

B

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.

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

Metric	Value	Source	Scale
State population	11,536,504	2010 Census ¹	
Land area	40,861 sq miles	2010 Census ²	
Rivers and streams			
Miles of named and designated streams	>23,000	ODNR ³	1:24K
Total miles	58,343	NHD ⁴	1:24K
Miles of perennial streams	29,412	NHD ⁴	1:24K
Miles of intermittent streams	28,931	NHD ⁴	1:24K
Miles of primary headwater streams	>115,000	Ohio EPA ⁵	
Miles of large rivers (draining more than 500 sq miles)	1,248	NHD ⁴	1:24K
Miles of principal streams (draining 50 to 500 sq miles)	4,453	NHD ⁴	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	ODNR ⁶	1:24K
Total acreage of significant publicly owned lakes	118,963	ODNR ⁶	1:24K
Wetlands			
Acreage	507,057	Ohio EPA ⁷	1:24K
Percent of original wetlands	10 percent	Dahl ⁸	

¹ Source: [census.gov/2010census/data/](https://www.census.gov/2010census/data/)

² Source: [census.gov/geo/reference/state-area.html](https://www.census.gov/geo/reference/state-area.html)

³ Mileage for waters listed by Ohio Department of Natural Resources in *Gazetteer of Ohio Streams, 2nd edition* (ODNR 2001).

⁴ 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). nhd.usgs.gov/index.html

⁵ 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).

⁶ Acreage for significant publicly owned lakes (> 5 acres) listed by Ohio Department of Natural Resources in *Inventory of Ohio's Lakes* (ODNR 1980).

⁷ Acreage for wetlands listed by Ohio EPA in *Intensification of the National Wetland Condition Assessment for Ohio: Final Report* (Ohio EPA 2015).

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

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 more than 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 one square mile) 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 mi². 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. Equally 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.

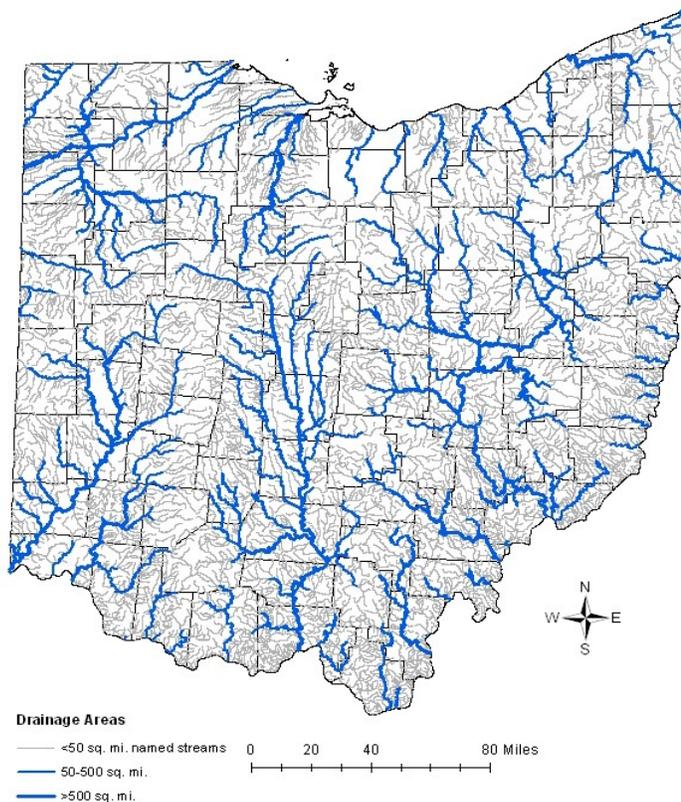


Figure B-1 — Map of Ohio's principal streams and large rivers.

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.

In Ohio, 14 river systems 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 watercraft.ohiodnr.gov/scenicrivers.

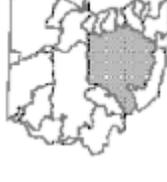


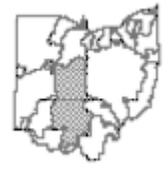
Figure B-2 — Ohio Scenic River System (ODNR 2017)
Source: watercraft.ohiodnr.gov/scenicriversmap

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			
<p>Maumee Basin</p> 	<p>Maumee River Auglaize River Blanchard River Tiffin River</p>	<p>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</p>	<p>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</p>
<p>Portage Basin</p> 		<p>Portage River Sugar Creek North Branch Portage River Toussaint Creek</p>	<p>South Branch Portage River Middle Branch Portage River Rocky Ford</p>
<p>Sandusky Basin</p> 	<p>Sandusky River</p>	<p>Wolf Creek East Branch Wolf Creek Sycamore Creek Broken Sword Creek</p>	<p>Green Creek Honey Creek Muddy Creek Tymochtee Creek</p>
<p>Huron Basin</p> 		<p>Huron River East Branch Huron River West Branch Huron River</p>	
<p>Vermilion Basin</p> 		<p>Vermilion River</p>	

Basin	Large Rivers (draining > 500 mi ²)	Principal Streams (draining > 50 mi ² but less than 500 mi ²)
<p>Black Basin</p> 		<p>Black River East Branch Black River West Branch Black River</p>
<p>Rocky Basin</p> 		<p>Rocky River East Branch Rocky River West Branch Rocky River</p>
<p>Cuyahoga Basin</p> 	<p>Cuyahoga River</p>	<p>Tinkers Creek Breakneck Creek Little Cuyahoga River</p>
<p>Chagrin Basin</p> 		<p>Chagrin River Aurora Branch</p>
<p>Grand Basin</p> 	<p>Grand River</p>	<p>Mill Creek Rock Creek</p>
<p>Ashtabula Basin</p> 		<p>Ashtabula River Conneaut Creek</p>

