State of Ohio
Environmental Protection Agency

Division of Surface Water

Ohio 2006 Integrated Water Quality Monitoring and Assessment Report

prepared to fulfill the requirements of
Sections 303(d), 305(b), and 314 of the Clean Water Act

Final Report

Submitted to U.S. EPA: March 27, 2006
Approved by U.S. EPA: May 1, 2006

Bob Taft, Governor
Joseph P. Koncelik, Director

Table of Contents

6 Addressing Waters Not Meeting Water Quality Goals

Maps

Appendices

Lists of Tables and Figures

Tables

Figures

Executive Summary

The *Ohio 2006 Integrated Water Quality Monitoring and Assessment Report* summarizes water quality conditions in the State of Ohio. The report satisfies Ohio's water quality reporting requirements under Sections 303(d), 305(b), and 314 of the Clean Water Act. The report was last updated in 2004.

Using methods devised to determine the suitability of waters for three specific uses – aquatic life (fish and aquatic insects), recreation such as boating and swimming, and human health impacts related to fish tissue contamination – available data were compared with water quality goals. The results indicate which waters are meeting goals and which are not. Waters not meeting the goals for one or more of the three types of uses are referred to as *impaired.* The waters found to be impaired are prioritized and scheduled for further study and restoration. The report also includes the monitoring schedule that the Ohio EPA plans to follow for the next several years.

The report describes the methods used to judge impairment of each type of use. The methods have evolved in each reporting cycle as the Agency obtains improved access to more data and a better understanding of what it means. Starting with this reporting cycle, the evaluation of fish tissue contaminant data is no longer linked to fish consumption advisories; the revised methodology directly compares the data to the human health-based water quality criteria. This more direct linkage with available data allows an expanded look at more sampling locations. Also, an assessment methodology for the public drinking water supply use is being proposed for comment.

Results are reported for 331 watershed units and 23 large river units (those draining more than 500 square miles). Additional information on streams draining between 50 and 500 square miles is presented for the first time. General information on Ohio's water quality is also reported in the form of statistics and progress toward Ohio's "80% attainment of the aquatic life use goal."

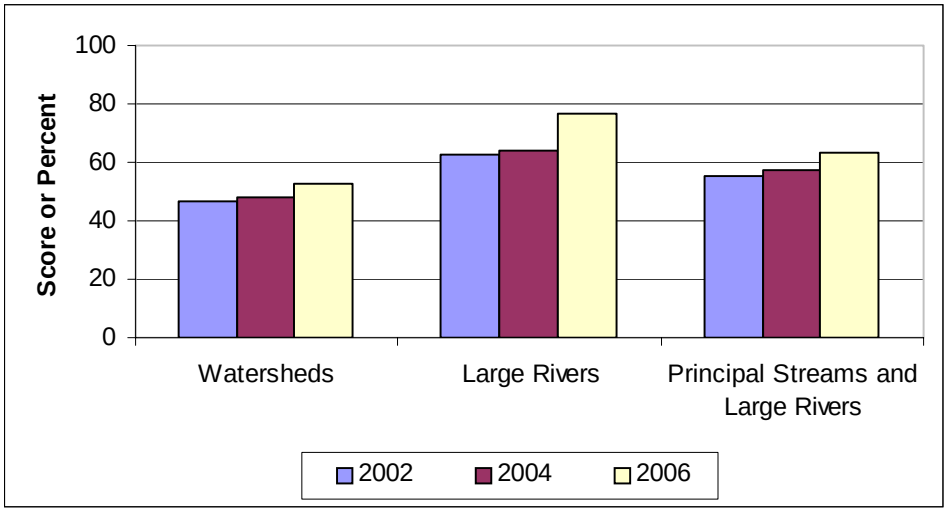
To satisfy the 303(d) requirements, each watershed and large river unit is assigned to a category indicating its water quality condition. The 2006 highlights include the following:

- The overall number of "303(d) listed" waters (impaired and requiring a restoration plan) waters did not change significantly. Twenty waters moved into the impaired category, all based on new data; twenty moved out of the category, 17 based on approval of restoration plans and three because of new data.
- Fewer waters are without any data (i.e., condition unknown), although the number of waters with data collected within the past 10 years is decreasing slightly.
- Most of the watersheds for which new data are collected show impairment of one or more uses.
- Overall, the 2006 report includes assessment results on more waters, but does not indicate any substantial decline or improvement in Ohio's waters over the past two years.
- The major source of new data for this report is Ohio EPA in-depth monitoring in the Olentangy, Mad, Tuscawaras, Wakatomika, Toussaint, Chagrin, Grand, and Hocking watersheds.

Comparison of results for inland waters: 2004 vs. 2006				
	Watersheds		Large Rivers	
Category	2004	2006	2004	2006
1 Attaining all WQS	1	**1**	1	**0**
2 Attaining some WQS	7	**13**	1	**2**
3 Insufficient data	75	**54**	0	**0**
4 Impaired, no restoration plan (TMDL) needed	6	**19**	1	**1**
5 Impaired, restoration plan (TMDL) needed	242	**244**	20	**20**

Data from the report does indicate incremental improvements in water quality and progress toward the "80% attainment of the aquatic life use goal." The upward trend in full attainment of this use in both watersheds and in larger streams continues. In general, large rivers in Ohio are meeting aquatic life use goals at a much higher percentage than smaller streams, an indication that the most pervasive problems affecting Ohio's aquatic resources are landscape scale nonpoint issues (both urban and agricultural). Impacts associated with these nonpoint issues include direct effects like instream habitat modifications and indirect effects such as increased overland nutrient and sediment loads. These factors are the major causes of impairment in many of Ohio's smaller streams.

The largest change in statistics between 2004 and 2006 involved the proportion of full aquatic life use attainment reported for the large river units. The increase from 64% in 2004 to 77% in 2006 is somewhat misleading in that six large rivers with data collected between 1992 and 1994 were dropped from the trend statistics due to the 10-year data threshold. If data from these six rivers are factored into the 2006 statistics (despite the age of the data), the proportion of miles in full attainment is 70%. Nevertheless an increase of 6% in aquatic life use full attainment in the State's large rivers is a positive development. The increase in full attainment across all large rivers is largely due to new assessments of the Hocking River (100% full attainment over 69 miles) and the Tuscarawas River (86% full attainment over 103 miles).



What's Changed from the 2004 Integrated Report?

New Methods

- An assessment methodology for the public drinking water supply (PWS) use is being proposed. Although not used to determine impairment in the 2006 report, we expect to include an evaluation of the PWS use in the 2008 report. The public was invited to review the methodology and submit comments for consideration. See Appendix C.
- The evaluation of fish tissue contaminant data has been totally uncoupled from fish consumption advisories. This more direct look at available data allows an expanded look at more sampling locations. The revised methodology directly compares the data to the human health based water quality criteria.

More Information

- More discussion and statistics about "principal streams" are provided. Principal streams drain 50 to 500 square miles. In previous reports, this type of information was limited to large rivers (draining more than 500 square miles).
- Summary pages for each assessment unit provide more information than in the 2004 report. For example, fish contaminant information has been expanded from "yes/no" in the previous report to length of impairment and more specific location information.
- Data from the two most recent assessment years were included in the analyses.

Results

- Ohio's water quality continues to improve.
- The 2006 report includes assessment results on more waters.
- Full attainment of the aquatic life use for large rivers increased from 64% in 2004 to greater than 70% in 2006.
- Progress in completing TMDL studies in impaired waters is the most noticeable trend in 303(d) listing statistics.

List of Acronyms

AmphIBI	amphibian index of biotic integrity
AU	assessment unit
BEACH	Beaches Environmental Assessment and Coastal Health (Act)
BMP	best management practice
CABB	Center for Applied Bioassessment and Biocriteria
CAFO	Concentrated Animal Feeding Operations
Corps	U.S. Army Corps of Engineers
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSO	combined ewer overflow
CSP	Conservation Security Program
CWH	Coldwater Habitat
CWA	Clean Water Act
DDAGW	Division of Drinking and Ground Waters
DDT	dichlorodiphenyltrichloroethane
DEFA	Division of Environmental and Financial Assistance
DES	Division of Environmental Services
DLG	Digital Line Graph
DSW	Division of Surface Water
EAG	External Advisory Group
EQIP	Environmental Quality Incentives Program
EWH	Exceptional Warmwater Habitat
FCA	fish consumption advisory
FFY	federal fiscal year
FWPCA	Federal Water Pollution Control Act
GRP	Grassland Reserve Program
HUC	hydrologic unit code
IR	Integrated Report
kg	kilogram
L	liter
LCI	Lake Condition Index
LEC	(Ohio) Lake Erie Commission
LEPF	(Ohio) Lake Erie Protection Fund
LRAUs	large river assessment unit
LRW	Limited Resource Water
LTCP	long-term control plan
MBI	Midwest Biodiversity Institute
MF	membrane filter
mg	milligram
mi^2	square miles
MOR	monthly operating data
MPN	most probable number
MS4	municipal separate storm sewer systems
MWH	Modified Warmwater Habitat
NEORSD	Northeast Ohio Regional Sewer District

NHD	National Hydrography Dataset
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source
NSSP	National Shellfish Sanitation Program
OAC	Ohio Administrative Code
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
ORSANCO	Ohio River Valley Water Sanitation Commission
OWDA	Ohio Water Development Authority
OWRC	Ohio Water Resources Council
PAHs	polyaromatic hydrocarbons
PCB	polychlorinated biphenyls
PDWS	Public Drinking Water Supply (PWS)
PS	point source
PTI	permit to install
PTO	permit to operate
PWS	Public Water Supply
QA	quality assurance
QC	quaity control
RF3	Reach File Version 3
RM	river mile
SDWA	Safe Drinking Water Act
SFY	state fiscal year (July 1 to June 30)
sq mi	square miles
SSM	single-sample maximum
STORET	STOrage and RETtrieval (a U.S. EPA water quality database)
SWIMS	Surface Water Information Management System
TMDL	total maximum daily load
TOC	total organic carbon
U.S. EPA	United States Environmental Protection Agency
ug	microgram
USC	United States Code
USGS	U.S. Geological Survey
VIBI	vegetation index of biotic integrity
WAUs	watershed assessment unit
WHIP	Wildlife Habitat Incentives Program
WPCLF	Water Pollution Control Loan Fund
WQ	water quality
WQC	Water Quality Certification (Section 401)
WQMP	Water Quality Management Plan
WQPSD	Water Quality Permit Support Document
WQS	water quality standards
WRP	Wetlands Reserve Program
WRRSP	Water Resource Restoration Sponsor Program
WSRLA	Water Supply Revolving Loan Account
WWH	Warmwater Habitat

1

Introduction

1.1 Purpose

This report describes the status of Ohio's surface waters, as required by Sections 303(d), 305(b), and 314 of the federal Clean Water Act. Recent guidance from the U.S. Environmental Protection Agency (U.S. EPA) directs states to prepare an **integrated** 305(b) water quality inventory and 303(d) list of impaired water bodies (U.S. EPA, 2005). Therefore, we have titled this document the *Ohio 2006 Integrated Water Quality Monitoring and Assessment Report*, or Integrated Report (IR).

Section 305(b) requires a summary of the status of the state's surface waters, while Section 303(d) of the Clean Water Act requires the state to develop a list of water bodies that do not meet established standards. Such waters are referred to as "impaired waters." The state must take appropriate actions to improve impaired water bodies, including the development of total maximum daily loads (TMDLs), water quality based permitting, and nonpoint pollution control measures. As such the *Ohio 2006 Integrated Report* is an important document that provides information and direction to much of the State's work in water quality planning, monitoring, financial and technical assistance, permitting, and nonpoint source programs.

1.2 History of Reporting on Ohio Water Quality

The 2006 Integrated Report (IR) continues Ohio's evolution to a fully-formed watershed basis for reporting on water quality conditions. For the past decade Ohio has maintained strong linkages between Section 305(b) reporting and Section 303(d) listing. Under the title *Water Resource Inventories*, Ohio prepared Section 305(b) reports every two years since 1988 using a biologically based assessment methodology[1]. Subsequently, Section 303(d) lists were compiled using the output of Section 305(b) reporting in 1992, 1994, 1996, and 1998. In 2002, the first IR was produced, addressing the needs of both reporting functions.

Reporting on Ohio's water resources continues to develop, including more data types and more refined methodologies. Analysis of the condition of aquatic life was the long-standing focus of reporting on water quality in Ohio and continues to provide a strong foundation. A methodology for using bacteria data to assess recreation suitability was developed for the 2002 report and

[1] In 1990 the linkage of fish and macroinvertebrate community index scores and attainment of aquatic life use designations was established in Ohio's Water Quality Standards (OAC 3745-1).

refined in 2004, remaining essentially the same for 2006. A methodology for comparing fish tissue contaminant data to human health criteria via fish consumption advisories was included in the 2004 report. That methodology is refined in 2006, comparing the data directly to the criteria without the consideration of the presence of a fish consumption advisory. A draft assessment methodology for the public drinking water supplies is being proposed in 2006. Although not used to determine impairment in the 2006 report, we expect to include an evaluation of the drinking water use in the 2008 report. Assessment methodologies are described in Section 4.

1.3 Assessment Units

The 2006 IR continues the watershed orientation outlined in previous reports. Throughout this report, references are made to large rivers and watersheds as assessment units defined for 303(d) listing purposes. Data from individual sampling locations in an assessment unit are accumulated and analyzed; summary information and statewide statistics are provided in this report. The three types of assessment units (AUs) are:

- Watershed Assessment Units (WAUs) - 331 watersheds that align with the 11-digit hydrologic unit code (HUC) system. Ohio HUC numbers are lowest in the northwest corner of the state, proceeding approximately clockwise around the state. The first two digits of Ohio numbers are either 04 (draining to Lake Erie) or 05 (draining to the Ohio River).

- Large River Assessment Units (LRAUs) - 23 rivers that drain more than 500 square miles; the length of each river included is from the mouth of each river upstream to the point where the drainage area reaches 500 square miles

- Lake Erie Assessment Units - for 3 nearshore areas of the lake: western, central, islands

Ohio River assessment units have been defined by the Ohio River Valley Water Sanitation Commission (ORSANCO). Ohio borders 25 of the 43 Ohio River assessment units included in ORSANCO's 305(b) report (2006).

It is important to remember that the information presented here is a summary. All of the underlying data observations are available and can be used for more detailed analysis of water resource condition on a more localized, in-depth scale. Much of the information is available in watershed reports available at http://www.epa.state.oh.us/dsw/document_index/psdindx.html. TMDL reports are another source of more in-depth analyses, available at http://www.epa.state.oh.us/dsw/TMDL/index.html#TMDL%20Projects.

Ohio's large rivers, defined for this report as draining greater than 500 square miles, are illustrated in Figure 1-1. Ohio's watershed units are shown in Figure 1-2. Some reporting also mentions principal streams, defined as draining 50 to 500 square miles. Principal streams are not assessment units, but information is included here to provide a more complete picture of water quality conditions. Principal streams and their condition are discussed in more detail in Section 2.

Figure 1-1. Ohio's large river assessment units
(rivers with greater than 500 mi^2 of drainage area)

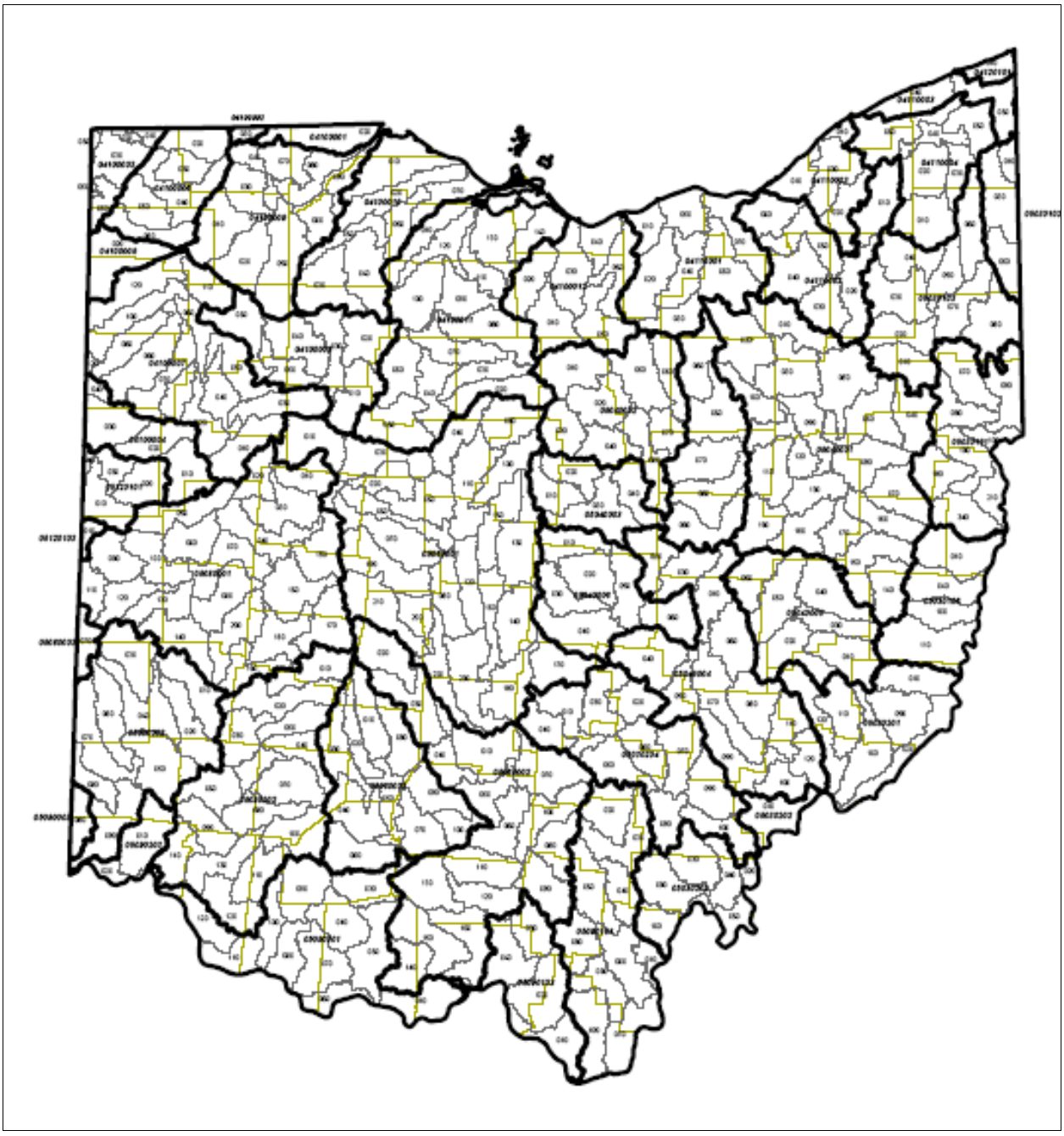


Figure 1-2. Ohio's watershed assessment units
(11-digit HUCs, 8 digit HUCs shown with heavy line)

1.4 Public Involvement

Ohio EPA convened an advisory group that included representatives from the regulated community (e.g., industries, municipalities), environmental groups, consultants, citizens, state and federal agencies, farm organizations, and development interests. The group, which included about eighty active participants, met from late 1998 to June 2000. One subgroup addressed listing issues. Their conclusions were as follows:

- ✓ monitoring and data quality are essential
- ✓ use outside data of highest quality
- ✓ endorse priorities of 1998 list
- ✓ increase attention to human health issues
- ✓ quantify "cost of inaction"
- ✓ more monitoring is needed
- ✓ data should be accessible and geographically referenced
- ✓ increased public involvement is needed
- ✓ current funding and resources are inadequate.

The cost associated with implementing the advisory group's listing recommendations was $3.2 million annually; the cost for implementing all advisory group recommendations was $9.7 million annually. Ohio EPA used these estimates to seek additional state funding but ultimately was unsuccessful in competing with other state funding priorities. We have incorporated the "low cost" recommendations (the first four listed above), and we continue to seek ways to address all of the group's recommendations.

Much of the data used in this report has been presented to the public in meetings and publications concerning individual watersheds. Data and assessments have also been available in previous 305(b), 303(d), and integrated reports. All of this information can be accessed from the following Internet web site:
http://www.epa.state.oh.us/dsw/document_index/psdindx.html.

An official public comment period was announced in the Ohio EPA Weekly Review and in legal notices published in Ohio's major daily newspapers (see Appendix B.4). A public information session was held in Columbus on February 8, 2006. The comment period for the draft 2006 Integrated Report ran from January 20 through February 20, 2006. Comments received, and responses to those comments, are summarized in Appendix B.5.

1.5 Organization of the Report

The opening sections of this document describe the universe of water quality in Ohio – the size and scope of Ohio's water resources, programs that are used to evaluate and improve water quality, and funding sources for water quality improvement.

The middle sections are more technical and explain the beneficial uses assigned to Ohio's waters, the assessment methodologies used for the analyses of those uses, the data used to determine whether those uses are being supported, and the conclusions drawn about water quality conditions in each assessment unit.

The closing section describes how waters found to be impaired will be scheduled for further study. A collection of maps that illustrate current conditions and future plans follow the text. Several appendices provide additional information and detail. The 303(d) list is contained in Appendix D.2. Appendix E contains a one-page summary of the condition of each assessment unit.

2

Ohio's Water Resource

2.1 Facts and Figures

Ohio is a water-rich state bounded on the south by the Ohio River and the north by lake Erie. These water bodies, as well as thousands of miles of inland streams and rivers and thousands of acres of lakes and wetlands, contribute to the quality of life of Ohio's citizens. The size and scope of Ohio's water resources are outlined in Table 2-1.

The larger water bodies included in Table 2-1 comprise the major aquatic resources that are used and enjoyed by Ohioans for water supplies, recreation and other purposes. The quality of these perennial streams and other larger water bodies is strongly influenced by the condition and quality of the small feeder streams, often called the headwaters. Approximately 28,800 miles of the over 58,000 miles of stream channels digitally mapped in Ohio are headwater streams. However, the digital maps currently available for Ohio do not include the smallest of headwater channels. Results of a special study of primary headwater streams (drainage areas less than 1 mi^2) place the estimate of primary headwaters between 146,000 to almost 250,000 miles (Ohio EPA, 2002). Some of these primary headwater streams are in fact perennial habitats for aquatic life that supply base flow in larger streams. This illustrates the importance of taking a holistic watershed perspective in water resource management.

Ohio is an economically important and diverse state with strong manufacturing and agricultural industries. Many of the historical patterns of environmental impact in Ohio are related to the geographical distribution of basic industries, land use, mineral resources, and population centers. Also important, however, is an understanding of Ohio's geology, land form, land use, and other natural features as these determine the basic characteristics and ecological potential of streams and rivers. Ohio EPA bases the selection, development, and calibration of ecological, toxicological, and chemical/physical indicators on these factors. These indicators are then used via systematic ambient monitoring to provide information about existing environmental problems, threats to existing high quality waters, and successes in abating water pollution problems in Ohio's surface waters.

Table 2-1. Ohio's water resource statistics		
	Value	**Source**
State population	11,353,140	2000 Census
Surface area	41,280 sq mi	ODNR
Rivers and streams		
Miles of named and designated streams	> 23,000	ODNR [1]
Total miles	58,230	NHD [2]
Miles of perennial streams	29,390	NHD
Miles of intermittent streams	28,840	NHD
Miles of primary headwater streams	>140,000	Ohio EPA (2002)
Miles of large rivers (draining more than 500 sq mi)	1,286	NHD
Miles of principal streams (draining 50 to 500 sq mi)	4,464	NHD
Border miles: Ohio River	451	NHD
Border miles: Lake Erie shoreline	312	NHD
Lakes/reservoirs/ponds		
Number of significant publicly owned lakes	447	ODNR
Total acreage of significant publicly owned lakes	118,963	ODNR
Wetlands		
Acreage	500,000	
% of original wetlands	10%	

[1] Mileage figure for waters listed by Ohio Department of Natural Resources in *Gazetteer of Ohio Streams, 2nd edition* (ODNR, 2001).

[2] An estimate prepared from a computer-digitized map of U.S. streams and rivers produced by the U.S. Geological Survey (USGS) known as the National Hydrography Dataset (NHD). The NHD is based upon the content of USGS Digital Line Graph (DLG) hydrography data integrated with reach-related information from the U.S. EPA Reach File Version 3 (RF3). http://nhd.usgs.gov/index.html

Twelve river systems in Ohio are included in the State Scenic Rivers Program, administered by the Ohio Department of Natural Resources (see Figure 2-1). Between 1970 and 2005, twelve stream systems totaling 616 miles were designated Scenic, 59 miles in three systems were designated Wild, and 63 miles in two systems were designated Recreational. Portions of three stream systems – the Little Miami, Little Beaver Creek, and Big and Little Darby Creek – are also included in the National Wild and Scenic System. The total Ohio stream miles included in the national designation is 207 miles. More information on Ohio's scenic rivers can be found at http://www.dnr.state.oh.us/dnap/sr/

Figure 2-1. Ohio Scenic River System (ODNR, 2005)

2.2 General Summary of Condition: Progress Toward the "80% by 2010" Goal

In the early 1990s, Ohio EPA established a goal of fully attaining the designated aquatic life use[2] in 80% of Ohio's streams and rivers by 2010. The purpose of the goal is not to supersede the Clean Water Act goal of 100% attainment for all uses but rather to provide an reasonable target against which to track water quality improvements in Ohio.

However, since inception of the "80% by 2010" goal, the Agency has struggled to find an effective and meaningful method to report progress. At first, the measure consisted of the percentage of total monitored stream miles attaining the aquatic life use. While this was simple to understand, the increased focus on watersheds during the late 1990s made it necessary to incorporate a watershed component to the reporting. The 2002 and 2004 Integrated Reports

[2] Beneficial use designations describe existing or potential uses of waterbodies. See Section 4.1 for additional description.

included a watershed score and a large river score[3], matching the assessment unit types established for 303(d) reporting purposes (see Section 1.3). While the large river score continued to be useful, the watershed score has proven to be too abstract and not effective in communicating current conditions and trends [4].

Therefore, the Agency has sought to clarify and simplify the procedure used to determine goal status. The 2006 Integrated Report introduces an alternative approach to assessing progress toward the "80% by 2010" goal. This measure identifies the subset of perennial stream and river miles that drain watersheds of 50 mi^2 or greater. This subset (5,750 miles out of approximately 29,390 perennial miles) represents 254 Principal Streams and Large Rivers in Ohio. These are named streams and rivers which are readily recognized by the public. Ohio EPA has conducted monitoring with sufficient site coverage to provide rigorous linear extrapolations of aquatic life use status for many of these streams. Table 2-2 provides a listing of the Principal Streams and Large Rivers by major Ohio watershed, and Figure 2-4 graphically depicts the extent of these stream and river miles within Ohio.

