utilities provide drinking water to nearly 3million people, and as such, it is important that the source water be evaluated for its suitability for use as drinking water after treatment. The public water supply use was assessed utilizing Ohio River water quality data as well as results of a survey sent out to each utility. Approximately two-thirds of the utilities responded to the survey which asked whether finished drinking water standards (Maximum Contaminant Levels) were violated as a result of Ohio River water quality, whether non-routine treatment was necessary to meet MCLs, or whether frequent intake closures were necessary to avoid poor source water conditions. No

impairments to Ohio River water quality were indicated from responses to water utility questionnaires. The public water supply use was assessed as impaired in three segments totaling 21.9 miles due to bacteria levels in Pittsburgh, Wheeling, and Louisville, primarily as a result of wet weather sources of bacteria. An additional 10.5 miles was Impaired due to phenol violations along the Ohio-West Virginia border upstream of Marietta, Ohio. A followup survey to identify sources should be conducted.

The Ohio River is used extensively for contact recreation by boaters and swimmers alike. Bacteria data is used solely to determine the status of attainment of the contact recreational use. Contact recreation bacteria monitoring is conducted in the six largest communities with combined sewer systems along the Ohio River – Pittsburgh, Wheeling, Huntington, Cincinnati, Louisville, and Evansville. All of these communities are classified as Not Supporting the contact recreational use based on monitoring results. These impairments have been documented since the installation of the monitoring sites in the early 1990's. In 2003, the Commission initiated longitudinal bacteria surveys in an effort to characterize bacteria levels in the entire Ohio River. To date, the upper 630 miles of the Ohio River have been monitored. This represents an increase of 450 miles of assessed waters of the Ohio River. Of approximately 630 assessed Ohio River miles, approximately 367 miles are impaired representing over one half of assessed miles. The lower third of the Ohio River will be monitored during the 2004 field season.

The entire Ohio River is partially supporting the fish consumption use for dioxin and PCBs. The states base their fish consumption advisories on the Commission's fish tissue contaminants program. All states have Ohio River fish consumption advisories for PCBs. In addition, the Commission has operated a dioxin-sampling program since 1997 and has collected samples in many segments and all regions of the Ohio River. Every sample collected exceeds the Commission's water quality criterion for human health protection from consumption of fish. Therefore, the entire Ohio River is classified as impaired for dioxin in addition to PCBs. Many states have statewide fish consumption advisories for mercury. However, no Ohio River fish tissue contaminant samples exceed the Commission's criterion. Therefore, no impairment is indicated for mercury.

The Commission completed an Integrated List containing waters requiring total maximum daily loads (TMDLs) for the purpose of promoting interstate consistency in TMDL-listed waters. States are not required to complete TMDLs for those waters appearing on the Commissions TMDL list, however this list should be consistent with the states' lists. River-wide TMDLs are indicated for PCBs and dioxin except for segments which already have a TMDL completed. Bacteria TMDLs are indicated for over 200 miles of the Ohio River. A TMDL for phenol is indicated in a 10-mile segment of the Ohio River upstream of Marietta, Ohio for public water supply protection. Finally, TMDLs are indicated for approximately 13 miles of the Ohio River in three separate segments based on biological data for which no pollutant has yet been identified. Additional work will be necessary to determine the pollutant(s) prior to completing these TMDLs.