Ohio's Water Resources

B1. 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 B-1.

The larger water bodies included in Table B-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 28,900 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 2009). 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.

The named streams and rivers that are readily recognized by the public are mostly those that drain more than 50 $mi^{2.}$ These 254 principal streams and large rivers in Ohio (comprising 5,679 linear stream miles) are listed by major Ohio watershed in Table B-2. Figure B-1 graphically depicts the extent of these stream and river miles within Ohio.

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.

Fourteen river systems in Ohio are included in the State Scenic Rivers Program, administered by the Ohio Department of Natural Resources (see Figure B-2). Between 1970 and 2008, a total of 674 miles were designated Scenic, 75 miles in three systems were designated Wild, and 79 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://ohiodnr.com/watercraft/scenicrivers/tabid/2310/Default.aspx.

Table B-1. Ohio's water resource statistics.

	Value	Source	Scale
State population	11,536,604	2010 Census[1]	
Land area	40,948 sq miles	2003 Census	
Rivers and streams			
Miles of named and designated streams	> 23,000	Ohio DNR[2]	1:24K
Total miles	58,343	NHD[3]	1:24K
Miles of perennial streams	29,412	NHD	1:24K
Miles of intermittent streams	28,931	NHD	1:24K
Miles of primary headwater streams	> 115,000	Ohio EPA[4]	
Miles of large rivers (draining more than 500 square miles)	1,248	NHD	1:24K
Miles of principal streams (draining 50 to 500 square miles)	4,453	NHD	1:24K
Border miles: Ohio River	451	USGS $7^{1/2}$, Maps	1:24K
Border miles: Lake Erie shoreline	290	USGS $7^{1/2}$, Maps	1:24K
Lakes/reservoirs/ponds			
Number of significant publicly owned lakes	447	Ohio DNR[5]	1:24K
Total acreage of significant publicly owned lakes	118,963	Ohio DNR[5]	1:24K
Wetlands			
Acreage	942,155	Ohio DNR[6]	30m x 30m[7]
% of original wetlands	10%	Dahl[8]	

1 Source: http://2010.census.gov/2010census/

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

3 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.

4 An estimate prepared by Ohio State University for Ohio EPA and reported in "Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams" (Ohio EPA 2009).

5 Acreage figure for significant publicly owned lakes (> 5 acres) listed by Ohio Department of Natural Resources in "Inventory of Ohio's Lakes" (Ohio DNR 1980).

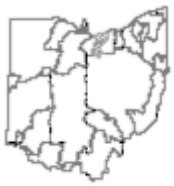
6 Acreage figure for wetlands listed by Ohio Department of Natural Resources in "Ohio Wetland Restoration and Mitigation Strategy Blueprint" (Ohio DNR/Ohio EPA 1999).

7 LandSat Thematic Mapper Data.

8 Loss of historic wetlands in Ohio estimated to be 90% (Dahl, 1990).

Table B-2. List of Ohio's principal streams and large rivers.

Basin	Large Rivers (draining >500 mi^2)	Principal Streams (draining >50 mi^2 but less than 500 mi^2)	
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 Toussaint Creek	South Branch Portage River Middle Branch Portage River Rocky Ford
Sandusky Basin 	Sandusky River	Wolf Creek East Branch Wolf Creek Sycamore Creek Broken Sword Creek	Green Creek Honey Creek Muddy Creek Tymochtee Creek
Huron Basin 		Huron River East Branch Huron River West Branch Huron River	

Basin	Large Rivers (draining >500 mi^2)	Principal Streams (draining >50 mi^2 but less than 500 mi^2)
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
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

Basin	Large Rivers (draining >500 mi^2)	Principal Streams (draining >50 mi^2 but less than 500 mi^2)	
Ashtabula Basin 		Ashtabula River Conneaut Creek	
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
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	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

Basin	Large Rivers (draining >500 mi^2)	Principal Streams (draining >50 mi^2 but less than 500 mi^2)	
Muskingum Basin (continued)		Stillwater Creek Little Stillwater Creek Brushy Fork Sugar Creek South Fork Sugar Creek Sandy Creek Nimishillen Creek Still Fork White Eyes 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
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 White Oak Creek East Fork White Oak Creek North Fork White Oak Creek

Basin	Large Rivers (draining >500 mi^2)	Principal Streams (draining >50 mi^2 but less than 500 mi^2)	
			
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
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	