Table 2-3 provides a few simple statistics to illustrate the general condition of Ohio's waterways and the degree of change over the past 3 reporting cycles (6 years). For continuity with prior reports the watershed assessment unit score is shown along with the miles of large rivers and principle streams that fully meet their designated aquatic life uses.

Each goal tracking measure indicates an upward trend in full aquatic life use attainment. The largest change in statistics between 2004 and 2006 involved the proportion of full attainment reported for the large river units. The increase from 64% in 2004 to 77% in 2006 is somewhat misleading in that six large rivers with data collected between 1992 and 1994 were dropped from the trend statistics due to the 10-year data threshold[5]. If data from these six rivers are factored into the 2006 statistics (despite the age of the data), the proportion of miles in full attainment is 70%. Nevertheless an increase of 6% in aquatic life use full attainment in the State's large rivers is a positive development. The steady increase in percent of principle streams in full aquatic life use attainment over the past three reporting cycles also is encouraging. The increase in full aquatic life use attainment across all large rivers is largely due to new assessments of the Hocking River (100% full attainment over 69 miles) and the Tuscarawas River (86% full attainment over 103 miles).

---

[3] A detailed explanation of how data were aggregated and synthesized for this effort and results for 2002 and 2004 can be found at http://www.epa.state.oh.us/dsw/bioassess/AquaticLifeGoal.html.

[4] The score calculated for each monitored watershed used a combination of a spatial assessment of small watershed sites and a linear stream mile extrapolation assessment for larger stream sites. The score calculation formula incorporates a site weighting method that gives more importance to larger sites in the watershed when deriving the score (See Section 4.6.4). This results in a score that is a dimensionless number (i.e., not a percentage). The statewide average of available WAU scores constitutes the watershed component of the "80% by 2010" Aquatic Life Use goal.

[5] Data older than 10 years were eliminated only from the trend analysis. Assessment units are not being delisted from the 303(d) list if they are currently in Category 5 (impaired, requiring a TMDL) even if data are more than 10 years old.

In general, large rivers in Ohio are meeting aquatic life use goals at a much higher percentage than smaller streams, indicating that the most pervasive problems affecting Ohio's aquatic resources are landscape scale nonpoint issues (both urban and agricultural). Impacts associated with these nonpoint issues include direct effects like instream habitat modifications) and indirect effects such as increased overland nutrient and sediment loads. These factors are the major causes of impairment in many of Ohio's smaller streams.

Table 2-2. List of Ohio's principal streams and large rivers			
Basin	**Large Rivers** (draining more than 500 sq miles)	**Principal Streams** (draining more than 50 sq miles, but less than 500 sq miles)	
Areas draining to Lake Erie			
Maumee Basin 	Maumee River Auglaize River Blanchard River Tiffin River	Swan Creek Beaver Creek Bad Creek South Turkeyfoot Creek North Turkeyfoot Creek Flatrock Creek Powell Creek North Powell Creek Blue Creek Little Auglaize River Prairie Creek West Branch Prairie Creek Dog Creek Riley Creek Ottawa Creek Eagle Creek Ottawa River	Sugar Creek Hog Creek Jennings Creek Ottawa River Tenmile Creek St. Joseph River Fish Creek Nettle Creek West Branch St. Joseph River East Branch St. Joseph River St. Marys River Black Creek Mud Creek Lick Creek Brush Creek Bean Creek
Portage Basin 		Portage River Sugar Creek North Branch Portage River	South Branch Portage River Middle Branch Portage River Rocky Ford Toussaint Creek
Sandusky Basin 	Sandusky River	Wolf Creek East Branch Wolf Creek Sycamore Creek Broken Sword Creek	Green Creek Honey Creek Muddy Creek Tymochtee Creek

Table 2-2. List of Ohio's principal streams and large rivers		
Basin	**Large Rivers** (draining more than 500 sq miles)	**Principal Streams** (draining more than 50 sq miles, but less than 500 sq miles)
Huron Basin 		Huron River East Branch Huron River West Branch Huron River
Vermilion Basin 		Vermilion River
Black Basin 		Black River East Branch Black River West Branch Black River
Rocky Basin 		Rocky River East Branch Rocky River West Branch Rocky River

Table 2-2. List of Ohio's principal streams and large rivers		
Basin	**Large Rivers** (draining more than 500 sq miles)	**Principal Streams** (draining more than 50 sq miles, but less than 500 sq miles)
Cuyahoga Basin 	Cuyahoga River	Tinkers Creek Breakneck Creek Little Cuyahoga River
Chagrin Basin 		Chagrin River Aurora Branch
Grand Basin 	Grand River	Mill Creek Rock Creek
Ashtabula Basin 		Ashtabula River Conneaut Creek

Table 2-2. List of Ohio's principal streams and large rivers			
Basin	**Large Rivers** (draining more than 500 sq miles)	**Principal Streams** (draining more than 50 sq miles, but less than 500 sq miles)	
Areas draining to the Ohio River			
Mahoning Basin 	Mahoning River	Meander Creek Mill Creek Mosquito Creek	Eagle Creek West Branch Mahoning River Pymatuning Creek
Little Beaver Basin 		Little Beaver Creek Bull Creek	North Fork Little Beaver Creek Middle Fork Little Beaver Creek West Fork Little Beaver Creek
Central Ohio Tributaries 		Captina Creek Cross Creek Duck Creek East Fork Duck Creek West Fork Duck Creek Little Muskingum River	McMahon Creek Short Creek Sunfish Creek Wheeling Creek Yellow Creek North Fork

Table 2-2. List of Ohio's principal streams and large rivers			
Basin	**Large Rivers** (draining more than 500 sq miles)	**Principal Streams** (draining more than 50 sq miles, but less than 500 sq miles)	
Muskingum Basin 	Muskingum River Licking River Tuscarawas River Walhonding River Mohican River Wills Creek	Wolf Creek South Branch Wolf Creek West Branch Wolf Creek Olive Green Creek Conotton Creek Indian Fork Killbuck Creek Doughty Creek Apple Creek Rocky Fork Licking River South Fork Licking River Raccoon Creek North Fork Licking River Moxahala Creek Jonathan Creek Stillwater Creek Little Stillwater Creek Brushy Fork Sugar Creek South Fork Sugar Creek Sandy Creek Nimishillen Creek Still Fork White Eyes Creek	Wolf Creek Chippewa Creek Mill Creek Kokosing River Jelloway Creek North Branch Kokosing River Lake Fork Mohican River Muddy Fork Mohican River Jerome Fork Mohican River Black Fork Mohican River Rocky Fork Mohican River Clear Fork Mohican River Salt Fork Wills Creek Sugartree Fork Crooked Creek Leatherwood Creek Seneca Fork Buffalo Fork Little Hocking River Meigs Creek Salt Creek Wakatomika Creek Little Wakatomika Creek
Hocking Basin 	Hocking River	Margaret Creek Federal Creek Sunday Creek Monday Creek	Clear Creek Rush Creek Little Rush Creek
Southeast Ohio Tributaries 	Raccoon Creek	Indian Guyan Creek Leading Creek Little Scioto River Rocky Fork Little Scioto River Pine Creek Little Raccoon Creek	Elk Fork Shade River East Branch Shade River Middle Branch Shade River West Branch Shade River Symmes Creek Black Fork

Table 2-2. List of Ohio's principal streams and large rivers			
Basin	**Large Rivers** (draining more than 500 sq miles)	**Principal Streams** (draining more than 50 sq miles, but less than 500 sq miles)	
Scioto Basin 	Scioto River Paint Creek	Big Beaver Creek Peepee Creek Walnut Creek Scippo Creek Walnut Creek Big Walnut Creek Mill Creek Alum Creek Blacklick Creek Bokes Creek Little Scioto River Rush Creek Big Darby Creek Little Darby Creek Deer Creek Sugar Run Olentangy River	Whetstone Creek North Fork Paint Creek Compton Creek Rocky Fork Paint Creek Rattlesnake Creek Lees Creek West Branch Rattlesnake Creek Sugar Creek East Fork Paint Creek Salt Creek Salt Lick Creek Middle Fork Salt Creek Laurel Run Scioto Brush Creek South Fork Scioto Brush Creek Sunfish Creek
Southwest Ohio Tributaries 		Bullskin Creek Eagle Creek West Fork Eagle Creek Ohio Brush Creek Baker Fork	West Fork Ohio Brush Creek Straight Creek Whiteoak Creek East Fork Whiteoak Creek North Fork Whiteoak Creek
Little Miami Basin 	Little Miami River	O'Bannon Creek Turtle Creek East Fork Little Miami River Stonelick Creek Todd Fork	Cowan Creek Caesar Creek Anderson Fork Massies Creek

Table 2-2. List of Ohio's principal streams and large rivers		
Basin	**Large Rivers** (draining more than 500 sq miles)	**Principal Streams** (draining more than 50 sq miles, but less than 500 sq miles)
Great Miami Basin 	Great Miami River Mad River Stillwater River Whitewater River	Indian Creek Clear Creek Bear Creek Wolf Creek Honey Creek Lost Creek Tawawa Creek Stony Creek Buck Creek Ludlow Creek Greenville Creek Swamp Creek Dry Fork Fourmile Creek Sevenmile Creek Twin Creek Loramie Creek Muchinippi Creek South Fork Great Miami River
Mill Basin 		Mill Creek
Wabash Basin 		Wabash River Beaver Creek

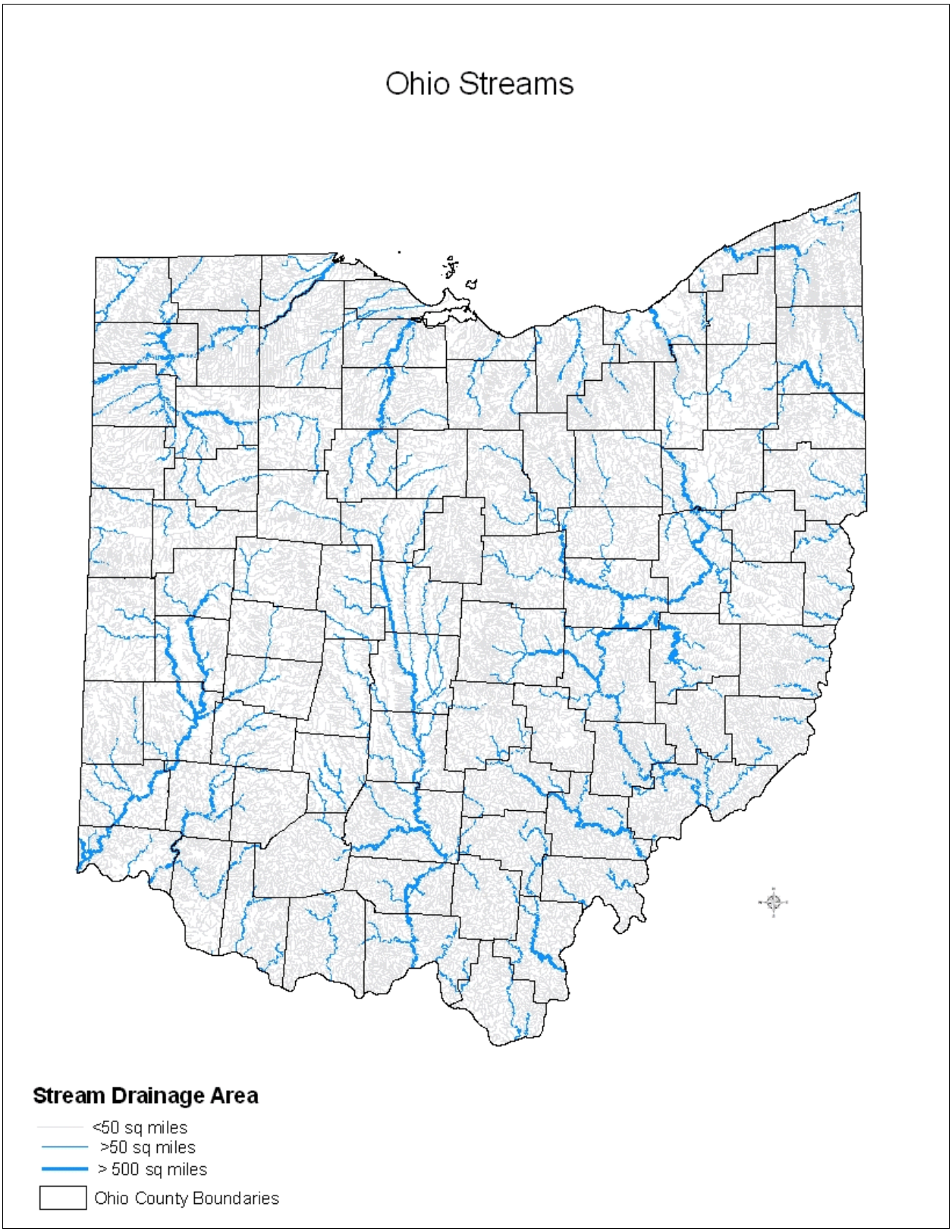


Figure 2-2. Map of Ohio's principal streams and large rivers

Table 2-3. Progress towards the 80% by 2010 Aquatic Life Use goal over the last three Integrated Report assessment cycles[1]			
Integrated Report Statistics	**2002** (1991-2000)	**2004** (1993-2002)	**2006** (1995-2004)
Watershed Assessment Units (WAUs): 331 Total			
WAUs Assessed (% of Total)	224 (68%)	225 (68%)	212 (64%)
No. Sites Assessed	3272	3620	3785
WAU Goal Status (Average Ohio WAU Score)			
Full Attainment Score	**46.6**	**48.3**	**52.5**
Large River Assessment Units (LRAUs): 23 Rivers / 1286 Miles *(miles defined as those draining >500 mi^2 watersheds)*			
LRAUs Assessed (% of Total)	22 (96%)	21 (91%)	17 (74%)
No. Sites Assessed	422	425	374
Miles Assessed (% of Total)	905 (70%)	918 (71%)	873 (68%)
LRAU Goal Status (% Monitored Miles in Full Attainment)			
% Full Attainment	**62.5**	**64.0**	**76.8**
Principal Streams and Large Rivers: 254 Rivers and Streams / 5750 Miles *(miles defined as those draining >50 mi^2 watersheds)*			
No. Sites Assessed	1444	1445	1312
Miles Assessed (% of Total)	3921 (68%)	3781 (66%)	3630 (63%)
Goal Status (% Monitored Miles in Full Attainment)			
% Full Attainment	**55.2**	**57.6**	**63.3**

[1] Using the current construct based on the Watershed Assessment Unit statewide average full attainment score and the Large River Assessment Unit percentage of assessed miles in full attainment, and the alternative measurement of goal progress using the percentage of miles in full attainment for Principal Streams and Large Rivers.

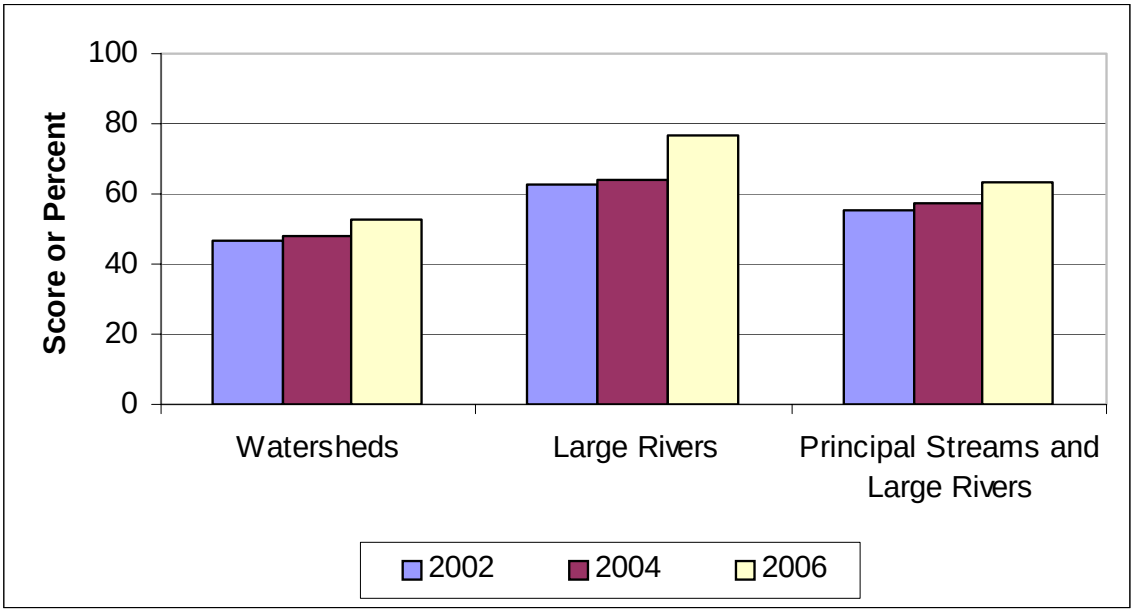


Figure 2-3. Progress toward the "80% by 2010" goal

3

Managing Water Quality

In this section, Ohio EPA programs that play a role in water quality in Ohio are described. Sources of funding for water quality initiatives are also briefly discussed.

3.1 Program Summary - Surface Water

Integration of program activities around the TMDL program and a watershed-based approach to assessments and delivery of services has been a program management objective within the Division of Surface Water (DSW) for several years. Summary descriptions of selected surface water programs are presented below.

In 1990 Ohio EPA initiated an organized, sequential approach to monitoring and assessment termed the Five-Year Basin Approach. One of the principal objectives of this new approach was to better coordinate the collection of ambient monitoring data so that information and reports would be available in time to support water quality management activities such as the re-issuance of NPDES permits and periodic revision of the Ohio water quality standards (WQS).

The State was divided into twenty-five different areas that were aggregations of subbasins within major river basins. Each of the twenty-five areas were assigned to one of the 5 basin years, taking into account the need to appropriately distribute the monitoring workload among Ohio EPA's 5 district offices. The initial workload estimates and resource planning done in the 1990s for the Five-Year Basin Approach indicated that 5 years would be needed to complete the cycle of monitoring. However, the monitoring program has never been fully funded to meet those resource needs, and thus the monitoring cycle takes more than 10 years to complete.

The Five-Year Basin Approach and the core work of the biological and water quality monitoring program has gradually become the Division's assessment component within the Total Maximum Daily Load (TMDL) program. Ohio's TMDL program has been designed to be watershed focused and to promote integration of other ongoing water program elements on a watershed basis.

3.1.1 Biological and Water Quality Surveys

Ohio EPA routinely conducts biological and water quality surveys, or biosurveys, on a systematic basis statewide. A biosurvey is an interdisciplinary monitoring effort coordinated on a reach specific or watershed scale. Such efforts may involve a relatively simple setting focusing on one or two small streams, one or two principal stressors, and a handful of sampling

sites or a much more complex effort including entire drainage basins, multiple and overlapping stressors, and tens of sites.

Each year Ohio EPA conducts biosurveys in 20-25 Watershed and Large River Assessment Units with an aggregate total of 400-450 sampling sites. Biological, chemical, and physical monitoring and assessment techniques are employed in biosurveys in order to meet four major objectives:

- ✓ to provide a current and thorough assessment of water quality conditions in watersheds that are scheduled for TMDLs in the near future (1-3 years)
- ✓ to determine the extent to which use designations assigned in the Ohio Water Quality Standards (WQS) are either attained or not attained
- ✓ to determine if use designations assigned to a given water body are appropriate and attainable
- ✓ to determine if any changes in key ambient biological, chemical, or physical indicators have taken place over time, particularly before and after the implementation of point source pollution controls or best management practices.

The data gathered by a biosurvey is processed, evaluated, and synthesized in a biological and water quality report. The findings and conclusions of each biological and water quality study may factor into regulatory actions taken by Ohio EPA and are incorporated into Water Quality Permit Support Documents (WQPSDs), State Water Quality Management Plans, the Ohio Nonpoint Source Assessment, and the aquatic life beneficial use analysis in the Ohio Integrated Water Quality Report (this report, prepared to meet the requirements of sections 305(b) and 303(d) of the Clean Water Act) and TMDLs.

Additional information on DSW's water quality monitoring is contained in the recently updated *Surface and Ground Water Monitoring and Assessment Strategy, 2005 - 2009* (Ohio EPA, 2005).

3.1.2 Total Maximum Daily Load (TMDL) Program

The Total Maximum Daily Load (TMDL) program identifies and restores polluted waters. TMDLs can be viewed simply as problem solving: investigate the problem, decide on a solution, implement the solution, and check back to make sure the solution worked. By integrating programs and aligning resources, Ohio is pursuing TMDLs as a powerful tool to develop watershed-specific prescriptions to improve impaired waters.

Ohio uses three key enhancements to the basic federal TMDL requirements to increase the chances that real, measurable improvements in Ohio's water resources will result:

- an initial, in-depth watershed assessment to obtain recent data for analysis of problems and discussion of alternatives
- implementation actions identified as part of the TMDL with follow-through in permitting and incentive programs such as 319 and loan funds
- involving others – citizens, landowners, officials, natural resource professionals – in the process.

In particular, involving others is critical to restoring waters. Working watershed by watershed, we meet with citizens and landowners to explain the findings of our water quality studies and to identify workable solutions to the problems we have found. We include other agencies who can improve water resources either by exercising their authority in new ways or through relationships they have already established with critical stakeholders. After solutions are identified and recommendations are made, we follow-through with meetings with consultants, elected officials, and others to ensure that projects continue to completion.

Ohio's TMDL program approach has been endorsed by an external advisory group of Ohio citizens, businesses, and interest groups. The program already incorporates many of the recommendations of the National Research Council 2001 study.

TMDLs are active in about one-third of Ohio's watersheds, as shown in the "Ohio TMDL Program Progress" map in the Maps section. By the end of 2005, twenty-two TMDL projects had been approved by U.S. EPA, and about 25 others are currently being developed. The approved projects include two federal TMDLs completed by U.S. EPA Region 5 (Wabash River (05120101 101 and 040) and Mahoning River (05030103 050 and 080)). All of these TMDLs are available on Ohio EPA's TMDL web page at http://www.epa.state.oh.us/dsw/tmdl/index.html

In October 2001, U.S. EPA was sued by several environmental interest groups over the pace of progress in Ohio's TMDL program (National Wildlife Federation et al. v United States Environmental Protection Agency et al., Case No. C2-01-1052). The State of Ohio and various industry groups intervened in the litigation. A Consent Decree was established in August 2004, containing two requirements: to conduct assessments in 50 assessment units and to establish TMDLs in 50 assessment units by September 30, 2007. In the second annual court report (February 2006), Ohio EPA listed completed assessments in a total of 119 assessment units (surpassing the Consent Decree requirement for assessment) and approved TMDLs in 48 assessment units (96% of the Consent Decree requirement to establish TMDLs).

3.1.3 Nonpoint Source (NPS) Program

The framework for Ohio's nonpoint source program is detailed in Ohio's Nonpoint Source Management Program. In September 2005, a revised plan – "Getting to the Point on Nonpoint" – was developed in conjunction with a multitude of nonpoint source management partners convened as a work group under the Ohio Water Resources Council. The revised plan provides an aggressive framework for implementing nonpoint source management program activities through 2010. This plan represents a solid foundation for progress, built upon the many lessons that Ohio has learned during previous years.

Ohio's NPS Management Program relies heavily upon TMDL development and local watershed planning, during which the nature, extent and cause of water quality impairments caused by nonpoint source pollutants are identified. Program strategies are then designed to most effectively address identified NPS causes of impairment to Ohio's surface waters. An important revision to Ohio's Nonpoint Source Management Plan is the incorporation of identified local strategies from TMDL studies and state endorsed local watershed plans. Once such strategies are incorporated into Ohio's NPS Plan, Ohio EPA and other state funding partners mobilize programs and resources designed to result in measurable improvements to water quality throughout Ohio. For example, during FFY2005, 88% of Section 319(h) Implementation grants

were awarded to watersheds with completed TMDL studies and/or state endorsed watershed plans. Section 319(h) base funds also provide significant support for staff biologists, modelers, and others involved in TMDL development.

An important component of Ohio's NPS Management Program involves effectively communicating all of the activities that are underway to address NPS impairments within Ohio's watersheds. Additionally, these educational and outreach efforts are designed to inform Ohioans of the actions they can undertake to contribute to solving NPS impairments.

Success in minimizing the impacts of NPS pollution depends heavily upon local implementation of restoration and NPS pollution prevention projects and programs. Progress in addressing a problem as ubiquitous as nonpoint source pollution requires creativity, collaboration and a commitment to quality and effective project implementation. Ohio's NPS Management Program embraces all of these characteristics and reflects an ongoing determination to implement programs, projects and activities that result in meaningful and measurable improvements to Ohio's rivers, streams, lakes and groundwater supplies.

3.1.4 National Pollutant Discharge Elimination System (NPDES) Permits

To protect Ohio's water resources, Ohio EPA issues National Pollutant Discharge Elimination System (NPDES) permits. These permits authorize the discharge of substances at levels that meet the more stringent of technology or water based effluent limits and establish other conditions related to issues such as combined sewer overflows, pretreatment and sludge disposal. This is an overview of the process for issuing individual NPDES permits. The series of steps for a particular permit may vary somewhat depending on the size, nature, and complexity of the discharge.

The first step in developing an NPDES permit is acquisition of chemical, physical, and biological data from the field and laboratory. Instream chemical data are collected to determine the effect of the discharge on receiving water and sediment quality. Biological data are collected to determine if the discharge is having an impact on the fish and macroinvertebrate organisms that live in the receiving water. Effluent chemical data are also obtained to establish an accurate portrayal of current discharge conditions. Instream chemical data and stream physical data, such as cross section measurements and flow, are necessary for conducting water quality modeling.

As part of developing effluent limits and monitoring requirements, the water quality standards that apply to the receiving water are determined, and federal effluent guidelines are consulted for applicability. Permit conditions are developed to protect the designated use and associated chemical criteria of the receiving stream as well as any applicable technology requirements. Permits are also based on the applicable regulatory requirements to address issues such as new or expanded discharges, combined sewer overflows, sludge disposal, and industrial pretreatment programs.

Since the early 1990s, Ohio EPA has moved to issuing permits on a watershed basis. Ohio EPA has built on this watershed approach in recent years by integrating the NPDES renewals with the TMDL process. Permit writers are included on the TMDL teams and work with permittees and the TMDL team on permit language necessary to implement the TMDL. This allows concurrent development of the TMDL and renewal of NPDES permits.

3.1.5 Combined Sewer Overflow Control Program

Combined sewers were built to collect sanitary and industrial wastewater, as well as storm water runoff, and transport this combined wastewater to treatment facilities. During dry weather, they are designed to transport all flow to the treatment plant. When it rains, the volume of storm water and wastewater may exceed the capacity of the combined sewers or of the treatment plant. When this happens, the combined sewers are designed to allow a portion of the combined wastewater to overflow into the nearest ditch, stream, river or lake. This is a combined sewer overflow. Ohio has about 1,400 known CSOs in 87 communities (October 2003), ranging from small, rural villages to large metropolitan areas.

In 1994, U.S. EPA published the national CSO Control Policy. Working from the national policy, Ohio EPA issued its CSO Control Strategy in 1995. The primary goals of Ohio's Strategy are to control CSOs so that they do not significantly contribute to violations of water quality standards or impairment of designated uses and to minimize the total loading of pollutants discharged during wet weather. Ohio's Strategy addresses several issues that aren't covered by the national Policy; for example, sanitary sewer extensions that occur up pipe of CSOs.

In 2000, Congress passed the Wet Weather Water Quality Act, which did two important things. It codified the 1994 national policy by making it part of the Clean Water Act, and it required that all actions taken to implement CSO controls be consistent with the provisions of the national Policy.

Ohio EPA continues to implement CSO controls through provisions included in NPDES permits and using orders and consent agreements when appropriate. The NPDES permits for our CSO communities require them to implement the nine minimum control measures. Requirements to develop and implement Long Term Control Plans (LTCPs) are also included where appropriate. As of October 2005, 37 LTCPs are approved and 560 LTCPs are under review or scheduled for submission.

3.1.6 General Permits

Ohio EPA is working to eliminate the backlog of pending applications and expired minor discharger permits. The issuance of general permits is one important tool in this effort. A general permit is a single permit issued to cover specific types of discharges, pollutants and best management practices deemed necessary to protect water quality. Permits may cover all regions of the State, or only specific areas. For example, some permits are not available for certain streams that have very strict water quality conditions. Applicants submit a brief "Notice of Intent" (NOI) and the appropriate fee to be covered by a specific general permit.

U.S. EPA delegated administration of the general permit program to Ohio EPA on August 17, 1992. Ohio EPA currently has 8 general permits available to dischargers. These permits cover the following areas:

- ✓ discharge of non-contact cooling water
- ✓ discharge of wastewater for petroleum related corrective actions
- ✓ coal strip mining
- ✓ small municipality storm water (2 permits)

✓ industrial storm water
✓ construction storm water
✓ small sanitary wastewater dischargers.

3.1.7 Sewage Sludge Program

In addition to sewage treatment and disposal facilities, ORC § 6111 gives the Director of Ohio EPA the authority to issue permits for the disposal, use, storage, or treatment of sewage sludge. Sewage sludge generators located within the State of Ohio are required to have a valid NPDES permit, or until such NPDES permit is acquired, a valid Sludge Management Plan as per OAC 3745-42-02(A)(2), that describes how the sewage sludge they generate shall be treated, managed, transported, and ultimately disposed of. Entities wishing to bring sewage sludge generated outside the state to Ohio for use or disposal, or regional sewage sludge treatment facilities that receive sludge from numerous generators for treatment and subsequent sale or disposal, also must obtain a NPDES permit or be covered under a Sludge Management Plan until a NPDES permit is approved.

The Director of Ohio EPA adopted rules under ORC § 6111 for the disposal, use, storage, or treatment of sewage sludge in Ohio, effective April 8, 2002. Those rules are found under Chapter 3745-40 of the Ohio Administrative Code. The rules address management options other than land application such as disposal in a sanitary landfill, incineration and disposal in a sewage sludge surface disposal site (which is prohibited). The majority of the rules address the land application of sewage sludge. Management practices to protect public health established in federal regulations are incorporated into Ohio's rules. Watershed protection is addressed in Ohio's sewage sludge rules by incorporating best management practices for the land application of nutrients established by the United States Department of Agriculture, Natural Resources Conservation Service.

With the authorizing legislation in effect, and rules thereunder, the Ohio EPA received delegation of the federal sewage sludge management program from U.S. EPA in 2005. Ohio EPA will serve as the regulatory authority over the management of sewage sludge. Ohio EPA will be the responsible authority for conducting all aspects of the sewage sludge management program including permitting, monitoring and compliance, and enforcement if necessary.

3.1.8 Concentrated Animal Feeding Operations

On December 14, 2000 Governor Taft signed a bill that started the process of transferring authority to regulate concentrated animal feeding facilities to the Ohio Department of Agriculture. The Ohio Department of Agriculture now regulates construction and operation of large concentrated animal feeding facilities under their Permit to Install (PTI) and permit to operate (PTO) program. However, PTI authority for sewage treatment and disposal systems at animal feeding facilities and for animal feeding facilities that discharge to publicly owned treatment works remains with Ohio EPA.

Ohio EPA also retains authority for implementing the National Pollutant Discharge Elimination System (NPDES) permit program for animal feeding operations until the delegation agreement with U.S. EPA is revised by Ohio and approved by U.S. EPA. Any facilities that meet the

definition of a concentrated animal feeding operation (CAFO) need to apply to Ohio EPA for an NPDES permit

U.S. EPA recently revised the federal regulations addressing definitions, the duty to apply for NPDES permits, and the requirements that must be contained in the NPDES permits for CAFOs. The revised federal regulations for CAFOs became effective on April 14, 2003. A federal court decision on the appeal of those federal regulations will result in changes to the duty to apply and review of nutrient management plans provisions in the federal rules. Those changes are expected to be made in early 2006 at the national level, and Ohio EPA will need to adjust the permits and program accordingly. In the meantime, the NPDES General Permit for CAFOs that contains the 2003 federal requirements will continue to be used and individual NPDES permits for CAFOs will be issued with similar requirements.

The CAFO program at Ohio EPA uses a watershed perspective to prioritize work. Over the last several years, inspections were scheduled based on watersheds to provide the best support possible for TMDL activities. Individual permitting has been prioritized based on watershed issues to some degree, although the general the permit work has temporarily superseded that in order to get a more widespread impact. The status of the watershed is also considered in making decisions about enforcement and compliance activities (e.g., supplemental environmental projects may be preferred over penalties, more technical assistance may be focused on TMDL watersheds).

3.1.9 Storm Water Permit Program

Ohio EPA implements the federal regulations for storm water dischargers. Dischargers currently covered include certain municipalities (Phase I and II of the program) with separate storm sewer systems (MS4s) and those facilities that meet the definition of industrial activity, including construction, in the federal regulations.

Ohio EPA initially issued two storm water general permits: one for construction activity and the other for all remaining categories of industrial activity in 1992. The strategy was to permit the majority of storm water dischargers with these baseline general permits (33 USC § 1342; OAC 3745-38). It is estimated that 20,000 storm water discharges have been granted general permit coverage since that time. The industrial permit has been renewed twice. The construction permit was renewed in 2003 and addresses large and small constructions sites. The application form is a one-page Notice of Intent (NOI). Ohio EPA responds to NOI with approval letters for coverage under one of the general permits or, in limited instances, instructions to apply for an individual permit.

After the baseline general permits were issued, Ohio EPA directed its efforts towards further permitting, compliance and enforcement activities, education and technical assistance. Inspections and complaint investigations for compliance and enforcement have been handled at the district level as resources allow. Best management practices (BMPs) and pollution prevention has been the major thrust of education and technical assistance activities.

On the municipal side of permitting, five large and medium municipalities in Ohio submitted applications between November 1991 and November 1993. A work group was formed with the cities to draft acceptable permit language for the municipal permits. Best management practices included in a city-wide storm water management plan is the primary focus of the

permits. The city of Dayton, Toledo and Akron received their original permits in 1997. Exceptions for Cleveland and Cincinnati were also processed. Columbus received its initial permit in 2000. Permits for Dayton, Toledo, and Akron have been renewed once.

Additional categories of discharges, both public and privately owned, were included in Phase II. U.S. EPA issued Phase II regulations in December of 1999. The Phase II storm water regulations required a general permit for small MS4s be issued by December of 2002, and required applications by March of 2003. Ohio EPA issued two general permits for small MS4s during 2002. One is a baseline permit and the second is for MS4s in rapidly developing watersheds. This latter permit accelerates construction and post-construction measures to protect surface waters from the impacts of high density land use development. Federal regulations allowed small MS4s to apply for individual NPDES permits in lieu of general permit coverage. No small MS4 within Ohio chose the individual permit option.

3.1.10 Section 401 Permits

According to the federal Clean Water Act, anyone who wishes to discharge dredged or fill material into the waters of the U.S., regardless of whether on private or public property, must obtain a Section 404 permit from the U.S. Army Corps of Engineers (Corps) and a Section 401 Water Quality Certification (WQC) from the state. Ohio EPA has pre-granted Section 401 Water Quality Certifications to 404 permits for certain types of projects that are similar in nature and cause minimal degradation to waters of the state. These permits are called Nationwide Permits and substantially expedite the permitting process.

For projects requiring an individual Section 401 WQC Ohio EPA has prepared Pre-application Guidelines and Projects and Activities of Concern to assist with the permitting process. For projects involving activity within a wetland the Ohio Rapid Assessment Method for Wetlands is most often used to assist in determining the appropriate wetland classification per Ohio's WQS.

Staff reviewing 401 WQCs have been organized by watersheds in order to better understand the issues and concerns that are unique to any particular watershed. By focusing their application reviews within specific geographical areas, DSW staff are better able to conduct application reviews that consider issues in a broader, watershed context.

3.1.11 Wetland Protection Program

Ohio's WQS (OAC 3745-1-50 to -54) contain definitions, beneficial use designations, narrative criteria and antidegradation provisions specific to wetlands. Many of the provisions for other surface water bodies apply to wetlands, including the narrative "free froms." For antidegradation review purposes wetlands are placed into the classifications of either Limited Quality Waters (Category 1 wetlands) or General High Quality Waters (Category 2 & 3 wetlands). There are specific provisions for wetland use designation, wetland narrative criteria, numeric criteria for waste water discharges to wetlands, and wetland antidegradation.

All wetlands receive the same beneficial use designation. OAC 3745-1-53 gives all wetlands the "wetland" designated use. The wetland antidegradation rule, OAC 3745-1-54, places wetlands into one of three categories based on the wetland's relative functions and values, sensitivity to disturbance, rarity, and potential to be adequately compensated for by wetland

mitigation. The level of protection provided and the corresponding demonstrations necessary to allow impacts, the mitigation ratios and mitigation location all vary with the category of wetland proposed for impacts

Categories 1, 2, and 3 wetlands demonstrate minimal, moderate and superior wetland functions, respectively. Wetlands assigned to Category 1 may be typified by hydrologic isolation, low species diversity, a predominance of non-native species, no significant habitat or wildlife use, and limited potential to achieve beneficial wetland functions. Category 2 wetlands may be typified by wetlands dominated by native species but generally without the presence of or habitat for, rare, threatened or endangered species and wetlands which are degraded but have a reasonable potential for reestablishing lost wetland functions. Wetlands assigned to Category 3 typically have high levels of diversity, a high proportion of native species, high functional values and may contain the presence of or habitat for rare, threatened and endangered species. Wetlands that are scarce, either regional or statewide, form a subcategory of Category 3 wetlands for which when allowable only short-term disturbances to water quality can be authorized.

3.1.12 Wetland Bioassessment Program

Several grants from U.S. EPA have funded work that is advancing the science of wetland assessment methodologies in Ohio. Recently published work includes an amphibian index of biotic integrity (AmphIBI) for wetlands, a vegetation index of biotic integrity (VIBI) for wetlands, and a comparison of natural and mitigation (constructed) wetlands. These, and reports on other wetland topics, are available on the Division of Surface Water web page. Work is also continuing on the analysis of wetland invertebrates and an invertebrate index for wetlands will be completed soon.

DSW recently received a grant from the federal government to develop wetland condition assessment techniques for watershed level assessment of wetland conditions. As part of this grant, over 400 wetlands in the Cuyahoga River watershed were assessed this spring and summer. Another grant will be used to determine the status of wetlands in an urban setting as wetlands within the Interstate 270 Outer Belt, around Columbus, are monitored in the 2006 field season.

3.1.13 Enforcement and Compliance Program

The Division of Surface Water staff works closely with the regulated community and local health departments to ensure that surface waters of the state are free of pollution. The regulated community with which DSW staff works includes wastewater facilities, both municipal and industrial, and small, unsewered communities experiencing problems with unsanitary conditions.

DSW staff provides technical assistance, conducts inspections of wastewater treatment plants, reviews operation reports, oversees land application of biosolids and manure from large concentrated animal feeding operations, and investigates complaints regarding malfunctioning waste water treatment plants and violations of Ohio's Water Quality Standards. DSW strives to ensure that permitted facilities comply with their National Pollutant Discharge Elimination

System (NPDES) permits. DSW also assists small communities with inadequate means of waste water treatment seek alternatives to help abate pollution to waters of the state.

In cases which Ohio EPA is unable to resolve continuing water quality problems, DSW may recommend that enforcement action be taken. The enforcement and compliance staff work with Ohio EPA attorneys, as well as the Attorney General's Office to resolve these cases. Where possible, an added emphasis and priority is given to actions in sensitive watersheds. All completed enforcement actions are posted on the DSW web page.

3.2 Program Summary - Environmental and Financial Assistance

The Division of Environmental and Financial Assistance (DEFA) provides incentive financing, supports the development of effective projects, and encourages environmentally proactive behaviors through three programs - the Ohio Water Pollution Control Loan Fund, the Water Supply Revolving Loan Account and the Village Capital Improvement Fund. See Section 3.6.4 for a ten-year financial summary of these financing programs. In addition, the division reviews Ohio Power Siting Board applications to identify potential environmental impacts from proposed projects, as well as measures to mitigate these impacts to acceptable levels. The following program accomplishment summary is taken from the Agency's 2005 annual report.

Water Pollution Control Loan Fund
In State Fiscal Year 2005 (SFY 2005), the Water Pollution Control Loan Fund (WPCLF) financed a number of municipal wastewater treatment needs, as well as nonpoint source pollution control needs, as enumerated below. Through this program $592.3 million in financing was provided, the highest annual total since the fund's inception. The fund also exceeded the $3.6 billion mark for total loans awarded since its beginning in October 1989.

The WPCLF financed implementation of 71 municipal wastewater treatment projects costing more than $566 million. The projects directly addressed sources of impairment for Ohio water resources, saving these communities more than $137 million in interest costs on loans made. Included in the total were

- $73.9 million in loans to 23 small, economically challenged communities, saving these communities more than $38.4 million of interest costs for facilities planning, design, and construction projects. Technical assistance was also provided to these communities.
- $91.7 million loan to the City of Columbus for the second phase of the Big Walnut/Rickenbacker Interceptor, which will relieve overloaded sewers in the southern section of Franklin County and provide for future service in this portion of the metropolitan area.
- $129.9 million to the City of Toledo for six projects to control combined sewer overflows, enabling it to meet the requirements of a Federal consent decree and improve water quality in Maumee Bay and Lake Erie.
- $747,000 zero-interest free rate hardship community loan to the Village of Morristown to build badly-needed sewers to eliminate the public health risks posed by failing septic systems.

Nonpoint source pollution is addressed through two programs of the WPCLF. The Water Resource Restoration Sponsor Program (WRRSP) financed 12 projects for over $21 million to protect and restore stream and wetland aquatic habitats in the Olentangy, Darby Creek, Little

Miami, Cuyahoga, Silver Creek, Tinkers Creek and Maumee watersheds. Projects financed through the WRRSP included:

- $124,000 for the restoration of Powderlick Run, a channelized stream in the Bokes Creek watershed in Union County
- $1 million for the Conneaut Creek Riparian Habitat Protection project, allowing ODNR Division of Natural Areas and Preserves to acquire and permanently protect streamside habitat along this state scenic river.

The WPCLF linked deposit program provided interest rate reductions for 119 loans totaling $4.9 million to private agricultural producers for implementation of best management practices to control nonpoint water source water pollution. These farmers saved over $900,000 when compared to the cost of conventional financing.

Water Supply Revolving Loan Account
The Water Supply Revolving Loan Account focuses on drinking water supplies. In SFY 2005, the fund made 18 loans for more than $65.6 million, saving recipients over $12.2 million. Of this amount $16.9 million was for water transmission and distribution lines, $45 million was for treatment facilities, and $3.8 million was for storage tanks and development of water sources.

Included in the total were small community loans of $3.7 million to the Village of Covington for construction of a new wellfield and water treatment plant to avoid existing bacterial contamination and provide a safe, more reliable and higher quality drinking water supply. The Lakengren Water Authority received a loan for $1.7 million for construction of a new water treatment plant to replace facilities which were built in 1969. The new plant will provide additional iron and manganese removal, allowing the water authority to provide a safer and more reliable source of drinking water.

Village Capital Improvement Fund
For SFY 2005, interest-free loans totaling $259,770 were provided through the Village Capital Improvements Fund to 10 villages. These loans are assisting the planning and design of wastewater treatment and public water supply facilities.

Ohio Power Siting Board
While there has been a dramatic decline in applications to the Ohio Power Siting Board in recent years for construction of new generation facilities as compared to the period immediately after electric deregulation went into effect in Ohio (1999 - 2002), the overall number of board projects has remained fairly high. The majority of these involved new or replacement natural gas or electric transmission lines. Typical issues encountered include stream and wetland crossings; stream, wetland, and woodland protection; threatened/endangered species; and headwater stream protection. In 2005, staff assisted the board with the review, approval, and/or inspection of approximately 25 projects.

3.3 Program Summary - Drinking and Ground Waters

Every Ohioan relies on a safe source of drinking water. The Division of Drinking and Ground Waters' (DDAGW) Drinking Water Program has jurisdiction over approximately 5,800 public water systems that are required to ensure a safe and adequate supply of drinking water to over 10 million Ohioans.

The Drinking Water Program oversees the design and construction of water treatment facilities through plan approval; conducts a sanitary survey inspection program; administers an operator certification program and a drinking water revolving loan fund; oversees compliance monitoring for bacteriological and chemical contaminants; and implements a Source Water Assessment and Protection Program to protect water sources of drinking water including the development of a public water supply beneficial use assessment methodology to evaluate Ohio's public water supplies that rely on surface water resources.

The DDAGW's Ground Water Program maintains a statewide ground water quality monitoring program and conducts ground water quality investigations; provides technical support to other Ohio EPA programs by providing technical expertise on local hydrogeology and ground water quality; and protects ground water resources through the regulation of waste fluid disposal in its Underground Injection Program for Class I, IV and V wells.

3.4 Program Summary - Environmental Services

For Ohio EPA to protect public health and the environment, Agency staff depend on scientific data to make well-informed decisions. Ohio EPA's laboratory, known as the Division of Environmental Services (DES), provides most of this data. DES analyzes environmental samples for more than 300 parameters. They also inspect other laboratories and provide technical assistance to other Ohio EPA divisions as well as other state and local agencies. The lab provides chemical analyses of drinking, surface, and ground water; wastewater effluent, sediment; soil; sludge; manure; air filters and air canisters; and fish tissue. The following are some of the vital services provided by DES as reported in the Agency's 2004 annual report:

- processed over 9,200 samples and generated over 153,000 inorganic and 124,000 organic scan test results covering a variety of matrices including water, drinking water, soil, sediment, air canister, air filter and fish tissue
- performed 73 bioassay toxicity tests of point source effluents for permit compliance and river assessment work
- analyzed 197 fish tissue samples for the Fish Consumption Advisory program
- conducted laboratory approvals, audits of laboratories and review of documents for Voluntary Action Program lab certification program
- conducted laboratory surveys and review of applications and lab plans for the drinking water laboratory certification program
- responded to over 6,600 requests for technical assistance requests (over half from individuals outside Ohio EPA).

3.5 Cooperation Among State Agencies and Departments

3.5.1 Ohio Water Resources Council

On July 1, 2001, Governor Taft signed legislation to permanently establish the Ohio Water Resources Council (OWRC) in state law. The OWRC is a forum for policy development, collaboration and coordination for one of Ohio's most important natural resources - water. The OWRC membership is comprised of an Executive Assistant to the Governor and the directors of the following nine state agencies:

Ohio EPA
Ohio Department of Natural Resources
Ohio Department of Health
Ohio Department of Transportation
Ohio Department of Agriculture
Ohio Department of Development
Ohio Water Development Authority
Public Utilities Commission of Ohio
Ohio Public Works Commission

In 2002, Governor Taft released the Ohio Water Resources Council Four-Year Strategic Plan. This plan has served as a guide in the protection and management of Ohio's waters through 2005. The OWRC is currently developing a 10-year vision for managing the water resources of Ohio. Water quality and watershed management are two of the topics incorporated into the 10-year vision. Nine State agencies, including Ohio EPA, meet monthly to work on near term action plans that will move us forward over the next four years. The OWRC continues to seek input from a multi-stakeholder advisory group. Additional information is available on line at: http://www.dnr.state.oh.us/owrc/.

3.5.2 Ohio Lake Erie Commission

The Ohio Lake Erie Commission is comprised of the directors of the Ohio departments of the environmental protection agency, natural resources, transportation, development, health and agriculture. The commission was established to preserve Lake Erie's natural resources, water quality and ecosystem. It also promotes economic development in the region. The commission oversees the Ohio Lake Erie Protection Fund (LEPF). During the last 11 years, the commission has raised nearly $7 million through the sale of Lake Erie license plates. This money is used to fund LEPF grants that focus on improving the quality of Lake Erie and to furthering the goals laid out in the Lake Erie Protection & Restoration Plan. Additional information is available on line at http://www.epa.state.oh.us/oleo/.

3.6 Economic Costs and Benefits of Pollution Controls

Several sources that provide funding for water quality improvement projects exist. An Ohio EPA publication titled "State and Federal Funding for Drinking Water and Wastewater Systems" details some of the funding State of Ohio sources. A few of the entities with funding available in Ohio include: Ohio EPA, the Ohio Public Works Commission, the Ohio Water Development Authority, and Rural Development. Additional funds from the federal government, as well as the

investment in water pollution control measures made by municipal and county governments and the private sector, are the reason for dramatic improvements in water quality in Ohio since the inception of the Clean Water Act in 1972.

A summary of funding sources, amounts and trends is presented here. The summary is not exhaustive. Efforts have been made to include funding sources not traditionally associated strictly with water quality improvement but that nevertheless have the potential to positively impact Ohio's water resources.

It is beyond the means of this report to place a dollar value on the environmental improvements gained to date. However, Ohio EPA has documented the recovery of numerous major river segments including the Cuyahoga River, Licking River, Paint Creek and Scioto River. The latter two are featured success stories on the Division's web page (http://www.epa.state.oh.us/dsw/bioassess/AquaticLifeGoal.html).

3.6.1 Clean Ohio Fund

Although not tied directly to measures of water resource improvement, a major Ohio bond fund provides funds for projects that should positively impact water quality in the state. The Clean Ohio Fund, created in November 2000, provides $400 million over four years for "Brownfield" environmental clean up projects and "Greenfield" open space and conservation preservation projects. The Fund consists of four competitive funding programs, as described below.

Clean Ohio Program	Purpose	Administered by	Funding/year
Clean Ohio Green Space Conservation Program	funds preservation of open spaces, sensitive ecological areas, and stream corridors	Ohio Public Works Commission	$37,500,000
Clean Ohio Agricultural Easement Purchase Program	supports the permanent preservation of Ohio's most valuable farmland through the purchase of development rights	Department of Agriculture	$6,250,000
The Clean Ohio Trails Fund	improve outdoor recreational opportunities by funding trails for outdoor pursuits of all kinds	Ohio Department of Natural Resources	$6,250,000
The Clean Ohio Revitalization Fund	cleanup of polluted properties so that they can be restored to productive uses	Ohio Department of Development and the Ohio EPA	$50,000,000

3.6.2 Ohio Water Development Authority

The Ohio Water Development Authority (OWDA) offers financial assistance for a number of project types, either alone or in conjunction with a state agency (including Ohio EPA). In addition to solid waste, brownfields, and emergency programs, OWDA oversees the Fresh Water Fund. The Fresh Water Fund is a market rate program that mirrors the below-market

financing available through the Water Supply Revolving Loan Account Fund and the Ohio Water Pollution Control Loan Fund (see below). The OWDA 2004 annual report provides an overall summary of loan expenditures for all State of Ohio water and wastewater programs in 2004 (OWDA, 2005).

Project Type	2004		2003		% of 2003
	Number	Amount ($)	Number	Amount ($)	
Planning					
Water	22	5,192,109	20	4,167,666	124.6
Wastewater	32	14,902,943	39	16,708,644	89.2
Subtotal	54	20,095,052	59	20,876,250	96.3
Construction					
Solid Waste	1	3,250,000			
Water	61	125,799,600	68	133,769,358	94.0
Wastewater	99	430,716,798	76	347,686,929	123.9
Subtotal	161	559,766,398	144	481,456,287	116.3
Total	215	579,861,450	203	502,332,537	115.4

3.6.3 Water Supply Revolving Loan Account Fund

The Water Supply Revolving Loan Account Fund provides below-market rate loans to eligible drinking water systems to finance the costs of infrastructure to achieve or maintain compliance with Safe Drinking Water Act requirements. Projects include the development and/or acquisition of potable water sources, construction and expansion of water treatment facilities, and the installation or improvement of water distribution systems. Applications are made to the Ohio EPA Division of Environmental and Financial Assistance.

3.6.4 Water Pollution Control Loan Fund

Municipal wastewater treatment improvements – sewage treatment facilities, interceptor sewers, sewage collection systems and storm sewer separation projects – and non-point pollution control projects are eligible for financing under the Ohio Water Pollution Control Loan Fund (WPCLF). This state revolving fund, jointly administered by the OWDA and Ohio EPA, was established in 1989 to replace the Construction Grants Program. Construction loans from WPCLF are available at two interest rates: a standard rate which is usually below market rates, and reduced rates for communities that qualify based on economic need and size. Planning loans are available at a short-term interest rate. Applications for WPCLF loans are made to the Ohio EPA Division of Environmental and Financial Assistance. Eligible activities include

- improvements to wastewater treatment facilities
- improvement or replacement of on-lot wastewater treatment systems

- brownfield/contaminated site remediation
- agricultural runoff control and best management practices
- urban storm water runoff
- septage receiving facilities
- landfill closure
- forestry best management practices.