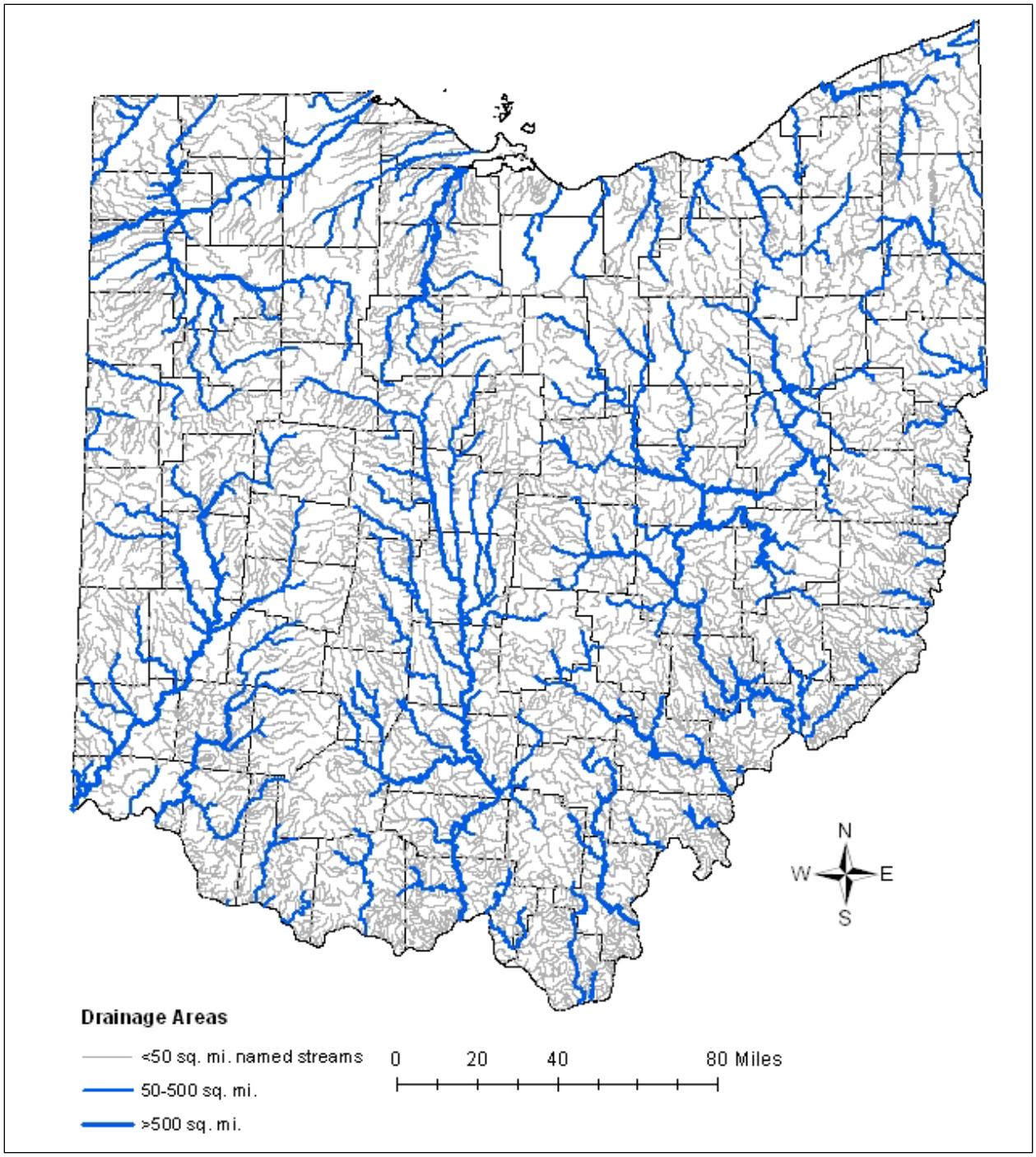


Figure B-1. Map of Ohio's principal streams and large rivers.

Figure B-2. Ohio Scenic River System (Ohio DNR 2013).
Source: http://watercraft.ohiodnr.gov/scenicriversmap (last visited 12/9/2013)

B2. 2020 Water Quality Goals

As has been shown, Ohio has a variety of high quality water resources. Ohio has set goals to track trends in water quality for many years. In the early 1990s, Ohio EPA established a goal of fully attaining the designated aquatic life use[1] in 80% of Ohio's streams and rivers by 2010. The purpose of the goal was not to supersede the Clean Water Act goal of 100% attainment for all uses, but rather to provide a reasonable target against which to track water quality improvements in Ohio. The 2010 Integrated Report marked the final accounting of "80 by 2010" goal progress and proposed new goals for the aquatic life beneficial use.

New goals for all four beneficial uses included in the IR were established in the 2012 report. Progress toward these goals is discussed in each IR cycle. Table B-3 lists the goal, the statistic that will be tracked to measure progress, and the baseline and current status for each goal. See Section G for more information about the aquatic life use goal.

[1] Beneficial use designations describe existing or potential uses of water bodies. See Section D2 for additional description.

Table B-3. 2020 goals for four beneficial uses.