Over the past ten years, the WPCLF has loaned out over 2.66 billion dollars. Of that, 5%, or 135.4 million dollars, was used to address nonpoint source (NPS) issues including agricultural runoff, landfill closures, Brownfields remediation, development of best management practices, and water resource habitat protection and restoration. The other 95%, or about 2.5 billion dollars, addressed municipal point source (PS) related problems such as wastewater treatment plant improvements, control of combined sewer overflows, new sewers for unsewered areas, storm water best management practices, and sewer system rehabilitation.

From July 1, 1995, through June 30, 2005, there were 1,669 WPCLF loans made. The majority (1,078 loans or 65%) were for nonpoint source issues. The other 35%, or 591 loans, were for municipal point source related problems. Municipal point source loans were only 35% of the total number of loans but accounted for 95% of the money loaned. Thus, point source loans were typically bigger loans for bigger projects.

Total yearly WPCLF loan amounts tended to fluctuate over time (see Figure 3-1). However, in the last two years the total amount of loans made has significantly increased, with $365,473,233 obligated in SFY 2004 and $592,301,322 in SFY 2005, which is the largest total for a single year. The lowest year in the last ten years was SFY 1999, in which $137,901,688 was obligated. Demand for WPCLF financing is expected to remain high in the future as communities implement their long-term control plans for capturing and treating wet weather combined storm water and wastewater.

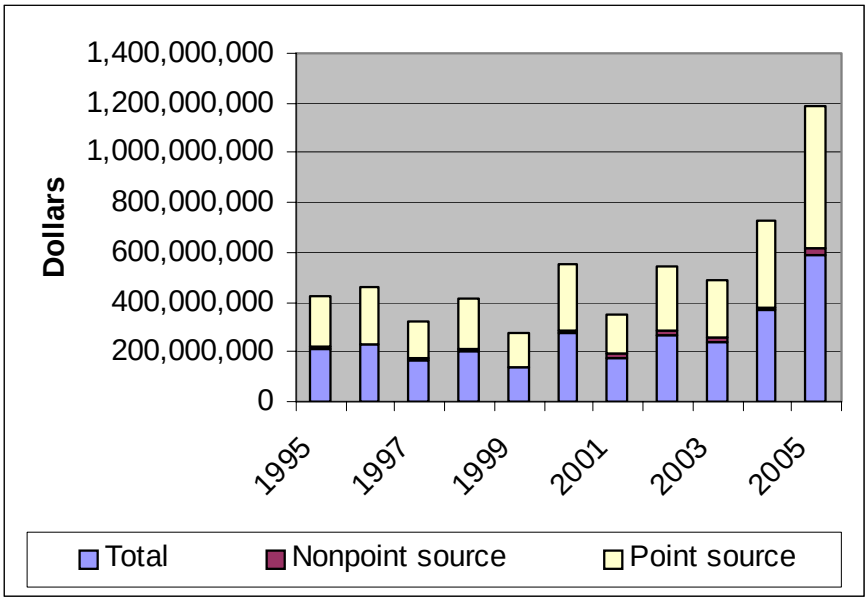


Figure 3-1. Water Pollution Control Loan Fund 10-year trend

Nonpoint source loans between SFY 1995 and SFY 2000 tended to stay relatively constant, around or below $10 million per year. However, from SFY 2000 onward, funds obligated for nonpoint source projects increased significantly. This was due to both an increase in activity in the agricultural linked deposit program, especially in the Maumee River basin, along with the advent of the Water Resource Restoration Sponsor Program (WRRSP) in SFY 2000.

Although the WPCLF has seen a significant increase in the funds obligated for nonpoint source projects, the main driving force behind the significant increase in WPCLF financing seen in the last several years are the loans made for municipal wastewater treatment projects. These accounted for over 95% of the funds obligated in the last 10 years (SFY 1995 - SFY 2005). The lowest year for funds obligated for municipal wastewater treatment projects was SFY 1999, when $133,837,236 in loans were provided. The largest year was SFY 2005, when $566,247,005 was obligated for municipal wastewater treatment projects.

3.6.5 Section 319 Grants Program

Ohio EPA receives federal Section 319(h) funding to implement a statewide nonpoint source program, including offering grants to address nonpoint sources of pollution. For federal fiscal year (FFY) 2001 through FFY 2005, yearly expenditures ranged from $3.6 to $4.9 million. The total amount of $20,855,886 was distributed among 95 grants. More than 69% of the 319 funding was awarded to home septic programs, agricultural management practices, and abandoned mine lands reclamation. About 18% of grants funds were awarded for restoration projects such as dam removals, natural stream reconstruction, or other projects designed to restore impaired waters. Close to half (45%) of all 319 grant funds during this period were awarded to local Soil and Water Conservation districts and health departments, with local governments receiving 8% of the funds awarded. In response to the "outcomes" focus of the newly revised nonpoint source management plan, FFY 2006 and future grants are expected to be directed to projects that eliminate or reduce water quality impairments caused by nonpoint sources of pollution, thus taking advantage of the prior 319 funding emphasis on watershed planning.

3.6.6 Federal Farm Bill Funding in Ohio

Among funding sources from the federal government, those connected to the 2002 "Farm Bill" legislation are notable. Administered by the U.S. Department of Agriculture, several programs provide cost share, technical assistance, and economic incentives to implement nonpoint source pollution management practices.

The Environmental Quality Incentives Program (EQIP) is the most widely used and well funded program coming out of the Farm Bills. EQIP is designed to improve management practices and facilities on working farms to achieve environmental quality goals, of which protecting water resources is a high priority. Several specific practices are eligible for funding through EQIP that cover broad categories such as nutrient and pesticide management and storage, manure management and storage, livestock fencing, conservation tillage, cover cropping, conservation crop rotation, and drainage water management among others. Funding can include cost-share dollars and/or incentive payments. In 2004, nearly $13 million were allocated across Ohio to 1,500 producers.

The Conservation Security Program (CSP) is available to producers that have a history of utilizing best management practices. The intent of this program is to promote continued use and enhance the use of conservation practices on those lands. Incentives are paid on a three-tier system, with the highest tier requiring that BMPs addressing all potential sources of pollution be employed across the entire farm. Ohio watersheds designated for the CSP program include

the Auglaize and St. Joseph in 2004, the upper Maumee, Raisin, Huron, Vermilion, Grand, Little Muskingum, and Hocking in 2005, and the upper Great Miami and Shenango in 2006 (see Figure 3-2). In 2005, over $5 million was distributed in 451 contracts; 38% of the funds were directed to the highest tier of incentives.

Set-aside-type programs such as the Conservation Reserve Program (CRP), the Grassland Reserve Program (GRP), and the Wetlands Reserve Program (WRP) are designed to temporarily or permanently take farmed land out of production to improve or protect threatened natural resources. Land targeted through these programs is environmentally sensitive and/or can have a particularly deleterious impact on natural resources when farmed. Examples

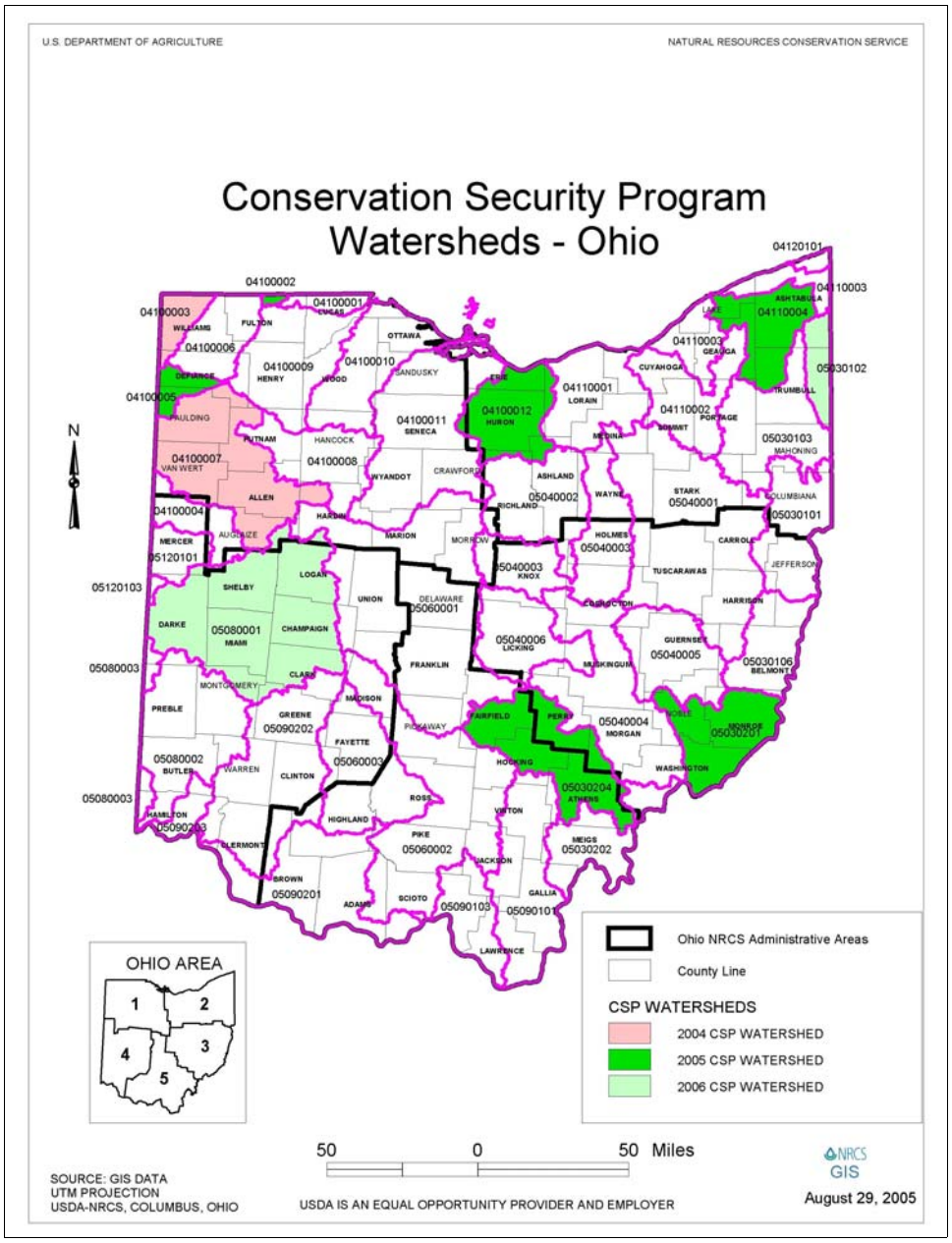


Figure 3-2. Ohio's Conservation Security Program watersheds (source: NRCS)

include highly erodible land, land near waterways, land that was formerly wetland, and lands that can serve as habitat critical to declining wildlife populations. The Grassland Reserve Program distributed over $1 million to Ohio landowners in 2004. Nearly $24 million were directed to 18,000 acres in Ohio from the Wetlands Reserve Program.

The Conservation Reserve Enhancement Program (CREP) is a Federal-State conservation partnership program that targets significant environmental effects related to agriculture. A voluntary program, CREP uses financial incentives to encourage farmers and ranchers to enroll in contracts of 10 to 15 years in duration to remove land from agricultural production. Three CREPs are approved in Ohio:

CREP Project	Area Addressed	Total Funding	Acreage Goal
Lake Erie	Maumee River, Portage River, Sandusky River, Huron River, Vermilion River, Black River, Lake Erie direct drainage	$201 million	67,000 acres
Upper Big Walnut Creek	upstream of Hoover Reservoir	$13 million	3,500 acres
Scioto River	Scioto River watershed	$207 million	70,000 acres

Funding through the Wildlife Habitat Incentives Program (WHIP) can be applied towards both farm and non-farm lands. This program provides cost share dollars only and is intended to enhance habitats for both aquatic and terrestrial wildlife populations.

4

Comparing Waters to Water Quality Goals: Methods

Reporting on the status of Ohio's waters involves several steps:

- deciding what is an appropriate goal for the waters, in the form of beneficial uses
- gathering available data
- developing methods to compare available data to the goal
- using the methods to compare the data to the goal.

This Section describes the uses assigned, the data used, and the assessment methodologies employed to determine if specific uses were met, impaired or partially impaired. Not all uses or water body types can be assessed; for those, an explanation is presented along with a status report on efforts to collect data and develop methods for future evaluation.

4.1 Ohio's WQS Use Designations

Beneficial use designations describe existing or potential uses of water bodies. They take into consideration the use and value of water for public water supplies, protection and propagation of aquatic life, recreation in and on the water, agricultural, industrial and other purposes.

Ohio EPA assigns beneficial use designations to water bodies in the state. There may be more than one use designation assigned to a water body. Examples of beneficial use designations include: public water supply, primary contact recreation, and numerous sub-categories of aquatic life uses. The following chart lists all of Ohio's WQS designated uses and how the use was evaluated for the Ohio 2006 IR.

Table 4-1. Ohio's beneficial use designations

Beneficial Use Category	Key Attributes, or why a water would be designated in the category	Evaluation status in 2006 Integrated Report
Categories for the protection of aquatic life		
Coldwater Habitat	native cold water or cool water species; put-and-take trout stocking	Assessed on case by case basis
Seasonal Salmonid Habitat	supports lake run steelhead trout fisheries	No direct assessment, streams assessed as EWH or WWH
Exceptional Warmwater Habitat	unique and diverse assemblage of fish and invertebrates	64% of the Watershed Assessment Units and 74% of the Large River Assessment Units fully assessed using direct comparisons of fish and macroinvertebrate community index scores to the biocriteria in Ohio's WQS; sources and causes of impairment were assessed using biological indicators and water chemistry data
Warmwater Habitat (WWH)	typical assemblages of fish and invertebrates	
Modified Warmwater Habitat	tolerant assemblages of fish and macro-invertebrates; irretrievable condition precludes WWH	
Limited Resource Waters	fish and macroinvertebrates severely limited by physical habitat or other irretrievable condition	Assessed on case by case basis
Categories for the protection of recreational activities		
Bathing Waters	Lake Erie (entire lake); for inland waters bathing beach with lifeguard/bath house	Lake Erie public beaches fully evaluated; no inland waters evaluated
Primary Contact Recreation	water depth allows full body immersion	44% of the assessment units assessed using percentile rankings of fecal coliform counts
Secondary Contact Recreation	water depth prevents full body immersion	Not assessed
Categories for the protection of water supplies		
Public Water Supply	waters within 500 yards of all public water supply surface water intakes	Method proposed, with example project, see Section 4.3.1
Agricultural Water Supply	water used, or potentially used, for livestock watering and/or irrigation	Not assessed
Industrial Water Supply	water used for industrial purposes	Not assessed

4.2 Sources of Existing and Readily Available Data

For two decades Ohio EPA has placed a high priority on collecting data to accurately measure the quality of Ohio's rivers and streams. Therefore, the Agency has a lot of information and data to draw upon for the IR. The chart below summarizes the WQS uses evaluated in the 2006 IR, the basic types of data used, the period of record considered, the sources of data and the minimum amount of data needed to evaluate a water body. Specific methodologies used to assess attainment of the standards are described in more detail in the text that follows. The available data sets from Ohio EPA and external sources, including efforts used to obtain additional data, are also discussed below.

WQS Uses & Criteria Evaluated (basic rationale [1])	Type of Data Time period	Source(s) of Data	Minimum Data Requirement
Human health, single route exposure via food chain accumulation and eating sport fish (criteria apply to all waters of the State)	Fish Tissue Contaminant Data 1983 to 2004	Fish Tissue Contaminant Database	Data collected within past years. Three fish tissue samples of appropriate species from same water body
Recreation Use, pooled all data within water body and compared the average and maximum criteria to the 75th & 90th percentiles of the data, respectively	Bacteria counts 2001 to 2005 (May to October only)	Ohio EPA NPDES permittees Health depts. Northeast Ohio Regional Sewer District (NEORSD)	Bathing Waters - 5 *E. coli* samples over 30 day period Primary Contact - 3 sites per assessment unit and 15 fecal coliform samples
Aquatic life (specific sub-categories), fish and macroinvertebrate community index scores compared to biocriteria in WQS[2]	Watershed scale biological and water quality surveys & other more targeted monitoring 1995 to 2004	Ohio EPA Ohio DNR Miami University Ohio Northern U. MBI CABB NEORSD	Fish and/or macroinvertebrate samples collected using methods cited in WQS[3]. Generally, at least 5 locations sampled per watershed assessment unit (11-digit HUC)

[1] Additional explanation is provided in the text of Section 4.
[2] OAC 3745-1-07(A)(6) and Table 7-15.
[3] OAC 3745-1-03(A)(5)

Ohio EPA's 2006 IR uses fish contaminant data to determine impairment using the human health based water quality criteria. Fish consumption advisories (FCAs) were not used in determining impairment status. However, the public should use the FCAs in determining the safety of consuming Ohio's sport fish.

Bacteria data were used in the same way as in 2004, and external data was pooled with Ohio EPA results. Direct comparisons to the specifications in the WQS (i.e., 5 samples over a 30 day period) is not possible, however.

Most bacteria data generated by outside entities were acquired directly through access to the NPDES permit monthly operating data (MOR). Over 21,000 MOR records were retrieved and included in the analysis of recreational use impairment. The nine entities who submitted data for the 2004 IR received a direct mailing inviting them to submit any additional bacteria data. One party responded, but the data submitted had already been obtained from the Ohio Department of Health. See Appendix B.2 for a copy of the mailing.

The evaluation of biological and water quality survey data was not changed from the approach used in the 2004 IR. Ohio EPA and outside sources of data were evaluated, provided the required methods were followed. The external sources of biological and water quality data from the past decade have been compiled from several different sources. Sources include the Ohio Department of Natural Resources - Division of Wildlife, Midwest Biodiversity Institute (MBI), Center for Applied Bioassessment and Biocriteria (CABB), Northeast Ohio Regional Sewer District, Miami University, and Ohio Northern University. These sources have either received intensive training and certification from Ohio EPA or have staff who are well versed in Ohio EPA field and laboratory protocols. Ohio EPA has confidence that data submitted by these sources meet the rigorous QA/QC protocols necessary to meet Ohio EPA data quality objectives. Because of Ohio EPA familiarity with the sources and types of biosurvey data being collected in Ohio, it was determined that no additional specific solicitation of external data was necessary.

In 2003 a new law was enacted in Ohio dealing with external sources of data. The "credible data law" as it is known (ORC 6111.50 to 6111.56) requires that the Director of Ohio EPA adopt rules which would, among other things, do the following:

- ✓ establish a water quality monitoring program for the purpose of collecting credible data under the act, require qualified data collectors to follow plans pertaining to data collection, and require the submission of a certification that the data were collected in accordance with such a plan; and,

- ✓ establish and maintain a computerized database or databases of all credible data in the Director's possession, and require each state agency in possession of surface water quality data to submit them to the Director.

The Director has proposed rules to accomplish these requirements.

In addition, the law explicitly established that outside data used for certain regulatory purposes, such as the Section 303(d) list, must be collected by a qualified data collector, and be found compliant with the specifications of "level 3 credible data". Therefore, Ohio EPA did not seek new outside sources of data (other than bacteria data from those parties who provided data for the 2004 IR). Provided the adoption of rules proceeds as scheduled, a more active and defined solicitation for external data might be possible when the 2008 IR is prepared.

4.3 Methods under Development

4.3.1 Drinking Water Use

Ohio EPA has made substantial progress toward development of an assessment methodology for the Public Water Supply (PWS) beneficial use – drinking water. This program provides the State an opportunity to strengthen the connection between Clean Water Act and Safe Drinking

Water Act (SDWA) activities by employing the authority of the CWA to meet SDWA objectives of source water protection and reduced risk to human health. The draft methodology is provided for review as Appendix C. Ohio EPA welcomes public comment on all aspects of the methodology including recommendations for water quality data sources which may assist in refinement of the assessment approach. The time taken by Ohio EPA to develop the document reflects the inherent difficulty in designing an assessment methodology based primarily on chemical water quality criteria. The draft methodology is not used to determine impairment in this reporting cycle; however, Ohio EPA expects to involve an evaluation of the PWS use in the 2008 report.

4.3.1.1 Public Drinking Water Supply Methodology Summary

The Draft PWS Methodology document provides background information on how specific core indicators were selected and rationale for why others were excluded at this time. It also describes how water quality criteria will be applied during assessments and proposes specific data requirements. Utilizing a tiered assessment approach will enable Ohio EPA to focus initial assessment efforts and limited resources on water bodies currently serving as public drinking water sources. The first round of assessments will focus on indicators with established water quality criteria, while later assessments will incorporate additional indicators as related criteria are finalized. Initial assessments will target watersheds with known source water quality impacts and coordinate with the Total Maximum Daily Load (TMDL) assessment schedule. Data and information gathered during the initial round of assessments will assist in refinement of the assessment process and guide future source water sampling designs and assessment planning.

Source water quality will be assessed through comparison of instream and applicable treated water quality data to numeric chemical water quality criteria for the core indicators; nitrate, pesticides, other contaminants, and *Cryptosporidium* (following criteria development). The numeric water quality criteria correspond to the treatment standards established by the SDWA or were adopted from U.S. EPA's 304(a) recommended water quality criteria. Criteria will apply as average concentrations except for nitrate. At elevated levels, nitrate can cause acute health effects and the SDWA finished water standard applies as a maximum concentration not to be exceeded. Consequently, the water quality criteria for nitrate will be applied as a maximum value. Algae and taste and odor will also be considered as supplemental indicators and assessed if there are known source water quality problems. If areas of nuisance algae are present and impacting the water treatment system, then the waters may be designated impaired due to the aesthetic narrative criteria described in OAC rule 3745-1-07.

Each assessment will result in identification of one of three attainment categories: Full Attainment, Impaired, and Not Assessed-Insufficient Data. Full attainment waters will further be evaluated for water quality conditions placing it on a "watch list". Waters on the watch list will be targeted for increased monitoring and assessment. The following table identifies impaired and "watch list" water quality conditions.

Public Drinking Water Supply Impairment Determination *Applies to in-stream ambient and treated water quality data for the most recent five year period.*	
Indicator	**Impaired Conditions**
Nitrate	❑ Two or more excursions[1] above the WQ criteria within the 5 year period
Pesticides	❑ Annual average exceeds WQ criteria
Other Contaminants	❑ Annual average exceeds WQ criteria
Cryptosporidium [2]	❑ Annual average exceeds WQ criteria (1.0 oocysts/L)
Indicator	**Full Attainment Conditions**
Nitrate	❑ No more than one excursion[1] above the WQ criteria within the 5 year period
Pesticides	❑ Annual average does not exceed the WQ criteria
Other Contaminants	❑ Annual average does not exceed the WQ criteria
Cryptosporidium	❑ Annual average does not exceed the WQ criterion
Indicator	**"Watch List" Conditions** *Source waters targeted for additional monitoring and assessment*
Nitrate	❑ Maximum instantaneous value > 8 mg/L (80% of WQ criterion)
Pesticides	❑ Running quarterly average ≥ WQ criteria ❑ Maximum instantaneous value ≥ 4x WQ criteria
Other Contaminants	❑ Maximum instantaneous value ≥ WQ criteria
Cryptosporidium	❑ Annual average ≥ 0.075 oocysts/L

[1] Excursions must be at least 30 days apart in order to capture separate or extended source water quality events.
[2] Impaired conditions for *Cryptosporidium* are based on proposed water quality criteria which Ohio EPA intends to develop.
WQ Criteria - Water Quality Criteria defined in OAC Chapter 3745-1 established to protect in-stream water quality for the PWS beneficial use (Human health - Drinking Water)

In addition to development of the draft PWS methodology, Ohio EPA has taken the following steps to assure that the assessment approach is comprehensive, consistent with other beneficial use assessments, and adequately protects the source water for the intended beneficial use.

4.3.1.2 Sandusky River Watershed Pilot Assessment Project

In early 2004, Ohio EPA initiated efforts to pilot test the draft methodology with a selected watershed. The Sandusky River watershed was selected due to the number of public water systems using surface water, known source water problems, availability of water quality data,

and the existence of an active watershed group. As part of the pilot project, Ohio EPA developed a survey for the public water systems in order to identify available water quality data, verify treatment processes used, obtain estimated costs of treatment for removal of specific source water contaminants, and provide the water systems an opportunity to voice specific source water concerns. Ohio EPA interviewed each of the eight public water systems in person and obtained completed surveys. A comprehensive watershed report on the status of PWS use attainment is currently being compiled. Numerous changes were made to the assessment methodology as a result of the pilot project.

4.3.1.3 Collection of Water Quality Data for Future Assessments

Since the spring of 2003, Ohio EPA has continued collection of water quality data specific for assessment of the PWS beneficial use. Sampling is coordinated with ongoing water quality surveys with data collected at all public water system intakes within the selected basins. Sampling is targeted on pesticides and nitrates, but also includes other parameters including total organic carbon (TOC). During the 2005 sampling season, three zones were targeted and included stream and lake sampling. Figure 4-1 identifies Ohio watershed assessment units which contain at least one active surface water drinking water intake. Public water supply source waters will continue to be sampled in coordination with TMDL and other DSW sampling efforts. This data and additional data collected in 2006 and 2007 will be used to complete assessments of Drinking Water Use for inclusion in the 2008 Integrated Report.

4.3.1.4 Supplemental Water Quality Surveys

In 2005, the Division of Drinking and Ground Waters purchased instream continuous monitoring equipment to investigate sources of nitrate and other parameters and better target additional chemical laboratory analysis on critical areas.

4.3.2 Wetlands

Ohio EPA began development of tools to determine beneficial use status of wetlands in 1996. In 1998, the State of Ohio established wetland water quality standards. Narrative criteria have been codified which protect the functional and recreational aspects of a designated wetland. A rule package including wetland numeric biological criteria is under review. As the rules are proposed these criteria will establish benchmarks for attainment of a tiered, ecoregion-specific wetland use system. The ecological integrity of a particular wetland will be evaluated using vascular plants and/or amphibians.

With hundreds of thousands of potential wetlands to be evaluated, methods to accurately characterize the status of an assessment unit which may include large numbers of designated wetlands are being considered. A probabilistic and targeted evaluation of wetland quality in several watershed assessment units was utilized in the study of the Cuyahoga River watershed and it is anticipated that this format will be used for other watershed scale assessments.

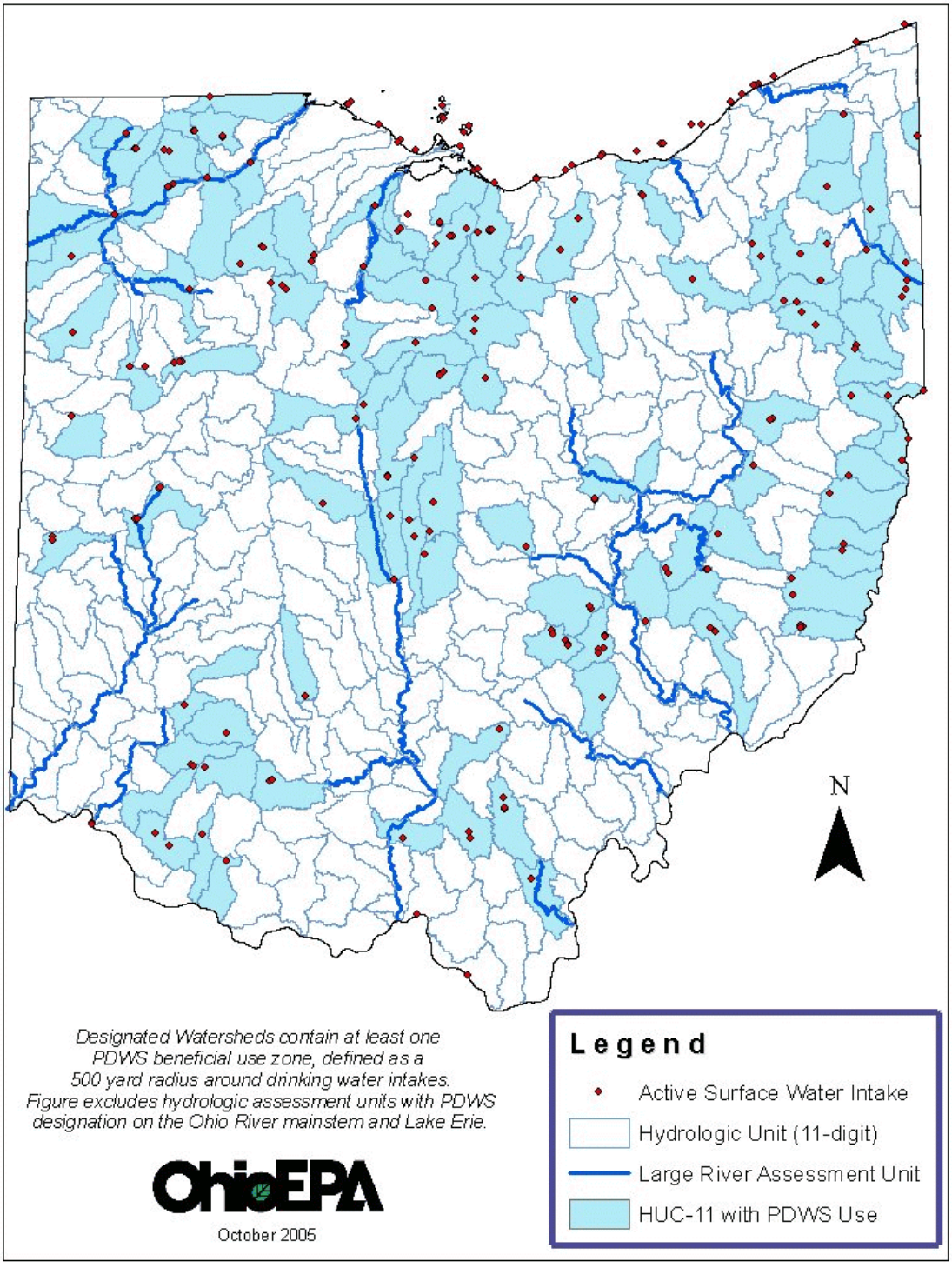


Figure 4-1. Watershed and Lake Erie assessment units containing one or more surface water drinking water intakes

4.3.3 Inland Lakes and Reservoirs

Ohio EPA's most recent work to assess lakes began in 1989 with a Clean Water Act Section 314 Lake Water Quality Assessment grant that supported the evaluation of 52 lakes. Various additional grants enabled the evaluation of 89 more lakes through 1995. An analysis and determination of use status for 447 public lakes (>5 acres in surface area) was presented in Volume 3 of the 1996 Ohio Water Resource Inventory (305(b) report). As part of the 1996 Section 305(b) report, Ohio EPA developed and applied the Lake Condition Index (LCI) to characterize overall lake health and to assess beneficial use status. From 1996 to the present, Ohio EPA has monitored 53 lakes, but LCI scores have not been calculated.

Although the LCI methodology was later revised to address changes in the interpretation of the threatened and full use attainment categories, the current implications of identifying a lake as impaired with the necessity of a TMDL were not anticipated. Thus, uncertainty exists about how a lake sampled in the early 1990s and characterized as "threatened" should be categorized under the present regulations and guidance on Section 303(d) listings. The Ohio Credible Data Law requirements further complicate the subject. The Ohio 2004 IR indicated that the Agency would strive to include lakes in this reporting cycle. However, available resources continue to be inadequate to attend to this evaluation need. If additional resources could be devoted to a lake monitoring and assessment effort, Ohio EPA intends to incorporate the LCI into the assessment of use attainment and 303(d) listing. To the extent possible, water quality in lakes will be evaluated as TMDLs are developed for various WAUs that have inland lakes.

4.4 Methodology for Fish Contaminant Data and Human Health Criteria

4.4.1 Background

The State of Ohio has operated a formal FCA program since 1993. Since July 2002, the program's technical and decision making expertise has been housed at the Ohio Environmental Protection Agency. The risk assessment protocols used were developed in the early 1990s under the auspices of the Great Lakes Governors Association.

Ohio has adopted human health WQS criteria to protect the public from adverse impacts, both carcinogenic and non-carcinogenic, due to exposure via drinking water (applicable at public water supply intakes) and to exposure in the contaminated flesh of sport fish (applicable in all surface waters). The latter criterion is called the non-drinking water human health criterion. The purpose of that criterion is to ensure levels of a chemical in water do not bioaccumulate in fish to levels harmful to people who catch and eat the fish. The relationship of the non-drinking water human health criterion to the FCA risk assessment protocols is explained below.

4.4.2 Rationale and Evaluation Method

U.S. EPA's guidance for preparing 2006 integrated reports states:

> "Although the CWA does not explicitly direct the use of fish and shellfish consumption advisories or NSSP classifications to determine attainment of water quality standards, states are required to consider all existing and readily available data and information to identify impaired segments on their section 303(d) lists. For purposes of determining whether a

segment is impaired and should be included on a section 303(d) list, EPA considers a fish or shellfish consumption advisory, a NSSP classification, and the supporting data to be existing and readily available data and information that demonstrates non-attainment of a section 101(a) "fishable" use when:

- the advisory is based on fish and shellfish tissue data;
- a lower than "Approved" NSSP classification is based on water column and shellfish tissue data (and this is not a precautionary "Prohibited" classification or the state water quality standard does not identify lower than "Approved" as attainment of the standard),
- the data are collected from the specific segment in question, and
- the risk assessment parameters (e.g., toxicity, risk level, exposure duration and consumption rate) of the advisory or classification are cumulatively equal to, or less protective than those in the State's WQSs." (U.S. EPA, 2005)

Ohio's WQS regulations do not describe human consumption of sport fish as an explicit element of aquatic life protection. However, the WQS do include human health criteria that are applicable to all surface waters of the State. Certain of these criteria are derived using assumptions about the bioaccumulation of chemicals in the food chain, and the criteria are intended to protect people from adverse health impacts that could arise from consuming fish caught in Ohio's waters. To determine when and how waters should be listed as impaired because of FCAs, the risk assessment parameters on which the human health WQS criteria are based were compared with those used in the Ohio FCA program. If the State has issued an advisory for a specific water body and that advisory is equal to or less protective than the State's WQS, then one can assume there is an exceedence of the WQS. On the other hand, if the advisory is more protective than the WQS, one cannot assume that the issuance of the advisory indicates an exceedence of the WQS. Figure 4-2 illustrates this point.

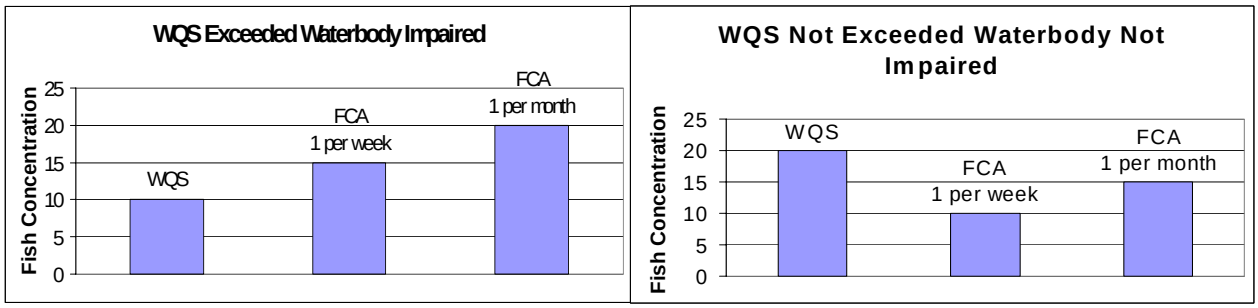


Figure 4-2. Illustration of the relationship among the water quality standard (WQS) values, the values that trigger issuance of fish consumption advisories (FCAs) and the resulting decision regarding water body impairment associated with an FCA.

An FCA is determined based on the quantity of a chemical in fish, such as micrograms of chemical per kilogram of fish tissue (ug/kg). WQS, on the other hand, are expressed as the quantity of chemical in water, such as micrograms of chemical per liter of water (ug/l). The information used to calculate the human health non-drinking WQS criterion can be used to calculate a maximum safe fish concentration. That fish concentration value can then be directly compared to the FCA program values to determine whether the advisory is less or more protective than the WQS criterion. The values in the chart below make this comparison for chemicals for which there is both an FCA and an Ohio human health non-drinking water

criterion. Because Ohio human health criteria differ between the Lake Erie and Ohio River basins, separate comparisons are presented.

Basin / Parameter	Fish concentration on which the WQS is based [1]	Range of fish concentrations triggering an "eat no more than one meal per week" advisory	Range of fish concentrations triggering an "eat no more than one meal per month" advisory
Lake Erie / PCB	23 ug/kg	50 - 220 ug/kg	221 - 1,000 ug/kg
Ohio River / PCB	54 ug/kg	50 - 220 ug/kg	221 - 1,000 ug/kg
Lake Erie / mercury	350 ug/kg	50 - 220 ug/kg	221 - 1,000 ug/kg
Ohio River / mercury	1,000 ug/kg	50 - 220 ug/kg	221 - 1,000 ug/kg
Lake Erie / lead [2]	2,000 ug/kg	86 - 371 ug/kg	372 - 1,609 ug/kg
Lake Erie / hexachlorobenzene	29 ug/kg	800 - 3,499 ug/kg	3,500 - 15,099 ug/kg
Ohio River / hexachlorobenzene	67 ug/kg	800 - 3,499 ug/kg	3,500 - 15,099 ug/kg

values	advisory is less protective than WQS criterion, WQS exceeded, water body impaired
values	advisory may be more, or less, protective than WQS criterion
values	advisory is more protective than WQS criterion, WQS not exceeded, no impairment from FCA

[1] See Appendix A.1 for an explanation of how these concentrations were calculated.
[2] There is no Ohio human health non-drinking water criterion for lead in the Ohio River basin.

These constituents were chosen because both human health WQS criteria and fish advisories are based on them.

The table demonstrates that the levels of fish tissue contaminants that trigger a fish advisory have little relation to the levels of fish tissue contaminants on which the WQS criteria are based. This discrepancy exists because different assumptions about fish consumption rates are made in calculating water quality standards than in issuing fish advisories. As a specific example, the fish consumption rate used to calculate the Ohio River Basin WQS criteria is 17.5 grams per day. The fish consumption rate used to calculate a "one meal per week" advisory recommendation is 32.6 grams per day. These values are not the same because the WQS criteria fish consumption rates are based on nutritional studies that attempt to capture approximately how much sport caught fish people are eating, whereas the fish consumption advisory rates are meant to advise people how much fish they can safely consume.

U.S. EPA stipulates that the risk assessment parameters used to categorize fish tissue contaminant data must be at least as protective as those used in the WQS-based fish concentrations. Fish advisory contaminant levels are not directly related to the WQS criteria contaminant levels, and in some cases are not as protective. Therefore, Ohio EPA has elected

to directly compare fish tissue data with the WQS criteria calculations shown in the above table, instead of using advisory based categorizations.

4.5 Methodology for Recreation Uses

4.5.1 Background

Prior to the 2002 IR, the reporting of recreational use impairment in Ohio was sporadic. Section 305(b) reports (1998 and earlier) may have included an indication of the potential for recreational use impairment in various streams, but a cohesive listing was not presented. The 2002 IR employed a uniform methodology to examine readily available data on fecal coliform counts. This approach was based on counting the number of exceedences of the secondary contact recreational use maximum criterion (5000/100 ml fecal coliform or 576/100 ml *E. coli*). Any assessment unit with five or more samples over the last five years above these values was listed as impaired.

The methodology adopted in 2004 continues to be used in 2006. The linkage of the methodology to the Ohio WQS is summarized in the following chart and subsequent text.

Bathing Waters		
Indicator	Criterion (Table 7-13, OAC 3745-1-07)	Assessment Method
E. coli	geometric mean E. coli content (either MPN or MF), based on not less than five samples within a thirty-day period, shall not exceed 126 per 100 ml and E. coli content (either MPN or MF) shall not exceed 235 per 100 ml in more than ten per cent of the samples taken during any thirty-day period	Lake Erie beach data was extensive enough to allow direct comparisons of geometric mean to the water quality criteria of 126; running geometric means calculated to arrive at the number of days in recreational season above the criterion; threshold of 10 days above criterion considered impairment of bathing water use. Comparisons to the single sample maximum criteria incuded for informational purposes, as well as information for individual beaches
Primary Contact		
Indicator	Criterion (Table 7-13, OAC 3745-1-07)	Assessment Method
Fecal coliform	geometric mean fecal coliform content (either MPN or MF), based on not less than five samples within a thirty-day period, shall not exceed 1,000 per 100 ml and fecal coliform content (either MPN or MF) shall not exceed 2,000 per 100 ml in more than ten per cent of the samples taken during any thirty-day period	Statewide data on rivers and streams was not extensive enough to allow direct comparison of geometric mean to the water quality criterion of 1000; data pooled from all sources over period of record was used; thresholds used for impairment of primary contact use were 75th percentile compared to 1000 and 90th percentile compared to 2000.

4.5.2 Evaluation Method - Lake Erie

Attainment of recreational water quality standards for the three Lake Erie assessment units was based upon examination of *E. coli* data provided by the Ohio Department of Health (ODH). Routine bacteria monitoring is performed by local health districts, ODH, and the Northeast Ohio Regional Sewer District (NEORSD) in order to monitor bacteria levels at public bathing beaches and advise the public when elevated bacteria are present that represent an increased risk of contracting waterborne illness as a result of exposure to pathogens while recreating in the water. Bacteria data collected by local or state health agencies at public beaches during the recreation season from 2001 through 2005 were included in the analysis. Ohio's water quality standards define the recreation season as May 1 - October 15, though Lake Erie beach monitoring typically commences in late May and concludes Labor Day weekend.

Each of the 23 beaches (shown in Figure 4-3) were individually analyzed to evaluate the percentage of recreation days during which the bathing water geometric mean water quality criteria of 126/100 ml were exceeded. The total number of recreation days for a particular beach were determined by adding the number of days starting with the first day of sampling and ending with Labor Day. The total number of days exceeding the bathing water geometric mean criteria was determined by adding the total number of days during the recreation season (as defined above) during which the running geometric mean of the samples exceeded the criteria. Once the running geometric mean exceeded the criteria, it was assumed to continue exceeding the criteria until further sampling documented that the criterion was not being exceeded.

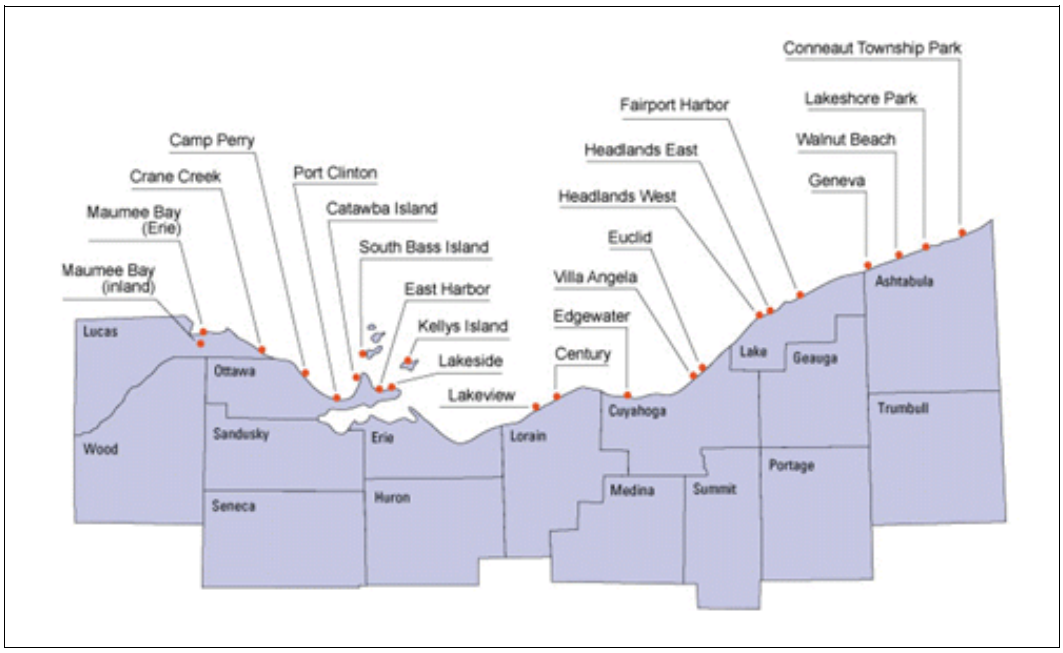


Figure 4-3. Lake Erie beaches sampled by Ohio health departments
(Note: Huntington Beach is not shown; located in Cuyahoga County to the west of Edgewater Beach.)

The percentage of exceeding days was determined for each beach over the five-year period. The 5-year beach data for the individual beaches were then pooled into the corresponding Lake Erie recreation assessment units in order to determine the attainment status for each of the

three assessment units. Attainment status for each Lake Erie assessment unit was based upon whether the average number of days the geometric mean *E. coli* bathing water quality criteria exceeded ten days. The basis for using a benchmark of ten days is Ohio's 1998 State of the Lake Report prepared by the Ohio Lake Erie Commission (Ohio LEC, 1998). While the stated goal in this report for beaches is to have clean beaches all of the time (no days under advisement) the report considered having ten or fewer days under advisement to be "excellent". The Ohio Lake Erie Commission's latest edition of the State of the Lake Report (2004) continues to use these benchmarks in rating the swimmability of Lake Erie beaches along Ohio's 262 mile shoreline. The 2006 IR also continues to use these criteria in determination of impairment at the assessment unit level. In addition, statistical summaries are included for individual beaches to provide additional detail and permit comparisons between beach performance.

Beach data were examined based upon a comparison to the single sample maximum E. coli beach criterion of 235/100 ml for the 2006 IR. While the geometric mean criteria were used to determine attainment/nonattainment for each of the three lake assessment units in the 2006 IR, as was done in the 2004 IR, the comparison to the single sample maximum was included for informational purposes. Ohio is in the process of transitioning from use of the geometric mean criteria to the single sample maximum criteria for purposes of beach monitoring to comply with provisions of the 2004 federal Beaches Environmental Assessment and Coastal Health Act (BEACH) rule. Recommendations for posting a beach advisory continued to rely on the exceedence of the E.coli geometric mean criterion of 126/100 ml through the 2005 recreation season. Beginning in 2006, recommendations to post a beach advisory will be based upon exceedence of the single sample maximum E. coli criteria of 235/100 ml.

4.5.3 Evaluation Method - Rivers and Streams

The 2006 recreational use impairment list was developed using ambient fecal coliform data collected from May 2001 to October 2005. These data were obtained from the STORET and SWIMS databases, which contain ambient monitoring data collected by Ohio EPA and ambient monitoring data collected by point source dischargers, respectively. Data collected outside of the recreation season, as defined in Ohio's Water Quality Standards, were excluded from the analysis. Values reported as "too numerous to count" and values reported as "greater than" were also excluded from further analysis in cases where it was not possible to estimate the maximum (e.g., the dilution series used in the analysis was not known). In addition, values reported to be "less than" values ranging from 100 to 2,000 were excluded. Approximately 30,550 fecal coliform bacteria records were used in the analysis, of which approximately 33% were from STORET and 67% were from SWIMS. Data were sorted into their respective 11-digit HUCs using a geo-spatial analysis of the latitude/longitude data associated with each fecal coliform value.

Statistical computations were performed using the pooled dataset of all fecal coliform data from within an 11-digit HUC. Statistical analysis performed include computation of the geometric mean, median, 75th percentile, and 90th percentile of the fecal coliform data for each assessment unit for which data were available. Statistical computations were performed using Microsoft Excel 2000. The geometric mean was computed as the arithmetic mean of the log-transformed fecal coliform values. The median and percentiles were computed by ranking (i.e., non-parametrically) untransformed fecal coliform values. A tally of the number of ambient sites and the number of NPDES dischargers reporting fecal coliform data to Ohio EPA's SWIMS

database for each assessment unit was made. The amount of fecal coliform data included in the statistical analysis for each assessment unit was also tallied (MOR, ambient, combined total).

Recreational use assessment determinations were based on a comparison of the 75th percentile to Ohio's geometric mean fecal coliform criterion of 1,000 and the 90th percentile to Ohio's single sample maximum fecal coliform criterion of 2,000. An assessment unit was determined to be impaired when either the 75th percentile exceeded 1,000 fecal coliform or the 90th percentile exceeded 2,000 fecal coliform. A minimum of three sampling locations within the assessment unit and 15 measurements were required in order to make an assessment determination.

4.6 Methodology for Aquatic Life Uses

4.6.1 Background and Rationale

Ohio EPA has been evaluating streams using standardized biological field collection methods for nearly thirty years. Stream assessments are based on the experience gained through the collection of over 20,000 fish population samples, over 9000 macroinvertebrate community samples and more than 72,500 water chemistry samples. Aquatic life use assessment for the 2006 Integrated Report are based on biological and chemical data collected from 1995 to 2004 at over 4450 wadeable stream and large river sampling locations.

Ohio's Water Quality Standards (WQS) have seven subcategories of aquatic life uses (see summary presented in Section 5). The WQS rule contains a narrative for each aquatic life use and the three most commonly assigned aquatic life uses have quantitative, numeric biological criteria that express the minimum acceptable level of biological performance based on three separate biological indices. A specially designed 1983-1984 U.S. EPA study known as the Stream Regionalization Project was used to select reference, or least impacted sites, in each of Ohio's five ecoregions. Biological data from a subset of these sites in addition to supplemental data from other least impacted Ohio reference sites were used to establish the ecoregion specific biocriteria for each aquatic life use. Note that some criteria vary according to stream size and some indices do not apply in certain circumstances. Ohio's WQS rule stipulates that "biological criteria .....provide a direct measure of attainment of the warmwater habitat, exceptional warmwater habitat and modified warmwater habitat aquatic life uses" (OAC 3745-1-07(A)(6)). The numeric biological criteria applicable to Exceptional Warmwater Habitat (EWH), Warmwater Habitat (WWH), and Modified Warmwater Habitat (MWH) waters are found in Table 7-15 of the WQS rule. Neither Coldwater Habitat (CWH) nor Limited Resource Water (LRW) streams have numeric biological criteria and attainment status must be determined on a case by case basis. For sites and segments designated with these aquatic life uses, attainment status was determined by using biological data attributes (e.g., presence and abundance of coldwater species in CWH streams) and/or interim biological criteria (LRW streams) to assess consistency with the narrative aquatic life use definition in the Water Quality Standards.

4.6.2 General Determination of Attainment Status

A biological community at an EWH, WWH, or MWH sampling site must achieve the relevant criteria for all three indices, or those available and/or applicable, in order to be in full attainment

of the designated aquatic life use. Partial attainment is determined if one criterion is not achieved while non-attainment results when all biological scores are less than the criteria or if poor or very poor index scores are measured in either fish or macroinvertebrate communities. The chemical and physical data collected as part of Ohio EPA's comprehensive watershed evaluations are considered in gaging causes and sources of pollution and factor into the confirmation of impaired uses.

Adequate sampling is necessary to represent the aquatic life use attainment status for all streams in a Watershed Assessment Unit (WAU). Despite Ohio EPA's significant biological sampling effort, over one third of Ohio's WAUs are precluded from this analysis due to insufficient data. While some data may be available for some of the WAUs, many have no water quality monitoring data or the scope of monitoring was judged to be too limited to adequately generate a WAU assessment and watershed score. Generally, at least five sample sites are minimally considered necessary for extrapolation. Presently, Ohio EPA prefers that the principal investigators make informed decisions about the data relevance for a particular WAU evaluation rather than institute specific guidance on minimum effort.

Recognizing the state's limited resources, one way to increase WAU assessment coverage is to utilize all available relevant data. While Ohio EPA uses data from a variety of sources in its work, the data used to determine the aquatic life use status in this report were primarily collected by Ohio EPA. Some additional biological data were provided by the Ohio Department of Natural Resources, Northeast Ohio Regional Sewer District, Miami University, Ohio Northern University, Midwest Biodiversity Institute, and Center for Applied Bioassessment and Biocriteria. Those interested in providing data to Ohio EPA for aquatic life use attainment status determinations must attend appropriate training provided by Ohio EPA or its designee (e.g., through the Voluntary Action Program Biocriteria Certification or future Qualified Data Collector Level 3 Certification) and confirm competency in Ohio EPA biological sampling protocols. All data used to make attainment determinations are carefully reviewed for consistency with all Ohio EPA methods and guidance.