Goal	Statistic to be Tracked	Baseline	Update
Public Drinking Water Supply Use			
All drinking water sources will attain WQS by 2020	Of those assessed, % intakes/assessment units attaining for nitrates, atrazine, and cryptosporidia	Nitrate: 93% attainment Atrazine: 71% attainment Crypto: insufficient data Source: 2010 IR Data range: 2004-2008	Nitrate: 91% attainment Atrazine: 72% attainment Crypto: 100% attainment[1] Source: 2014 IR Data range: 2008-2012
All drinking water sources will be assessed (nitrate and atrazine) by 2020	% intakes/zones assessed	Nitrate: 34% assessed Atrazine: 13% assessed Source: 2010 IR Data range: 2004-2008	Nitrate: 37% assessed Atrazine: 15% assessed Source: 2014 IR Data range: 2008-2012
Recreation Use			
Ohio beaches and canoeing streams will be safe for swimming (meet WQS) by 2020	Lake Erie beaches below *E. coli* WQS on 90% of recreation days (single sample maximum), using most recent 5 years of data	5 of 23 (22%) major public beaches met target Source: 2010 IR Data range: 2004-2008	14 of 63 (22%) public beaches met target Source: 2014 IR Data range: 2008-2012
	For state park beaches, 90% of *E. coli* samples collected in past 5 years are below the bathing beach *E. coli* criterion	57 of 77 (75%) state park beaches met target Source: 2010 IR Data range: 2004-2008	50 of 67 (75%) state park beaches met target Source: 2014 IR Data range: 2008-2012
	% of assessed stream sites meeting seasonal geo mean *E. coli* criteria, using most recent 5 years of data	Aggregate: 587 of 1,598 (37%) Class A: 165 of 349 (47%) Class B: 419 of 1,229 (34%) Class C: 3 of 20 (15%) Source: 2010 IR Data range: 2004-2008	Aggregate: 556 of 2,267 (25%) Class A: 220 of 744 (30%) Class B: 333 of 1,514 (22%) Class C: 3 of 9 (33%) Source: 2014 IR Data range: 2008-2012
Maintain adequate monitoring coverage on Ohio's watersheds, large rivers and beaches	# of sites assessed (bacteria data in 5-year period)	Watersheds: 472 of 1,538 (31%) assessed Large rivers: 15 of 38 (40%) assessed Beaches: 23 of 23 (100%) assessed Source: 2010 IR Data range: 2004-2008	Watersheds: 664 of 1,538 (43%) assessed Large rivers: 16 of 38 (42%) assessed Beaches: 63 of 63 (100%) assessed Source: 2014 IR Data range: 2008-2012
Human Health Use (Fish Tissue)			
More fish from Ohio's waters will be safe to eat by 2020	Levels of contaminants (mercury & PCBs) in sport fish compared with level in 2010	Not applicable	To be calculated in 2019 with 2009-2018 data.

Goal	Statistic to be Tracked	Baseline	Update
	Number of AUs listed as impaired for fish consumption compared to the 2010 IR	33% of AUs were impaired, and 87% of LRAUs Source: 2010 IR Data range: 1999-2008	To be calculated in 2019 with 2009-2018 data.
Aquatic Life Use			
100% full aquatic life use attainment on all Ohio large rivers by 2020	% assessed miles in full attainment of biological WQS criteria (Large rivers drain more than 500 square miles.)	93% (794 of 852 large river miles assessed) Total large river miles assessed: 852 of 1227 (69%) Source: 2010 IR Data range: 1999-2008	89.2% (1023 of 1147 large river miles assessed) Total large river miles assessed: 1147 of 1248 (92%) Source: 2014 IR Data range: 2003-2012
80% full aquatic life use attainment on Ohio's principal streams and small rivers by 2020	% assessed sites in full attainment of biological WQS criteria (Principal stream and small river sites drain between 20 and 500 square miles.)	61% (944 of 1,538 principal stream and small river sites assessed) Source: 2010 IR Data range: 1999-2008	64% (995 of 1,545 principal stream and small river sites assessed) Source: 2014 IR Data range: 2003-2012
Identify more high quality waters	Designate an additional 500 miles of stream, small river, and large river reaches from undesignated, WWH, or other lower tier aquatic life use to EWH	2,222 field verified EWH miles Source: Ohio WQS (OAC 3745-1, effective 10/9/09) Data range: 1990-2007	2,545 field verified EWH miles, (current as of WQS use designation rulemaking effective 6/16/2011, plus additional field verifications of existing and recommended EWH use in select basins sampled in 2005 and from 2009-2012). Net new miles since 2010 IR baseline: 323 (61 new or increased EWH stream and river reaches) Source: Ohio WQS (OAC 3745-1) and basin TSDs Data range: 1990 - 2012
Maintain adequate monitoring coverage on Ohio's principal and small rivers	# of sites assessed in 10-year period that have between 20- to 500-square-mile drainage area	1,538 sites Source: 2010 IR Data range: 1999-2008	1,545 sites Source: 2014 IR Data range: 2003-2012

[1] Using the proposed criteria listed in Table H-1.