4.6.3 Evaluation Method - Large River Assessment Units (LRAUs)

Decades of monitoring work by Ohio EPA has resulted in an extensive data set which includes recent data for 17 of the 23 defined LRAUs in Ohio. The longitudinal sampling pattern (upstream to downstream and bracketing pollution sources and tributaries) used to measure fish community health, macroinvertebrate community condition and water chemistry allows WQS attainment status to be fairly precisely estimated based on linear distances. The length of the Large River deemed to be in attainment, as described in the previous sentence, was divided by the total assessed length of the Large River and multiplied by 100 to yield a value between 0 (no miles in attainment) and 100 (all miles in attainment). A LRAU was considered meeting its aquatic life designated use only if a score of 100 was reported. In other words, if all sites are not in full attainment of the designated aquatic life use, the entire Large River Assessment Unit is listed as impaired and placed in Integrated Report Category 4 or 5.

4.6.4 Evaluation Method - Watershed Assessment Units (WAUs)

The assessment of aquatic life use attainment in WAUs was determined using a combination of spatial and linear analysis. Data were grouped according to the watershed size at the point of

sampling: sites with drainages $\leq$ 5 mi^2 (Spatial Data Group 1); sites with drainages > 5 mi^2 and less $\leq$ 20 mi^2 (Spatial Data Group 2); sites with drainages > 20 mi^2 and less $\leq$ 50 mi^2 (Spatial Data Group 3); and sites with drainages > 50 mi^2 and $\leq$ 500 mi^2 (Principal Streams). Within each WAU, a "linear" attainment score was calculated for the assessed Principal Streams (drainage areas between 50 and 500 mi^2) in the fashion described above for Large Rivers. A separate "spatial" attainment score was calculated for each WAU using information about the fraction or proportion of sites within Data Groups 1 - 3 that demonstrated full aquatic life use attainment. To correct a bias in biosurvey design that generates a larger number of data points from small watersheds (Data Groups 1 and 2 sites), the following formula was used to give more weight in the final spatial score to results from larger streams (Data Group 3 sites).

Data Group 1 $\leq$ 5 mi^2	Data Group 2 > 5 mi^2 to $\leq$ 20 mi^2	Data Group 3 > 20 mi^2 to $\leq$ 50 mi^2	Spatial Score

$$\frac{\dfrac{\left(\dfrac{a}{b}+\dfrac{a}{b}\right)}{2}+\dfrac{a}{b}}{2} * 100 = c$$

where
- a = number of sites in full attainment
- b = total number of sites in Data Group
- c = spatial attainment score for WAU

The spatial and linear scores calculated for each WAU were averaged for an overall measure of aquatic life attainment in the watershed. Watershed Assessment Units were considered meeting their aquatic life designated use(s) only if a score of 100 was reported. In other words, if all assessed sites within Data Groups 1 - 3 and all assessed Principal Stream sites are not in full attainment of the designated aquatic life use(s), the entire assessment unit is listed as impaired and placed in Integrated Report Category 4 or 5.

Additional synthesis of data was used to provide aggregate statewide statistics for Ohio's universe of assessed principal streams and large rivers. WAU and LRAU scores were used to estimate full attainment, partial attainment, and non-attainment for total miles of perennial streams within each assessment unit (based on perennial stream mile estimates determined from the National Hydrography Dataset). These statistics were then summed and averaged to provide a snapshot of aquatic life use condition (full, partial, and non-attainment) within Ohio. Similar aggregated statistics based on the last two Integrated Report cycles (2002 and 2004) were used along with the 2006 results to track trends of attainment levels across Ohio's principal streams and large rivers in an effort to quantify progress made in point and nonpoint source pollution controls and in meeting Ohio's goal of 80% full aquatic life use attainment by 2010.

4.6.5 Evaluation Method - Lake Erie Nearshore, Islands, and Lacustuaries

Aquatic life use determinations are predicated on a narrative description of the aquatic community associated with the relevant use tier. In the absence of numeric criteria, the narrative expectation provides the impairment determination. In 1997, Ohio EPA completed the document *Development of Biological Indices Using Macroinvertebrates in Ohio Nearshore Waters, Harbors, and Lacustuaries of Lake Erie in Order to Evaluate Water Quality* (Lake Erie Protection Fund Grant LEPF-06-94, undated draft). In 1999, the document *Biological Criteria for the Protection of Aquatic Life: Volume IV: Fish and Macroinvertebrate Indicies for Ohio's Lake Erie Nearshore Waters, Harbors, and Lacustuaries* was produced (Ohio EPA, undated draft). The data analyses in these documents, including refinement of field sampling protocols and development of assessment indices, provide a foundation to establish numeric biocriteria for aquatic life use in Lake Erie along the Ohio shoreline and in lacustuary areas.

The term "lacustuary" was coined to specify the zone where Lake Erie water levels have intruded into tributary river channels. The aquatic life use status of a lacustuary is included in the assessment of the tributary river. Excluding lacustuaries, the status of the Lake Erie shoreline is evaluated in three assessment units: western basin nearshore, islands, and central basin nearshore ("nearshore" in this case meaning areas within 100 meters of the shoreline). Linear nearshore and island miles monitored and assessed are extrapolated from nearshore and island sites where sufficient and current biosurvey data have been collected. Techniques to assess open water areas are being explored under grants from the Ohio Lake Erie Protection Fund.

4.7 Methodology for the Ohio River

Ohio EPA participates in an Ohio River Valley Water Sanitation Commission (ORSANCO) workgroup to promote consistency in 305(b) reporting and 303(d) listing. The workgroup discussed and agreed upon methods to evaluate attainment / non-attainment of aquatic life, recreation and public water supply uses, as well as impairments based on Sportfish Consumption Advisories. ORSANCO has prepared the Section 305(b) report for the Ohio River and has listed the impaired beneficial uses and segments of the Ohio River. Ohio EPA defers to the ORSANCO analysis and the list of impaired Ohio River segments found in *2006 Biennial Assessment of Ohio River Water Quality Conditions* (ORSANCO, 2006).

5

Comparing Waters to Water Quality Goals: Results

Using the methodologies described in Section 4, data were compiled for each large river and watershed assessment unit and the three Lake Erie assessment units. The data was evaluated to determine whether the assessment unit supported, partially supported, or did not support each designated use. Results are discussed below by type of data:

- fish tissue data (human health criteria)
- bacteria counts (recreation uses)
- fish and macroinvertebrate community index scores (aquatic life uses).

General statewide observations about the overall results for each type of use impairment are also presented. Appendix D.1 shows the complete status by assessment unit type for each use evaluated. The Maps section also contains a map of condition by designated use.

5.1 Fish Contaminant Data and Human Health Impairment

Fish tissue data for four contaminants were reviewed to determine an integrated report category. The methodology for selecting, reviewing, and categorizing fish tissue data is given in Section 4.4. The four contaminants reviewed were mercury, PCBs, lead, and hexachlorobenzene. These contaminants were chosen for review based on current and recent fish consumption advisories in Ohio due to these contaminants, as well as existing human health WQS criteria for the four contaminants.

Results are presented here and in Appendix A. Table 5-1 lists waters impaired because fish tissue levels of PCBs or mercury exceed the threshold level upon which the WQS criterion is based, while Table 5-2 includes those not significantly impaired. Appendix A.3 lists waters with current fish tissue data where inadequate samples exist to determine level of impairment. Appendix A.4 lists waters with only historical fish tissue data.

There are three water bodies in Ohio with significant pollution from other contaminants that affect fish tissue, as shown in Table 5-3. Remediation activities on all of these water bodies is underway.

Table 5-4 lists two water bodies identified as impaired for this use on the 2004 303(d) list which no longer meet the data constraints in the methodology described in Section 4.4. The data for both of these locations have become historical and new data would need to be collected before

a current impairment status can be determined. Since age of data alone is not a reason for delisting, the water bodies remain on the 303(d) list.

In the 2004 IR, threatened waters were discussed with respect to the human health methodology based on fish consumption advisories. Under the new 2006 methodology, all the waters identified as threatened in 2004 continue to be in impaired status for the human health use.

For a statewide perspective, the following table shows aggregate state statistics for fish contaminant data compared to human health criteria. The stream and river information includes both principal stream (50 to 500 square mile drainage) and large rivers (greater than 500 square miles drainage). The lake acres are the total based on publicly owned lakes greater than 5 acres.

	Principal Wadeable Streams and Large Rivers (Miles)	**Inland Lakes and Reservoirs (Acres)**
All Ohio Miles/Acres	5750	118963
Miles/Acres Monitored	4159	77826
Miles/Acres Full Support	321 (8%)	21706 (28%)
Miles/Acres Impaired	2580 (62%)	21870 (28%)
Miles/Acres Indeterminate	1258 (30%)	34250 (44%)

Table 5-1. Waters impaired because fish tissue levels of PCBs or mercury exceed the threshold level upon which the WQS criterion is based.

Water Body	Assessment Unit(s)	Pollutant(s)
Ashtabula River Kelloggsville – State Road to Lake Erie	04110003 050	PCBs, hexachlorobenzene
Auglaize River Wapakoneta – Mudsock Road to Defiance	04100007 010 04100007 020 04100007 060 04100007 mainstem	Mercury
Berlin Lake	5030103020	PCBs
Big Darby Creek North Lewisburg Road to State Route 104	05060001 190 05060001 200 05060001 220	PCBs
Black River Ford Road Bridge to Lake Erie	04110001 050	PCBs
Blanchard River[1] County Road 183 to Auglaize River	04100008 010 04100008 020 04100008 030 04100008 mainstem	PCBs
Chippewa Creek[1] Seville – Seville Road to bridge near mouth	05040001 020	PCBs, hexachlorobenzene
Cross Creek North Branch to County Road 74	05030101 340	PCBs
Cuyahoga River Horwath's Landing at Eldon Russell Park to old channel at end	04110002 010 04110002 020 04110002 030 04110002 040 04110002 mainstem	PCBs
Delaware Lake[1]	05060001 110	PCBs
Dicks Creek Cincinnati Road to Main Street	05080002 050	PCBs
Duck Creek[1] Stanleyville – County Road 42 to Ohio River	05030201 120	PCBs
East Branch Black River[1] East Fork East Branch Black River to Elyria – Fuller Road	04100001 030 04100001 040	PCBs, Mercury
Eastwood Lake	05080001 190	PCBs
Grand Lake St. Marys[1]	05120101 020	PCBs
Grand River Upstream Hobart Road to Lake Erie	04110004 mainstem	PCBs, Mercury

Table 5-1. Waters impaired because fish tissue levels of PCBs or mercury exceed the threshold level upon which the WQS criterion is based.

Water Body	Assessment Unit(s)	Pollutant(s)
Great Miami River Tawawa Creek to oxbow	05080001 mainstem	PCBs
Hamilton (a.k.a. Ford) Hydraulic Canal Control Structure to Great Miami River	05080002 050 05080002 090	PCBs
Hocking River Lancaster – Lithopolis Road to Hockingport	05030204 010 05030204 050 05030204 mainstem	PCBs
Lake Erie	Western basin Central basin Lake Erie Islands	PCBs
Lake LaSuAn[1]	04100003 020	Mercury
Lake Lavere[1]	04100003 020	Mercury
Lake Sue[1]	04100003 020	Mercury
Little Beaver Creek State Park to Grimms Bridge Road	05030101 090	PCBs
Little Miami River[1] Yellow Springs – Jacoby Road to Cincinnati – Beechmont Avenue	05090202 010 05090202 020 05090202 030 05090202 mainstem	PCBs
Little Three Mile Creek[1] Ohio River Meldahl Pool	05090201 060	PCBs
Mad River Pimtown Road to Findley Street	05080001 150 05080001 160 05080001 180 05080001 003	PCBs
Mahoning River Berlin Dam to Lowellville Dam	05030103 030 05030103 040 05030103 mainstem	PCBs
Maumee River Indiana State Line to Toledo Wastewater Treatment Plant	04100001 mainstem	PCBs
Middle Branch Nimishillen Creek[1] Werner Church Road to Canton – Cook Park	05040001 050	PCBs
Middle Fork Little Beaver Creek State Route 45 overpass to State Route 7	05030101 070	PCBs
Muskingum River Coshocton – Armco Steel to Marietta	05040004 mainstem	PCBs

Table 5-1. Waters impaired because fish tissue levels of PCBs or mercury exceed the threshold level upon which the WQS criterion is based.

Water Body	Assessment Unit(s)	Pollutant(s)
Nesmith Lake	05040001 010	PCBs
New Lyme Lake	04110004 030	Mercury
Nimishillen Creek Canton Wastewater Treatment Plant – Mill Road to Westbrook Road	05040001 050	PCBs
North Branch Portage River Silverwood Road to Kohring Road	04100010 050	PCBs
Ohio Canal (a.k.a. Portage Canal) Summit Lake	05040001 010	PCBs
Olentangy River[1] Galion – Cummings Road to Columbus – Scioto River	05060001 090 05060001 110 05060001 120	PCBs
Ottawa River Lima – Thayer Road to Kalida – U.S. Route 224	04100007 030 04100007 040 04100007 050	PCBs
Ottawa River Toledo – University of Toledo Dam to Toledo – near state line	04100001 020	PCBs
Paint Creek State Route 734 to Scioto River	05060003 010 05060003 050 05060003 mainstem	PCBs
Pine Creek[1] Superior - State Route 522 to Hayport Road	05090103 020	PCBs
Pymatuning Reservoir[1]	05030102 010	PCBs
Rocky Fork Licking River[1] Camp Falling Rock to Hanover – Hickman Road	05040006 050	PCBs
Rocky Fork Mohican River[1] Marion – U.S. Route 30 to Basdorf Road	05040002 020	PCBs
Rocky River[1] Berea – Cedar Point Road to Lakewood	04110001 070	PCBs
Ross Lake[1]	05060002 060	PCBs
Sandusky River Bucyrus – Keiss Road to Wightman's Grove	04100011 020 04100011 040 04100011 070 04100011 090 04110011 120	PCBs

Table 5-1. Waters impaired because fish tissue levels of PCBs or mercury exceed the threshold level upon which the WQS criterion is based.

Water Body	Assessment Unit(s)	Pollutant(s)
Sandy Creek West Township Park to Bolivar Dam	05040001 040 05040001 060	PCBs
Scioto River Downstream Kenton Wastewater Treatment Plant to Portsmouth – Ohio River	05060001 010 05060001 030 05060001 mainstem	PCBs
Scippo Creek Kingston Pike to River Road	05060002 010	PCBs
Shade River[1] Chester – State Route 248 to Stethem Road	05030202 040	PCBs
St. Joseph River Lazy River Campground to bridge on County Road 15	04100003 030 04100003 060	PCBs
St. Marys River[1] St. Marys – Glynwood Road to Willshire Eastern Road	04100004 010 04100004 020 04100004 030	PCBs
Summit Lake	04110002 030	PCBs
Tiffin River[1] Archbold – U.S. Route 20A to Defiance – Dey Road	04100006 040 04100006 mainstem	PCBs, Mercury
Tinkers Creek[1] Twinsburg – Glenwood Avenue to Cleveland Metropark – Dunham Road	04110002 050	PCBs
Toussaint Creek[1] Rife Road to State Route 2	04100010 020	PCBs
Tuscarawas River Akron – Arlington Road to upstream mouth	05040001 010 05040001 030 05040001 mainstem	PCBs, hexachlorobenzene
Twin Creek Downstream State Route 40 to Dayton-Oxford Road	05080002 030 05080002 040	PCBs
Vermilion River[1] Fayette Road to Lake Erie	04100012 050 04100012 060	Mercury
Wakatomika Creek[1] Frampton Road to Dresden – North Dresden Road	05040004 020	PCBs
Walhonding River Mohawk Dam to Coshocton – State Route 83	05040003 mainstem	PCBs
Walnut Creek Baltimore – State Route 37 to Little Walnut Road	05060001 170 05060001 180	PCBs
West Branch Black River[1] State Route 511 to Elyria – 3rd Street	04110001 020	PCBs

Table 5-1. Waters impaired because fish tissue levels of PCBs or mercury exceed the threshold level upon which the WQS criterion is based.		
Water Body	**Assessment Unit(s)**	**Pollutant(s)**
West Branch Rocky River[1] Medina – State Route 3 to Lewis Road	04110001 060	PCBs, Mercury
Wheeling Creek[1] State Route 9 to Blaine Bridge	05030106 040	PCBs
Whetstone Creek[1] Mt. Gilead – McKibbon Road to State Route 229	05060001 100	PCBs
Whitewater River Indiana State Line to Suspension Bridge Road	05080003 mainstem	PCBs
Wolf Creek Gettysburg Road to Dayton – Great Miami River	05080002 010	PCBs
Yellow Creek[1] Bergholz – State Route 164 to Hammondsville – State Route 213	05030101 180	PCBs

[1] Water bodies newly identified as impaired due to fish contaminant data in the 2006 integrated report.

Table 5-2. Waters not significantly impaired because fish tissue levels of PCBs or mercury do not exceed the threshold level upon which the WQS criterion is based	
Water Body	**Assessment Unit(s)**
Adams Lake	05090201 050
Alum Creek Reservoir	05060001 150
Buckeye Lake	05040006 040
Caesar Creek Reservoir	05090202 050
Cowan Lake	05090202 070
Dale Walborn Reservoir	05030103 020
East Fork Little Miami River Canada Road to Lower East Fork Little Miami River Wastewater Treatment Plant	05090202 100 05090202 110 05090202 120 05090202 130
Four Mile Creek Camden College Road to Eaton Road	05080002 070
Highlandtown Lake	05030101 100
Indian Lake	05080001 010
Lake Logan	05030204 050
Little Darby Creek Mechanicsburg – Irwin Road to Big Darby Creek	05060001 210
Mill Creek Jefferson – State Route 46 to Calpin Road	04110004 050
Rocky Fork Reservoir	05060003 060
Sevenmile Creek Camden – Anthony Wayne Parkway to Taylor School Road	05080002 060
Stillwater River Schroeder Road to Dayton – Great Miami River	05080001 090 05080001 100 05080001 mainstem
Tappan Lake	05040001 160
Tymochtee Creek Marseilles – State Route 67 to Sandusky River	04100011 050
White Oak Creek New Hope Covered Bridge to Ohio River – Meldahl Pool	05090201 100
Wills Creek Reservoir	05040005 mainstem

Table 5-3. Water bodies with contaminants that affect fish tissue, not included in Tables 5-1 or 5-2 for these pollutants

Water Body	Pollutant	Section 303(d) listing decision relative to pollutant listed
Duck Creek Stanleyville – County Road 42 to Ohio River	DDT	Not listed as impaired for DDT due to ongoing remediation through state cleanup programs.
Middle Fork Little Beaver Creek State Route 14 at Allen Road to Little Beaver Creek	Mirex	Not listed as impaired for mirex due to ongoing remediation through state and federal cleanup programs.
Little Scioto River State Route 739 to Holland Road	PAHs	Not listed as impaired for PAHs because remediation is ongoing using state hazardous waste cleanup funds.

Table 5-4. Assessment units for which a current impairment status cannot be determined because data have become historical and no new data are available
(The waters remain on the 303(d) list.)

AU Number	AU Name	Pollutant	Most recent year of data
04100010 060 04100010 070	Portage River Ohio Turnpike to Lake Erie	PCBs	1994
05080001 030 05080001 040	Great Miami River Logansville – State Route 47 to Tawawa Creek	PCBs	1993, 1994
05090203 010	Mill Creek (Cincinnati)	PCBs	1992

5.2 Bacteria Counts and Recreation Use Impairment

Using the methodology outlined in the previous chapter and available data, results for the Recreation Use are presented here. Results are presented for Lake Erie assessment units, watershed assessment units, and large river assessment units.

5.2.1 Lake Erie Public Beaches

Information about water quality conditions at Lake Erie public bathing beaches is summarized in Tables 5-5 through 5-7 and Figure 5-1. The locations of these beaches is shown in Figure 4-3.

Table 5-5 contains the seasonal geometric mean *E. coli* levels at each of Ohio's 23 public beaches along Lake Erie for the past five recreational seasons (2001-2005). The table also indicates the number of beach advisories for each beach based upon the two following decision criteria:

1. Comparison of the five day rolling geometric mean to Ohio's geometric mean *E. coli* criteria for beaches (126) has been employed by the Ohio Department of Health and local health departments to trigger the issuance of beach advisories through 2005.
2. Beginning with the 2006 recreation season, Ohio will employ the single sample maximum *E. coli* criteria for beaches of 235 to trigger the issuance of beach advisories. This change is being made to comply with the federal BEACH Act rule, which became effective on December 16, 2004.

Highlighted cells indicate impairment of the recreational use at a given beach in a given year and allows for a side-by-side comparison of impairment using the geometric mean criterion and the single sample maximum criterion.

In Table 5-6, the data are aggregated into the three assessment units. The table indicates the number of days (and the percentage for all years) when Ohio Lake Erie public beaches exceeded Ohio's bathing water geometric mean *E. coli* criteria compared to the total number of days in the sampling period. Data for the past five recreation seasons was examined to track the number of days over the sampling period when the geometric mean of 5 consecutive samples within a 30 day period exceeded the bathing water *E. coli* criterion of 126. For the full five-year period, the percent of days with criteria exceedences ranged from 0% to a high of 51%. These extremes coincided with a remoteness from pollution sources along the Lake Erie Island beaches compared to the close proximity of urban areas in Lorain and Cuyahoga counties where inputs of storm water runoff and combined sewer overflows are known sources of bacteria.

As depicted in Figure 5-1, the frequency with which individual beaches were recommended for a swimming advisory because of elevated bacteria levels above the state water quality standards ranged from 0% at several beaches to over 90% of the 2003 recreation season at Edgewater beach. Considerable variation in the frequency of advisories was observed between beaches. However, several beaches stand out as consistently good performers over the last five recreation seasons, including Catawba, Century, Conneaut, Crane Creek, East Harbor, Geneva, Headlands East, Headlands West, Kelly's Island, South Bass Island, and Walnut Beach. These beaches infrequently exceeded the goal of fewer than 10 days per season under advisement. There were also several beaches that performed poorly on a consistent basis with

Table 5-5. Seasonal geometric mean *E. coli* levels at Ohio's 23 public beaches along Lake Erie

Beach	2001			2002			2003			2004			2005		
	Seasonal geomean	# of days Posted		Seasonal geomean	# of days Posted		Seasonal geomean	# of days Posted		Seasonal geomean	# of days Posted		Seasonal geomean	# of days Posted	
		5-day	SSM		5-day	SSM		5-day	SSM		5-day	SSM		5-day	SSM
Catawba Island	11	1	9	12	0	1	10	13	8	17	9	12	8	0	6
Century	14	4	16	34	2	14	15	0	6	37	7	16	35	6	11
Camp Perry	181	46	46	36	7	9	64	17	27	45	14	17	63	29	30
Conneaut	10	0	4	18	0	6	17	8	8	50	12	18	28	4	15
Crane Creek	37	0	18	33	1	11	35	2	12	28	0	2	33	7	9
Edgewater	104	35	28	79	36	21	273	92	57	59	9	11	63	6	18
East Harbor	19	0	0	9	0	2	18	11	13	18	0	1	8	0	7
Euclid State Park	121	41	42	143	44	29	68	31	17	82	30	19	34	7	16
Fairport Harbor	45	0	22	32	0	13	77	24	21	47	13	10	38	11	18
Geneva State Park	33	0	6	29	0	3	23	1	4	44	10	21	34	5	18
Headlands East	30	0	8	37	0	17	25	0	3	30	0	13	39	0	15
Headlands West	33	11	12	33	0	17	26	0	8	22	0	10	26	0	15
Huntington	51	11	24	54	10	25	71	25	20	47	12	21	40	6	21
Kelleys Island	10	0	7	22	0	0	7	0	7	9	0	0	12	0	0
Lakeshore Park	166	44	42	116	59	31	85	31	24	97	42	39	34	5	11
Lakeside	21	0	15	16	0	3	36	26	18	15	0	12	17	0	9
Lakeview	104	38	42	178	53	39	48	11	15	399	88	58	56	14	15

Table 5-5. Seasonal geometric mean *E. coli* levels at Ohio's 23 public beaches along Lake Erie

Beach	2001			2002			2003			2004			2005		
	Seasonal geomean	# of days Posted		Seasonal geomean	# of days Posted		Seasonal geomean	# of days Posted		Seasonal geomean	# of days Posted		Seasonal geomean	# of days Posted	
		5-day	SSM		5-day	SSM		5-day	SSM		5-day	SSM		5-day	SSM
Maumee - Erie	82	34	22	56	8	10	115	44	36	75	20	16	66	8	31
Maumee - Inland	29	0	5	32	0	1	49	15	14	62	21	14	71	33	24
Port Clinton	108	43	47	11	0	6	36	28	39	27	3	7	12	12	14
South Bass Island	3	0	0	3	0	0	12	0	0	3	0	0	3	0	0
Villa Angela	151	57	32	180	69	49	254	77	53	81	24	27	105	40	30
Walnut	19	0	7	31	2	9	13	0	2	16	0	5	31	0	9

Highlighted cells indicate impairment of the recreational use. Impairment is triggered by an exceedance of the geometric mean on a seasonal basis *(Seasonal geomean)*, or if the 5-sample running geometric mean *(5-day)* or the single-sample maximum criteria *(SSM)* are exceeded more than 10% of the time during a season.
The beach season is defined for this analysis as the time *E. coli* monitoring commences, typically in late May, though the end of the Labor Day weekend. The number of days posted is determined by counting the number of days the criteria are exceeded. Days for which no monitoring data were collected are presumed to be in exceedance if the preceding day's bacteria level exceeded the criteria. Likewise, unmonitored days are presumed to be below the criteria when preceded by a monitored day that was below the criterion.

Table 5-6. The number of days (and the percentage for all years) when Ohio Lake Erie public beaches exceeded Ohio's bathing water geometric mean *E. coli* criteria compared to the total number of days in the sampling period, 2001 - 2005

Beach	2001	2002	2003	2004	2005	All years (%)
Western Basin Assessment Unit						
Camp Perry	46/97	7/85	17/106	14/98	29/98	113/484 (23%)
Catawba Island State Park	1/97	0/85	13/106	9/98	0/98	23/484 (4.8%)
Crane Creek State Park	0/97	1/104	2/106	0/98	7/98	10/503 (2.0%)
East Harbor State Park	0/97	0/85	11/105	0/98	0/98	11/483 (2.3%)
Lakeside	0/97	0/85	26/106	0/98	0/98	26/490 (5.3%)
Maumee Bay State Park (inland)	0/105	0/103	15/105	21/98	33/98	69/509 (14%)
Maumee Bay State Park (Erie)	34/105	8/103	44/105	20/98	8/98	114/509 (22%)
Port Clinton	43/109	0/91	28/105	3/98	12/98	86/501 (17%)
Central Basin Assessment Unit						
Century Beach	4/98	2/85	0/98	7/98	6/98	19/477 (4.0%)
Conneaut Park	0/98	0/85	8/98	12/98	4/98	24/477 (5.0%)
Edgewater State Park	35/106	36/106	92/106	9/106	6/106	178/530 (34%)
Euclid State Park	41/98	44/85	31/97	30/98	7/98	153/476 (32%)
Fairport Harbor	0/106	0/105	24/111	13/105	11/105	48/532 (9.0%)
Geneva State Park	0/98	0/85	1/98	10/98	5/98	16/477 (3.4%)
Headlands State Park (East Beach)	0/106	0/106	0/111	0/105	0/105	0/533 (0.0%)
Headlands State Park (West Beach)	11/106	0/106	0/111	0/105	0/105	11/533 (2.1%)
Huntington Beach	11/98	10/98	25/98	12/106	6/105	64/505 (13%)
Lakeshore Park	44/98	59/85	31/98	42/98	5/98	181/477 (38%)
Lakeview	38/98	53/85	11/98	88/98	14/98	204/477 (43%)
Villa Angela State Park	57/106	69/105	77/105	24/106	40/106	267/528 (51%)
Walnut Beach	0/98	2/85	0/98	0/98	0/98	2/477 (0.4%)
Lake Erie Island Assessment Unit						
South Bass Island State Park	0/97	0/83	0/78	0/86	0/92	0/436 (0.0%)
Kelly's Island State Park	0/83	0/83	0/93	0/92	0/92	0/442 (0.0%)

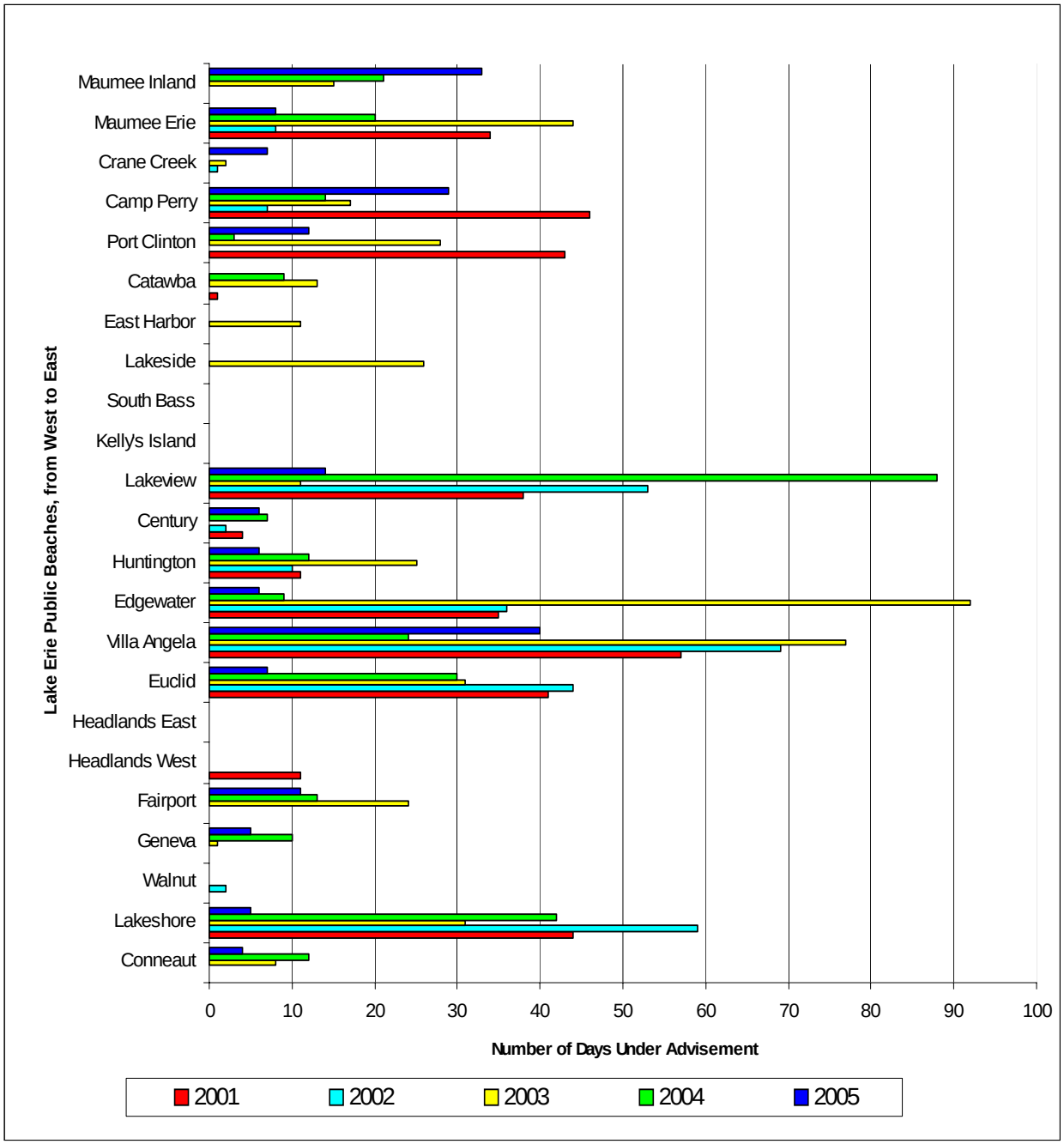


Figure 5-1. Seasonal frequency of advisory postings at Ohio's Lake Erie public beaches

three or more of the last five seasons under advisement for more than one-third of the season, including Edgewater, Euclid, Lakeshore, Lakeview, and Villa Angela beach.

High variation in bacteria levels was also seen between seasons for some beaches. For example, Lakeview beach was under advisement for 88 days in 2004, but only under advisement for 14 days in 2005. In general, bacteria levels were considerably lower at Ohio's Lake Erie public beaches in 2005 compared to 2003 and 2004. Six of the 23 public beaches monitored exceeded the goal of ten or fewer days in the recreation season recommended for an advisory posting, compared to fourteen of the beaches in 2003 and ten of the beaches in 2004. This is probably a result of the dry summer Ohio experienced in the summer of 2005 compared to the wet summers of 2003 and 2004.

Impairment of the bathing water recreational use was determined by pooling data from beaches in each of the three Lake Erie assessment units and calculating the percentage of days in the recreational season when the *E. coli* criterion was exceeded. A threshold of impairment was set at 10 days per season based upon the Ohio Lake Erie Commission's evaluation system (Ohio LEC, 1998). Results are shown in Table 5-7.

Table 5-7. Bathing water geometric mean *E. coli* exceedence frequency at 23 Lake Erie public beaches from 2001-2005 (pooled by Lake Erie assessment unit to report attainment status)

	Western Basin	Central Basin	Lake Erie Islands
Number of beaches	8	13	2
Total recreation days	3963	6499	878
Total days in exceedence	452	1167	0
Exceedence percentage	11.4%	18.0%	0%
Average # of days E. coli criteria exceeded per beach per season [1]	11	18	0
Attainment status	Non attainment	Non attainment	Full attainment

[1] Divide the total days in exceedence in a basin by the number of beaches in the basin, and then divide that result by the number of seasons (5) from which the exceedence data were accumulated.

5.2.2 Rivers and Streams

For the 2006 evaluation, 30,550 bacteria records were examined. Using the methodology described in Section 6.4.3, it was possible to determine the status of recreational use attainment of 44% of the WAUs and LRAUs. This represents an approximate three-fold increase compared to the 2002 IR and about the same as in the 2004 IR (see Table 5-8). In 2002, 18% of the assessed watersheds were in attainment. By contrast, 33% of the watersheds for which sufficient data were available attained the primary contact recreation use designation in 2004 and 37% of the watersheds attained in 2006. These differences reflect the change in methodology used to determine attainment status (2002 versus 2004/2006), a change in the period of record used to determine attainment status (though this would not lead to the delisting of an impaired watershed), and more data available with the inclusion of discharger monitoring

data and increased sampling effort by Ohio EPA. The changes between reporting years are summarized in Table 5-8.

Table 5-8. Overall differences in the assessment of recreation use attainment, 2002 to 2006

	2002 Report		2004 Report		2006 report	
	Number	Percentage	Number	Percentage	Number	Percentage
Total AUs	354	100	354	100	354	100
Assessed	56	16	166	47	154	43
Attaining Recreation Use	10	18	56	33	57	37
Impaired Recreation Use	46	82	110	67	97	63
Not Assessed	298	84	188	53	200	57

There were a dozen assessment units identified as impaired in the 2004 IR that are now identified as attaining the recreational use designation. In both reports, the methodology used to assess recreational use attainment status is based upon a comparison of the 75th and 90th percentile fecal coliform data in a WAU to the primary contact recreation criteria of 1,000 and 2,000, respectively. Watershed assessment units in which neither percentile exceeds the criteria are defined as attaining the recreation use. Table 5-9 compares the results of the 2004 analysis with the results of the 2006 analysis for the 12 assessment units. All but two of the AUs (Sevenmile Creek (05080002 060) and Ohio River Tributaries (05030106 010)) remain listed due to aquatic life use or human health (fish tissue contaminants) impairments.

Table 5-9. Assessment units listed as impaired for recreation use in 2004 and found to be in attainment in the 2006 report

Assessment Unit	Description	2004 Results			2006 Results		
		# sites/ # samples	Percentile values		# sites/ # samples	Percentile values	
			75th	90th		75th	90th
04100003 030	St. Joseph River (East/West Branches to downstream Bear Creek)	3/79	920	2500	3/69	670	1860
04100010 060	Portage River (downstream North Branch to downstream Sugar Creek)	4/152	1300	2600	5/98	578	1030
04100011 001	Sandusky River (downstream Tymochtee Creek to the mouth)	11/228	560	2130	11/185	360	1687
04110001 060	West Branch Rocky River	9/124	823	2340	9/136	830	1950
04110001 070	Rocky River, East Branch Rocky River and Lake Erie tributaries (West of Porter Creek to West of the Cuyahoga River)	21/933	1175	3416	21/738	420	1400
04110002 050	Cuyahoga River (downstream Brandywine Creek to downstream Tinkers Creek; excluding mainstem)	27/ 841	900	2800	7/491	790	2000
05030101 070	Middle Fork Little Beaver Creek	32/250	660	2000[1]	4/159	502	1653
05030106 010	Ohio River Tributaries (downstream Cross Creek to downstream Short Creek)	5/118	639	2590	4/82	779	1980
05040001 010	Tuscarawas River (headwaters to downstream Wolf Creek)	26/206	1100	2650	27/287	820	1800
05060001 220	Big Darby Creek (downstream Little Darby Creek to the mouth)	29/323	638	2080	27/235	593	1790
05080001 001	Great Miami River (downstream Tawawa Creek to the mouth)	18/1052	920	2800	14/925	693	2000
05080002 060	Sevenmile Creek	25/227	805	2560	38 / 283	650	1492

[1] The 90th percentile fecal coliform result was 2000 (the cut off value for attainment vs. non-attainment). Ohio EPA District staff familiar with conditions in the watershed were consulted to arrive at the decision to call the assessment unit impaired for recreation use.

Six WAUs identified as attaining the recreational use in the 2004 IR are now identified as impaired for the recreational use the 2004 IR (Table 5-10). In the 2004 report, all six of these WAUs were identified as attaining the recreation use because both the 75th percentile of the fecal coliform data was below the primary contact recreation geometric mean criterion of 1000 and the 90th percentile of the fecal coliform data was below the single sample maximum criterion of 2,000. In 2006, all six of these AUs exceeded the 90th percentile threshold of 2,000, and two of the AUs also exceeded the 75th percentile threshold of 1,000 fecal coliform.

Table 5-10. Assessment units listed as attaining for recreation use in 2004 and found to be impaired in the 2006 report

Assessment Unit	Location Description	2004 Results			2006 Results		
		# site/ # samples	Percentile values		# site/ # samples	Percentile values	
			75th	90th		75th	90th
04100011 040	Sandusky River (downstream Broken Sword Creek to upstream Tymochtee Creek)	10/80	550	1600	13/86	638	5350
05030101 190	Yellow Creek (upstream Town Fork to the mouth)	4/19	225	350	38/132	685	2090
05040003 070	Killbuck Creek (downstream Salt Creek to downstream Black Creek)	3/59	659	916	4/66	2400	9400
05060001 120	Olentangy River (downstream Delaware Run to the mouth)	42/392	626	1692	20/248	890	2891
05060001 170	Walnut Creek (headwaters to downstream Sycamore Creek)	8/153	700	1640	31/338	1300	2900
05060001 180	Walnut Creek (downstream Sycamore Creek to the mouth)	6/96	565	1600	31/288	985	3060

The methodology used to assess recreational use attainment status in 2004 and 2006 was based upon a comparison of the 75th and 90th percentile fecal coliform data in a WAU to the primary contact recreation fecal coliform criteria of 1,000 and 2,000, respectively. In addition, minimum data requirements were set such that for attainment status of a WAU to be determined, a minimum of fifteen sample results from at least three sites within the WAU are required. All of the six WAUs met the minimum data requirements necessary in order to determine both the recreational use attainment status in 2004 as well as the present recreational use attainment status.

5.3 Aquatic Life Use Impairment

For the 2006 Integrated Report, new aquatic life data collected in 2003, 2004, and 2005 (2005 limited to the Tuscarawas River mainstem only) were incorporated into the assessment database. During this period, biosurvey data from approximately 800 sampling sites located in 48 watershed assessment units and nearly 60 sampling sites located in five large river assessment units were available from all credible sources to update previously assessed AUs or provide new assessments for AUs with unknown aquatic life status. Major watersheds monitored during 2003 and 2004 included the Olentangy, Mad, Tuscarawas (also 2005), Wakatomika, Toussaint, Chagrin, Grand, and Hocking basins. Limited new aquatic life data from 2003 were available for the three Lake Erie AUs.

A further examination of individual assessment units was then made to determine status changes due to site data collected during 1993 and 1994 which now exceeds the 10-year data threshold and has become "historical". From this examination, it was determined that data from 27 Watershed and 5 Large River AUs were now insufficient to provide adequate spatial coverage either due to all data being age restricted or enough that number of sites fell below the minimum needed to assess. These AUs are not being delisted if currently Category 5.

Summarized 2006 Integrated Report statistics for aquatic life assessments for watershed, large river, and Lake Erie AUs as well as the comparable statistics from the 2002 and 2004 Integrated Reports are tabulated in Table 5-11. Detailed aquatic life statistics for all AUs are provided in Appendices E.2 - E.4. The largest change in statistics between 2004 and 2006 involved the proportion of full attainment reported for the large rivers. The increase from 64.0% in 2004 to 76.8% in 2006 was somewhat misleading in that six large rivers with data collected between 1992 and 1994 were dropped from the statistics due to the 10-year data threshold. These included three rivers (Tiffin River, Mahoning River, and Wills Creek) with extensive miles of impaired aquatic life use (110 miles total) but also three rivers (Muskingum River, Walhonding River, and Licking River) with considerable, but fewer, miles of full attainment (63 miles total). If data from these six rivers are factored into the 2006 statistics (despite the age of the data), the proportion of miles in full attainment is 70%. Nevertheless, an increase of 6% in aquatic life use full attainment in the State's large river is a positive development. The increase in full attainment across all Large Rivers is largely due to new assessments of the Hocking River in 2004 (100% full attainment over 69 miles) and the Tuscarawas River in 2004 and 2005 (86% full attainment over 103 miles).

While causes and sources of aquatic life use impairment in Ohio's watershed, large river, and Lake Erie AUs have not been fully developed for the new 2003 and 2004 data, it is not suspected that they will be substantially different than those determined in previous assessment cycles. For the time period from 1993 through 2002, principal causes for watershed and large river AU impairments were those primarily related to landscape modification issues involving agricultural land use and urban development. An assessment of these traditional nonpoint source causes for the period 1993 through 2002 is provided in Table 5-12.

Table 5-11. Summary of aquatic life use assessment for Ohio's watershed, large river, and Lake Erie assessment units: 2002, 2004, and 2006			
	2002 (1991-2000)	**2004 (1993-2002)**	**2006 (1995-2004)**
Watershed AUs (331)			
No. AUs Assessed (percent of total)	224 (68%)	225 (68%)	212 (64%)
No. Sites Assessed	3272	3620	3785
Average AU Scores			
Full Attainment	46.6	48.3	52.5
Partial Attainment	25.2	23.6	22.6
Non-Attainment	28.2	28.1	24.9
Large River AUs (23 rivers totaling 1286 Miles)			
No. AUs Assessed	22	21	17
No. Sites Assessed	422	425	374
No. Miles Assessed (percent of miles)	905 (70%)	918 (71%)	873 (68%)
% Miles Full Attainment	62.5	64.0	76.8
% Miles Partial Attainment	23.0	21.4	15.1
% Miles Non-Attainment	14.5	14.6	8.1
Lake Erie AUs (3)			
No. AUs Assessed	3	3	3
No. Sites Assessed	92	111	93
% Sites Full Attainment	12.0	18.0	19.4
% Sites Partial Attainment	13.0	14.4	16.1
% Sites Non-Attainment	75.0	67.6	64.5

Table 5-12. Assessment of nonpoint source related causes of aquatic life impairment based on biological and water quality survey data collected from 1993-2002

Assessment Unit (AU)	#	Number & Percentage of Monitored AUs Having Nonpoint Source Related Causes of Impairment [1]			
		Siltation / Sediment	Nutrients	Habitat Modification	Hydro-Modification
Watershed		117 - 52%	94 - 42%	137 - 61%	102 - 45%
total	331				
monitored 1993 to 2002	225				
impaired aquatic life use	214				
1 or more NPS causes	198				
unassessed	106				
Large River		7 - 33%	5 - 24%	9 - 43%	7 - 33%
total	23				
monitored 1993 to 2002	21				
impaired aquatic life use	16				
1 or more NPS causes	13				
unassessed	2				

[1] Listed as high magnitude for at least one stream within watershed or one reach within large river.

6

Addressing Waters Not Meeting Water Quality Goals

6.1 Assigning Assessment Units to Categories

6.1.1 Categories of Waters

Using the results for the fish contaminant, bacteria, and aquatic life evaluations in Section 5, each Assessment Unit was placed in one of five categories. These categories reflect U.S. EPA guidance and are summarized below.

Category Reported Pursuant to Section 303(d) and U.S. EPA Guidance	Results of Data Assessment and Determination of WQS Use Attainment
Category 1	All designated uses are met, and no use is threatened
Category 2	Some of the designated uses are met but there is insufficient data to determine if remaining designated uses are met
Category 3	Insufficient data to determine whether any designated uses are met
Category 4 4A 4B 4C	Water is impaired or threatened but a TMDL is not needed - TMDL has been completed - other required control measures will result in attainment of WQS - impairment or threat not caused by a pollutant
Category 5	Water is impaired or threatened and a TMDL is needed.

6.1.2 Overall Results

Comparing results of the 2002 and 2004 IRs with the results of this reporting cycle reveals progress on completing TMDL projects in impaired waters. The growth in category 4 is attributable to the completion and approval of several TMDLs. Table 6-1 provides a summary comparison for all Section 303(d) list categories over the past three IR cycles. Table 6-2 is a detailed list of assessment unit category changes between the 2004 and 2006 IRs. Finally, a map showing the assessment unit reporting categories is included in the Maps section.

Overall, this report includes assessment results on more waters. The increases in category 5 numbers from 2002 to 2004 was the result of revised methodology for fish tissue and expanded data sources for bacteria data during that cycle. With no major methodology changes in the

2006 cycle, there are fewer changes in results. The overall number of "303(d) listed" waters (category 5 (impaired, requiring a TMDL)) did not change significantly. Twenty waters moved into the impaired category based on new data; twenty moved out of the category, 17 based on approval of restoration plans and three on new data. Thus, most of the watersheds for which new data are collected show impairment of one or more uses.

The trend of fewer assessment units with insufficient data (category 3) continues. It is important to note that, while acquiring new data moves a water from category 3 to another category – usually category 5 (impaired) -- the aging of data is not a reason to move waters out of category 5. The number of waters assigned to category 3 will probably continue to decline as new data are collected and waters are identified as impaired. As data ages, waters can move among categories 1, 2, and 3.

Table 6-1. Comparison of 303(d) listing results for Ohio's inland waters: 2002, 2004, and 2006

	Number of Watersheds			Number of Large Rivers		
Category	**2002**	**2004**	**2006**	**2002**	**2004**	**2006**
1 Attaining all WQS	1	1	1	0	1	0
2 Attaining some WQS	11	7	13	5	1	2
3 Insufficient data	105	75	54	1	0	0
4 Impaired, no TMDL needed	9	6	19	2	1	1
5 Impaired, TMDL needed	205	242	244	15	20	20

Table 6-2. Summary of changes in 303(d) category from 2004 to 2006				
Assessment Unit Description		Category		Reason for Change
		2004	2006	
Assessment units moved out of Category 5 (303(d) list) -- 20 total				
04100011 030	Broken Sword Creek	5	4A	TMDL completed
04100011 050	Tymochtee Creek (headwaters to downstream Warpole Creek)	5	4A	TMDL completed
04100011 060	Tymochtee Creek (downstream Warpole Creek to mouth)	5	4A	TMDL completed
04100011 070	Sandusky River (downstream Tymochtee Creek to upstream Honey Creek); excluding Sandusky R. mainstem	5	4A	TMDL completed
04100011 080	Honey Creek	5	4A	TMDL completed
04100011 090	Sandusky River (downstream Honey Creek to upstream Wolf Creek); excluding Sandusky R. mainstem	5	4A	TMDL completed
04100012 010	West Branch Huron River (headwaters to upstream Slate Run)	5	4A	TMDL completed
04100012 020	West Branch Huron River (upstream Slate Run to mouth)	5	4A	TMDL completed
04100012 030	Huron River, East Branch Huron River, Lake Erie tributaries (East of Sawmill Cr. to west of Huron R)	5	4A	TMDL completed
04100012 040	Lake Erie tributaries (East of Huron River to West of Vermilion River)	5	4A	TMDL completed
05030101 080	West Fork Little Beaver Creek	5	4A	TMDL completed
05030204 060	Monday Creek	5	4A	TMDL completed
05060001 130	Big Walnut Creek (headwaters to Hoover Dam)	5	4A	TMDL completed
05060001 140	Big Walnut Creek (downstream Hoover Dam to upstream Alum Creek); Blacklick Creek	5	4A	TMDL completed
05060001 150	Alum Creek (headwaters to Alum Creek Dam)	5	4A	TMDL completed
05060001 160	Big Walnut Creek (Alum Creek to mouth); Alum Creek (downstream Alum Creek Dam to mouth)	5	4A	TMDL completed
05080001 090	Stillwater River (headwaters to upstream Swamp Creek)	5	4A	TMDL completed
05030106 010	Ohio River tributaries (downstream Cross Creek to downstream Short Creek)	5	2	New bacteria data

Table 6-2. Summary of changes in 303(d) category from 2004 to 2006				
Assessment Unit Description		Category		Reason for Change
		2004	2006	
05030204 040	Clear Creek	5	2	New aquatic life and bacteria data
05080002 060	Sevenmile Creek	5	1	New bacteria data
Assessment units moved into Category 5 (303(d) list) -- 22 total				
05030201 110	East Fork Duck Creek	4A	5	New bacteria data
05090202 010	Little Miami River (headwaters to upstream Massies Creek)	4A	5	New fish data/methodology
04100004 030	St. Marys River (downstream Twelvemile Creek to upstream Twentyseven Mile Creek [IN])	3	5	New fish data/methodology
04100008 010	Blanchard River (headwaters to downstream Potato Run)	3	5	New bacteria data
04100008 020	Blanchard River (downstream Potato Run to upstream Eagle Creek)	3	5	New bacteria data
04100008 060	Blanchard River (downstream Riley Creek to mouth); excluding Blanchard R. mainstem	3	5	New bacteria data
04100011 100	Wolf Creek	3	5	New bacteria data
04100011 110	Green Creek	3	5	New bacteria data
05030102 010	Tributaries to Pymatuning Reservoir (within Ohio)	3	5	New fish data/methodology
05030202 040	Shade River (Middle Branch and West Branch to mouth)	3	5	New fish data/methodology
05030204 020	Rush Creek (headwaters to upstream Little Rush Creek)	3	5	New bacteria data
05030204 030	Rush Creek (upstream Little Rush Creek to mouth)	3	5	New bacteria data
05030204 080	Hocking River (downstream Monday Creek to Athens/RM 33.1); excluding Hocking R. mainstem	3	5	New aquatic life and bacteria data
05030204 090	Federal Creek	3	5	New aquatic life and bacteria data
05030204 100	Hocking River (downstream Athens/RM 33.1 to mouth); excluding Federal Creek and Hocking R. mainstem	3	5	New aquatic life data
05040001 160	Little Stillwater Creek	3	5	New aquatic life data

Table 6-2. Summary of changes in 303(d) category from 2004 to 2006				
Assessment Unit Description		Category		Reason for Change
		2004	2006	
05060002 060	Scioto River (downstream Paint Creek to upstream Salt Creek); excluding Scioto R. mainstem	3	5	New fish data/methodology
05060002 090	Salt Lick Creek (excluding Middle Fork)	3	5	New aquatic life data
05090201 060	Ohio River tributaries (downstream Ohio Brush Creek to upstream Eagle Creek)	3	5	New fish data/methodology
05040001 160	Little Stillwater Creek	2	5	New aquatic life data
05090201 010	Ohio River tributaries (downstream 8-digit divide to upstream Ohio Brush Creek)	4B	5	U.S. EPA guidance
05090202 080	Todd Fork (upstream East Fork Todd Fork to mouth)	4B	5	U.S. EPA guidance
Category changes not involving Category 5 -- 9 total				
05030101 100	Ohio River tributaries (downstream Little Beaver Creek to upstream Yellow Creek)	3	2	New bacteria data
05040001 080	Conotton Creek (downstream McGuire Creek to mouth)	3	2	New bacteria data
05040005 060	Wills Creek (downstream Birds Run to mouth); excluding Wills Creek mainstem	3	2	New fish data/methodology
05060002 080	Middle Fork Salt Creek	3	2	New bacteria data
05080001 200	Great Miami River (upstream Honey Creek to upstream Mad River); excluding GMR mainstem	3	2	New bacteria data
05080002 080	Indian Creek	3	2	New bacteria data
05030201 020	Ohio River tributaries (downstream Sunfish Creek to upstream Muskingum River)	2	3	Old bacteria data[1]
05040002 040	Clear Fork Mohican River (downstream Cedar Fork to mouth)	1	2	Old bacteria data[1]
05090101 mainstem	Raccoon Creek (downstream Little Raccoon Creek to mouth)	1	2	Old bacteria data[1]

[1] Data has aged past guidelines in methodology.

6.2 Prioritizing the Impaired Waters: the 303(d) List

After waters are identified as impaired and requiring a TMDL, the category 5 waters are prioritized.

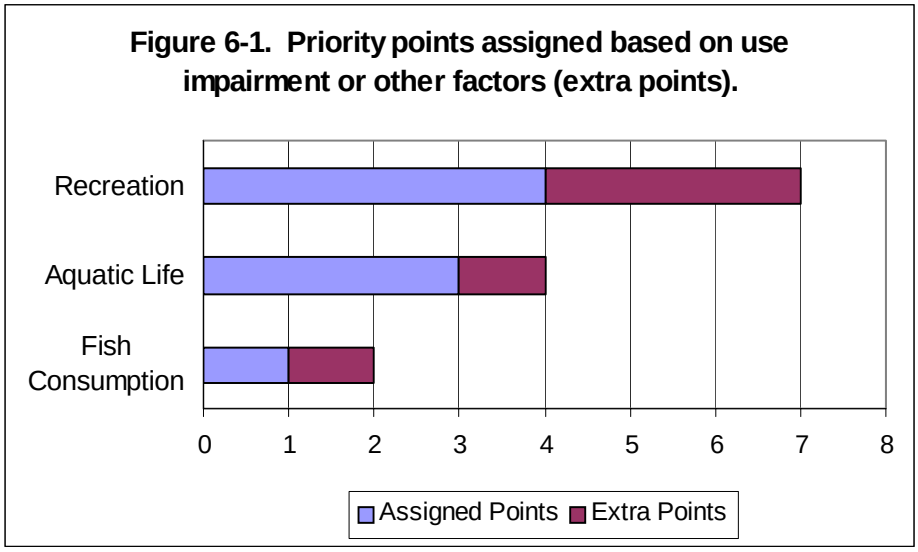
6.2.1 Ohio River and Lake Erie

Other organizations have accepted lead responsibility for TMDLs in two special waters affected by multiple jurisdictions: U.S. EPA for the open waters of Lake Erie, ORSANCO for the mainstem of the Ohio River. Ohio EPA automatically assigns these waters a low priority *for Ohio EPA-initiated action*. Ohio EPA is participating in TMDL actions conducted by the lead organizations. Lake Erie nearshore areas are assigned the priority of their contiguous watershed assessment units.

6.2.2 Inland Waters

A point system similar to that used in the 2004 Integrated Report was used to assign priority. Impairment of the Recreation Use continues to be more heavily weighted compared to the Aquatic Life Use and Fish Consumption Advisory. A total of 13 points could be assigned to an assessment unit, distributed as shown in Figure 6-1. The priority results for specific assessment units are reported in Appendices D.1, D.2, and E.

Figure 6-1. Priority points assigned based on use impairment or other factors (extra points).



As a practical matter, only the 331 watershed and 23 large-river assessment units are included in the priority-setting exercise. Recognizing the functionality and importance of watersheds, areas and assessment units identified in other ways (inland lakes, Lake Erie nearshore areas) were assigned the priority of the appropriate surrounding or contiguous watershed assessment unit. The assessment units were assigned priority points using the following guidelines.

Points assigned for fish tissue contaminants (Human Health impairment) (maximum of 2 points)		
Points	**Condition**	**# Assessment Units**
1	Listed as impaired for Fish Contaminants (Human Health Use)	101
1	Additional point in assessment units that have the most severe levels of advisories (do not eat or 1 meal per 2 months).	16

Points assigned for Recreation Use impairment (maximum of 7 points)		
Points	**Condition**	**# Assessment Units**
4	listed as impaired for recreation use	111
1	geometric mean of available fecal coliform data was greater than 1000	35
1	75th percentile of available fecal coliform date greater than 3000	15
1	total number of sites was greater than 15 and the geometric mean of available fecal coliform data was greater than 1000 or impairment is to bathing water recreation use (Lake Erie)	7 2

Points assigned for Aquatic Life Use impairment (maximum of 4 points)			
Points	**AU Score[1]**	**Explanation**	**# Assessment Units**
1	0 - 39	Scores in this range generally indicate severe basin-wide problems, comprehensive degradation that may require significant time and resources and broad-scale fixes, including, possibly, fundamental changes in land use practices. Educating about how water quality is affected by various practices and encouraging stewardship may be more effective in these areas than a traditional TMDL approach. For example, a program by Ohio EPA and the Ohio Department of Natural Resources that funds local watershed coordinators to develop a comprehensive, implementable, community-driven watershed plan may be appropriate in these areas.	95
2	80 - 99	Scores in this range generally indicate a localized water quality issue. Addressing the impairment may not require a complete watershed effort; rather, a targeted fix for a particular problem may be most effective.	52
3	40 - 79	Scores in this range indicate a problem of such scale that purposeful action should produce a measurable response within a 10-year period. These waters are the best candidates for a traditional TMDL. Local watershed coordinators (as mentioned above) can also work effectively in these areas in concert with a TMDL effort.	102
1	n/a	Where over half of the Aquatic Life Use "non-attainment" is "partial," the chances for recovery are better. Additional priority is given to assessment units with this characteristic.	27

[1] The assessment unit score is reported on the summary sheets in Appendix E and on the Aquatic Life Use Status (watershed assessment units) map in the Maps section.

6.3 Removing Waters From the 303(d) List

Federal regulations require a demonstration of good cause for not including water bodies on the Section 303(d) list that were included on previous 303(d) lists (40 CFR 130.7(b)(6)(iv)). In its guidance for preparation of this report, U.S. EPA outlined a number of causes for delisting (pages 58-59 of 7/29/2005 Guidance for 2006 Assessment, Listing, and Reporting Requirements (U.S. EPA, 2005)). Ohio is delisting 20 assessment units based on two of these causes:

✓ the assessment and interpretation of more recent data demonstrate that the applicable WQS is being met (3 assessment units)

✓ approval by U.S. EPA of a TMDL (17 assessment units).

Details for each delisting are summarized in the following text and tables.

6.3.1 More Recent Data

New data for three watershed assessment units indicate that standards are now being met. Table 6-3 identifies the watersheds and the 2004 category.

Table 6-3. Assessment units removed from category 5 because new data are available

AU Number	AU Name	Explanation	2004 Category	2006 Category
05030106 010	Ohio River tributaries (downstream Cross Creek to downstream Short Creek)	New bacteria data (Recreation Use)	5	2
05030204 040	Clear Creek	New biological and bacteria data (Aquatic Life and Recreation Uses)	5	2
05080002 060	Sevenmile Creek	New bacteria data (Recreation Use)	5	1

6.3.2 Approval of TMDL

Seventeen assessment units are being delisted because TMDLs that address all identified impairments have been approved by U.S. EPA (see Table 6-4).

Table 6-4. Assessment unit removed from category 5 based on TMDL approval			
AU Number	**AU Name**	**Date Approved**	**Pollutants Allocated, per U.S. EPA [1]**
04100011 030	Broken Sword Creek	9/24/2004	phosphorus, pathogens, sediment
04100011 050	Tymochtee Creek (headwaters to downstream Warpole Creek)		
04100011 060	Tymochtee Creek (downstream Warpole Creek to mouth)		
04100011 070	Sandusky River (downstream Tymochtee Creek to upstream Honey Creek); excluding Sandusky R. mainstem		
04100011 080	Honey Creek		
04100011 090	Sandusky River (downstream Honey Creek to upstream Wolf Creek); excluding Sandusky R. mainstem		
04100012 010	West Branch Huron River (headwaters to upstream Slate Run)	9/28/2005	nutrients (phosphorus), siltation, organic enrichment, flow, habitat alteration
04100012 020	West Branch Huron River (upstream Slate Run to mouth)		
04100012 030	Huron River, East Branch Huron River, Lake Erie tributaries (East of Sawmill Cr. to west of Huron R)		
04100012 040	Lake Erie tributaries (East of Huron River to West of Vermilion River) [Old Woman and Chappel Creeks]	8/31/2005	nutrients, siltation, habitat alteration
05030101 080	West Fork Little Beaver Creek	9/28/2005	
05030204 060	Monday Creek	9/22/2005	pH, metals, sediment
05060001 130	Big Walnut Creek (headwaters to Hoover Dam)	9/26/2005	nutrients (phosphorus), pathogens, siltation, organic enrichment, flow, habitat alteration
05060001 140	Big Walnut Creek (downstream Hoover Dam to upstream Alum Creek); Blacklick Creek		
05060001 150	Alum Creek (headwaters to Alum Creek Dam)		
05060001 160	Big Walnut Creek (Alum Creek to mouth); Alum Creek (downstream Alum Creek Dam to mouth)		
05080001 090	Stillwater River (headwaters to upstream Swamp Creek)	6/15/2004	nitrates, phosphorus

[1] The TMDL goal is restoration of the designated use through the attainment of applicable criteria; pollutants listed here were specifically recognized in U.S. EPA decision documents.

6.4 Schedule for TMDL Work

Once waters are assessed and the impaired waters prioritized, the next step is to determine a schedule to address the monitoring needs of all waters and restoration needs (including TMDLs) of the impaired ones. Various factors must be considered, including Ohio's ongoing TMDL work, the process identified to do TMDLs, the monitoring strategy, and the resources available for the work.

6.4.1 Ohio TMDL Status

Ohio EPA is currently working on TMDLs in nearly 50 project areas, encompassing more than 100 assessment units, as illustrated in the "Ohio TMDL Program Progress" map in the Maps section. Most of these TMDLs address Aquatic Life Use impairments, and some also address Recreation Use impairment. TMDLs in twenty-two of the areas are approved, and implementation is proceeding. Table 6-5 summarizes Ohio TMDLs approved by U.S. EPA.

Table 6-5. Ohio TMDLs[1] approved by U.S. EPA

Assessment Unit Code	Assessment Unit Name	U.S. EPA Approval Date	Pollutants Allocated, per U.S. EPA [2]
04110002 020	Cuyahoga River (below Black Brook to below Breakneck Creek)	10/11/2000	dissolved oxygen
04110002 030	Cuyahoga River (below Breakneck Creek to below Little Cuyahoga River)		
04110001 070	Rocky River (below West Br. to Lake Erie [including East Br.] and Lake Erie tribs [above Porter Cr to above Cuyahoga R]): Plum Creek	12/04/2001	phosphorus, nitrogen
05090202 010	Little Miami River (headwaters to above Massies Creek)	07/02/2002 05/13/2003	phosphorus, sediment
05090202 020	Little Miami River (above Massies Creek to below Beaver Creek)		
05090202 030	Little Miami River (below Beaver Creek of above Caesar Creek)		
05090202 040	Anderson Fork Caesar Creek		
05090202 050	Caesar Creek (except Anderson Fork)		
05060001 060	Bokes Creek (Scioto River above Bokes Creek to above Mill Creek)	09/27/2002 07/31/2003	phosphorus, sediment
05040001 100	Sugar Creek (headwaters to above Middle Fork Sugar Creek)	11/20/2002 07/08/2003	phosphorus, nitrogen, sediment
05040001 110	South Fork Sugar Creek		
05040001 120	Sugar Creek (upstream Middle Fork to mouth)		

Table 6-5. Ohio TMDLs[1] approved by U.S. EPA			
Assessment Unit Code	**Assessment Unit Name**	**U.S. EPA Approval Date**	**Pollutants Allocated, per U.S. EPA [2]**
05090101 020	Raccoon Creek (headwaters to above Hewett Fork)	3/20/2003	pH (acid), metals
05090101 030	Raccoon Creek (above Hewett Fork to below Elk Fork)		
05060001 070	Mill Creek (Scioto River basin)	9/02/2003	CBOD, ammonia, phosphorus, sediment, aldrin, d-BHC, dieldrin, endosulfan, endrin, heptachlor
05030201 110	East Fork Duck Creek	9/23/2003	TSS, aluminum, iron, manganese, BOD, ammonia
05030201 120	Duck Creek (except East Fork)		
04110002 040	Cuyahoga River (below Little Cuyahoga River to below Brandywine Creek)	9/26/2003	fecal coliform, phosphorus
04110002 050	Cuyahoga River (below Brandywine Creek to below Tinkers Creek)		
04110002 060	Cuyahoga River (below Tinkers Creek to Lake Erie)		
04110002	Cuyahoga River (mainstem)		
05080001 090	Stillwater River (headwaters to above Swamp Creek)	06/15/2004	nitrates, phosphorus
05080001 100	Stillwater River (above Swamp Creek to above Greenville Creek)		
05080001 110	Greenville Creek (headwaters to below West Branch)		
05080001 120	Greenville Creek (below West Branch to Stillwater River)		
05080001 130	Stillwater River (below Greenville Creek to above Ludlow Creek)		
05080001 140	Stillwater River (above Ludlow Creek to Great Miami River)		
05080001	Stillwater River (mainstem)		
04100007 010	Auglaize River (headwaters to below Pusheta Creek)	09/23/2004	ammonia, phosphorus, pathogens, sediment
04100007 020	Auglaize River (below Pusheta Creek to above Jennings Creek)		
04100007 060	Auglaize River (above Jennings Creek to above Little Auglaize River)		
04110002 010	Cuyahoga River (headwaters to below Black Brook)	09/27/2004	phosphorus, sediment

Table 6-5. Ohio TMDLs[1] approved by U.S. EPA			
Assessment Unit Code	**Assessment Unit Name**	**U.S. EPA Approval Date**	**Pollutants Allocated, per U.S. EPA [2]**
04100011 020	Sandusky River (headwaters to above Broken Sword Creek)	09/30/2004	phosphorus, pathogens, sediment
04100011 030	Broken Sword Creek		
04100011 040	Sandusky River (below Broken Sword Creek to above Tymochtee Creek)		
04100011 050	Tymochtee Creek (headwaters to below Warpole Creek)		
04100011 060	Tymochtee Creek (downstream Warpole Creek to Sandusky River)		
04100011 070	Sandusky River (below Tymochtee Creek to above Honey Creek)		
04100011 080	Honey Creek		
05090203 010	Mill Creek	4/26/2005	phosphorus, nitrogen
04100012 040	Lake Erie Tributaries (below Huron River to above Vermilion River) [Old Woman and Chappel Creeks]	8/31/2005	nutrients, siltation, habitat alteration
05030204 060	Monday Creek	9/22/2005	pH, metals, sediment
05060001 130	Big Walnut Creek (headwaters to Hoover Dam)	9/26/2005	nutrients (phosphorus), pathogens, siltation, organic enrichment, flow, habitat alteration
05060001 140	Big Walnut Creek (below Hoover Dam to above Alum Creek)		
05060001 150	Alum Creek (headwaters to Alum Creek Dam)		
05060001 160	Big Walnut Creek (above Alum Creek [except above Alum Creek Dam] to Scioto River)		
04110003 010 (partial)	Lake Erie Tributaries (East of Cuyahoga River to West of Grand River; excluding Chagrin River) [Euclid Creek]	9/27/2005	nutrients (phosphorus), organic enrichment, habitat alteration
04100012 010	West Branch Huron River (headwaters to above Slate Run)	9/28/2005	nutrients (phosphorus), siltation, organic enrichment, flow, habitat alteration
04100012 020	West Branch Huron River (above Slate Run to above East Branch Huron River)		
04100012 030	Huron River (above East Branch to Lake Erie) and Lake Erie Tributaries (below Sawmill Creek to below Huron River)		

Table 6-5. Ohio TMDLs[1] approved by U.S. EPA			
Assessment Unit Code	**Assessment Unit Name**	**U.S. EPA Approval Date**	**Pollutants Allocated, per U.S. EPA [2]**
05030101 070	Middle Fork Little Beaver Creek	9/28/2005	nutrients (phosphorus), pathogens, siltation, organic enrichment, flow, habitat alteration, unionized ammonia
05030101 080	West Fork Little Beaver Creek		
05030101 090	Little Beaver Creek (downstream Middle and West Forks to mouth)		

[1] One or more assessment units may be included in a TMDL report. The determination is made on a project-by-project basis, at the discretion of Ohio EPA.

[2] The TMDL goal is restoration of the designated use through the attainment of applicable criteria; pollutants listed here were specifically recognized in U.S. EPA decision documents. TMDL reports typically include such parameters for targeting, pollutant load characterization, and measuring interim progress, and may explore other indicators of watershed condition.

6.4.2 Long-Term Schedules for Monitoring and TMDLs

Ohio's five-year basin approach (see Section 3) provides a foundation for scheduling monitoring and TMDL projects. The assessment methodology allows that, generally, aquatic life use monitoring data up to ten years old are valid for judging assessment units, so it follows that each assessment unit must be monitored at least once every ten years to maintain coverage. Thus, each assessment unit is assigned to one of the next two monitoring cycles using the following factors:

- ✓ Ohio EPA's five-year basin monitoring strategy
- ✓ time since most recent assessment
- ✓ distribution of work effort among Ohio EPA district offices
- ✓ priority ranking
- ✓ TMDL schedule.

Our experience in doing TMDLs indicates that local involvement is a key to success. However, it is difficult to gauge the level of local interest sufficient to sustain a TMDL effort. Thus, the schedule is flexible and can be influenced by expressions of local interest to undertake a TMDL (e.g., significant interest from local citizens and decision-makers, especially combined with letters of resolution from local governments).

In an effort to maintain the monitoring and TMDL schedule, Ohio EPA is committed to researching and pursuing additional resources, both in terms of funding and partnering opportunities.

The scheduling and TMDL information is reported on the detailed information sheets for each assessment unit (see Appendix E). Appendix D.3 presents the scheduling information by monitoring year. A map illustrating the long-term monitoring schedule is included in the Maps section.

6.4.3 Short-Term Schedule for TMDL Development

Ohio EPA has scheduled several TMDL projects during the next two years, as indicated in Table 6-6. Because Ohio's TMDL process begins with a watershed assessment, all TMDLs to be completed in the next two years are already in progress.

The TMDL goal is restoration of the designated use through the attainment of applicable criteria. Pollutants to be targeted for pollutant load characterization and as measures of interim progress will be determined as part of the TMDL process described in Section 3.2.2.

Table 6-6. Short-term schedule for TMDL development	
Assessment Unit Code	**Assessment Unit Name**
TMDLs pending approval by U.S. EPA	
05030204 070	Sunday Creek
04100012 050 04100012 060	Vermilion River (headwaters to above East Branch) Vermilion River (above East Branch to Lake Erie)
04110001 060 04110001 070	West Branch Rocky River (bacteria) Rocky River and East Branch Rocky River (bacteria)
05060001 190 05060001 200 05060001 210 05060001 220	Big Darby Creek (headwaters to below Sugar Run) Big Darby Creek (below Sugar Run to above Little Darby Creek) Little Darby Creek Big Darby Creek (below Little Darby Creek to Scioto River)
TMDLs to be submitted to U.S. EPA in FFY 2006	
04100010 020	Toussaint Creek
05040004 020 05040004 030	Wakatomika Creek (headwaters to downstream Brushy Fork) Wakatomika Creek (downstream Brushy Fork to mouth)
05060001 090 05060001 100 05060001 110 05060001 120	Olentangy River (headwaters to downstream Flat Run) Whetstone Creek Olentangy River (downstream Flat Run to downstream Delaware Run); excluding Whetstone Creek Olentangy River (downstream Delaware Run to mouth)
05080001 150 05080001 160 05080001 170 05080001 180 05080001 190 05080001	Mad River (headwaters to downstream Kings Creek) Mad River (downstream Kings Creek to downstream Chapman Creek) Buck Creek Mad River (downstream Chapman Creek to upstream Mud Creek); excluding Buck Creek and Mad R. mainstem Mad River (upstream Mud Creek to mouth); excluding Mad R. mainstem Mad River (mainstem)
TMDLs to be submitted to U.S. EPA in FFY 2007	
04110001 020 04110001 030 04110001 040 04110001 050	West Branch Black River (headwaters to Black River) East Branch Black River (headwaters to below Coon Creek) East Branch Black River (below Coon Creek to Black River) Black River (below East Branch to Lake Erie) and Lake Erie tribs (below Black R. to above Porter Cr)
05040001 010 05040001 020 05040001 030	Tuscarawas River (headwaters to downstream Wolf Creek) Chippewa Creek Tuscarawas River (downstream Wolf Creek to downstream Sippo Creek); excluding Chippewa Creek
05040001 050	Nimishillen Creek

Table 6-6. Short-term schedule for TMDL development	
Assessment Unit Code	**Assessment Unit Name**
05040001 090	Tuscarawas River (downstream Sippo Creek to upstream Sugar Creek); excluding Tuscarawas R. mainstem
05040001 130	Tuscarawas River (downstream Sugar Cr. to upstream Stillwater Cr.); excluding Tuscarawas R. mainstem
05040001 180	Tuscarawas River (downstream Stillwater Cr. to upstream Evans Cr.); excluding Tuscarawas R. mainstem
05040001 190	Tuscarawas River (upstream Evans Creek to mouth); excluding Tuscarawas R. mainstem
05040001	Tuscarawas River (mainstem)
04110003 020	Chagrin River (headwaters to downstream Aurora Branch)
04110003 030	Chagrin River (downstream Aurora Branch to mouth)
04110004 050	Mill Creek
04110004 060	Grand River (downstream Mill Creek to mouth); excluding Grand R. mainstem
04110004	Grand River mainstem
05030204 010	Hocking River (headwaters to Enterprise); excluding Rush Creek and Clear Creek
05030204 020	Rush Creek (headwaters to upstream Little Rush Creek)
05030204 030	Rush Creek (upstream Little Rush Creek to mouth)
05030204 040	Clear Creek
05030204 050	Hocking River (Enterprise to upstream Monday Creek); excluding Hocking R. mainstem dst. Duck Creek
05030204 080	Hocking River (downstream Monday Creek to Athens/RM 33.1); excluding Hocking R. mainstem
05030204 090	Federal Creek
05030204 100	Hocking River (downstream Athens/RM 33.1 to mouth); excluding Federal Creek and Hocking R. mainstem
05030204	Hocking River (mainstem)
05120101 020	Beaver Creek (Grand Lake St. Marys and tributaries)
05120101 030	Beaver Creek (downstream Grand Lake St. Marys Dam to mouth)
TMDLs to be submitted to U.S. EPA in FFY 2008	
05080002 030	Twin Creek (headwaters to upstream Bantas Fork)
05080002 040	Twin Creek (upstream Bantas Fork to mouth)
05080002 070	Fourmile Creek (excluding Sevenmile Creek)
05080002 080	Indian Creek
04100008 010	Blanchard River (headwaters to downstream Potato Run)
04100008 020	Blanchard River (downstream Potato Run to upstream Eagle Creek)
04100008 030	Blanchard River (upstream Eagle Creek to upstream Ottawa Creek)
04100008 040	Blanchard River (upstream Ottawa Creek to upstream Riley Creek); excluding Blanchard R.
04100008 050	Riley Creek
04100008 060	Blanchard River (downstream Riley Creek to mouth); excluding Blanchard R. mainstem
04100008	Blanchard River (mainstem)

Table 6-6. Short-term schedule for TMDL development	
Assessment Unit Code	**Assessment Unit Name**
05030101 180 05030101 190	Yellow Creek (headwaters to upstream Town Fork) Yellow Creek (upstream Town Fork to mouth)
05030101 210	Ohio River tributaries (downstream Yellow Creek to upstream Cross Creek)
05060001 170 05060001 180	Walnut Creek (headwaters to downstream Sycamore Creek) Walnut Creek (downstream Sycamore Creek to mouth)
05060002 070 05060002 080 05060002 090 05060002 100	Salt Creek (headwaters to upstream Queer Creek) Middle Fork Salt Creek Salt Lick Creek (excluding Middle Fork) Salt Creek (upstream Queer Creek to mouth); excluding Little Salt Creek and Middle Fork Salt Creek
05040001 100 05040001 110 05040001 120	Sugar Creek (headwaters to above Middle Fork Sugar Creek) (bacteria) South Fork Sugar Creek (bacteria) Sugar Creek (upstream Middle Fork to mouth) (bacteria)

References

Ohio DNR. 2001. Gazetteer of Ohio Streams, 2nd edition. Ohio Department of Natural Resources, Columbus, OH.

Ohio EPA. 2002. Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams - September 2002, final version 1.0. Ohio Environmental Protection Agency, Division of Surface Water. Columbus, OH.

Ohio EPA. 2003 Ohio Sport Fish Consumption Advisory. Ohio Environmental Protection Agency, Division of Surface Water. Columbus, OH.

Ohio EPA. 2004. Ohio Sport Fish Consumption Advisory (draft December 2003). Ohio Environmental Protection Agency, Division of Surface Water. Columbus, OH.

Ohio EPA, 2005. Surface and Ground Water Monitoring and Assessment Strategy, 2005 - 2009. Ohio Environmental Protection Agency, Division of Surface Water. Columbus, OH. September 20, 2005.

Ohio EPA. 2005. Report of the State of Ohio Pursuant to Paragraph 4.C. of the Consent Order Entered on August 19, 2004, for National Wildlife Federation, League of Ohio Sportsmen, and Ohio Environmental Council vs. United States Environmental Protection Agency, et al., No. C2-01-1052, Judge Frost, Magistrate Judge Kemp. Ohio Environmental Protection Agency, Division of Surface Water. Columbus, OH.

Ohio Lake Erie Commission. 1998. State of the Lake Report. Ohio Lake Erie Commission. Toledo, OH.

Ohio Lake Erie Commission. 2004. State of the Lake Report. Ohio Lake Erie Commission. Toledo, OH.

ORSANCO. 2006. 2006 Biennial Assessment of Ohio River Water Quality Conditions. Ohio River Valley Sanitation Commission. Cincinnati, OH.

U.S. EPA 2005. Memorandum - Guidance for 2006 Assessment, Listing and Reporting Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act; TMDL-01-05. July 29, 2005. U. S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds. Washington, D.C.

U.S. EPA, 1991a. Total State waters: Estimating river miles and lake acreage for the 1992 assessments (305(b) reports). U.S. Environmental Protection Agency, Office of Water, Washington, D.C.