Basin	Large Rivers (draining > 500 mi ²)	Principal Streams (draining > 50 mi ² but less than 500 mi ²)	
Areas Draining to the Ohio River			
<p>Mahoning Basin</p> 	<p>Mahoning River</p>	<p>Meander Creek Mill Creek Mosquito Creek</p>	<p>Eagle Creek West Branch Mahoning River Pymatuning Creek</p>
<p>Little Beaver Basin</p> 		<p>Little Beaver Creek Bull Creek</p>	<p>North Fork Little Beaver Creek Middle Fork Little Beaver Creek West Fork Little Beaver Creek</p>
<p>Central Ohio Tributaries</p> 		<p>Captina Creek Cross Creek Duck Creek East Fork Duck Creek West Fork Duck Creek Little Muskingum River</p>	<p>McMahon Creek Short Creek Sunfish Creek Wheeling Creek Yellow Creek North Fork</p>
<p>Muskingum Basin</p> 	<p>Muskingum River Licking River Tuscarawas River Walhonding River Mohican River Wills Creek</p>	<p>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</p>	<p>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</p>

Basin	Large Rivers (draining > 500 mi ²)	Principal Streams (draining > 50 mi ² but less than 500 mi ²)	
<p>Hocking Basin</p> 	<p>Hocking River</p>	<p>Margaret Creek Federal Creek Sunday Creek Monday Creek</p>	<p>Clear Creek Rush Creek Little Rush Creek</p>
<p>Southeast Ohio Tributaries</p> 	<p>Raccoon Creek</p>	<p>Indian Guyan Creek Leading Creek Little Scioto River Rocky Fork Little Scioto River Pine Creek Little Raccoon Creek</p>	<p>Elk Fork Shade River East Branch Shade River Middle Branch Shade River West Branch Shade River Symmes Creek Black Fork</p>
<p>Scioto Basin</p> 	<p>Scioto River Paint Creek</p>	<p>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</p>	<p>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</p>
<p>Southwest Ohio Tributaries</p> 		<p>Bullskin Creek Eagle Creek West Fork Eagle Creek Ohio Brush Creek Baker Fork</p>	<p>West Fork Ohio Brush Creek Straight Creek White Oak Creek East Fork White Oak Creek North Fork White Oak Creek</p>
<p>Little Miami Basin</p> 	<p>Little Miami River</p>	<p>O'Bannon Creek Turtle Creek East Fork Little Miami River Stonelick Creek Todd Fork</p>	<p>Cowan Creek Caesar Creek Anderson Fork Massies Creek</p>

Basin	Large Rivers (draining > 500 mi ²)	Principal Streams (draining > 50 mi ² but less than 500 mi ²)	
<p>Great Miami Basin</p> 	<p>Great Miami River Mad River Stillwater River Whitewater River</p>	<p>Indian Creek Clear Creek Bear Creek Wolf Creek Honey Creek Lost Creek Tawawa Creek Stony Creek Buck Creek Ludlow Creek</p>	<p>Greenville Creek Swamp Creek Dry Fork Fourmile Creek Sevenmile Creek Twin Creek Loramie Creek Muchinippi Creek South Fork Great Miami River</p>
<p>Mill Basin</p> 		<p>Mill Creek</p>	
<p>Wabash Basin</p> 		<p>Wabash River Beaver Creek</p>	

B2. 2020 Water Quality Goals

Ohio has a variety of high-quality water resources and 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 use¹ in 80 percent of Ohio’s streams and rivers by 2010. The purpose of the goal was not to supersede the Clean Water Act goal of 100 percent 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 integrated report (IR) were established in the 2012 report. Progress toward these goals is discussed in each IR cycle. A new goal for the public drinking water supply use, based on the algae indicator, was established in this report.

Table B-3 lists the goals, the statistic that will be tracked to measure progress and the baseline and 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 D4 for additional description.

Table B-3 — 2020 goals for four beneficial uses, Lake Erie and the Ohio River.

Goal	Statistic to be Tracked	Baseline	Update
Public Drinking Water Supply Use			
All drinking water sources will attain WQS by 2020	Of those assessed, percent intakes/assessment units attaining for nitrates, atrazine, cryptosporidia (crypto) and algae	Nitrate: 93% attainment Atrazine: 71% attainment Crypto: insufficient data Source: 2010 IR Data range: 2004-2008	Nitrate: 88.3% attainment Atrazine: 84% attainment Crypto: 100% attainment ² Source: 2018 IR Data range: 2012-2017
All drinking water sources will be assessed (nitrate, atrazine and algae) by 2020	Percent intakes/zones assessed	Nitrate: 34% assessed Atrazine: 13% assessed Source: 2010 IR Data range: 2004-2008	Nitrate: 50% assessed Atrazine: 27% assessed Source: 2018 IR Data range: 2012-2017
Human Health Use (Fish Tissue)			
More fish from Ohio's waters will be safe to eat by 2020	Levels of contaminants (mercury and PCBs) in sport fish compared with level in 2010	Not applicable	To be calculated in 2019 with 2009-2018 data
	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
Recreation Use			
Ohio beaches and canoeing streams will be safe for swimming (meet WQS) by 2020	Lake Erie beaches below <i>E. coli</i> WQS on 90% of recreation days (single sample maximum), using most recent five years of data	5 of 22 (22%) major public beaches met target (note: one beach from 2010 report is no longer public) Source: 2010 IR Data range: 2004-2008	12 of 65 (18%) public beaches met target Source: 2018 IR Data range: 2013-2017
	For state park beaches, 90% of <i>E. coli</i> samples collected in past five years are below the bathing beach <i>E. coli</i> criterion	57 of 77 (75%) state park beaches met target Source: 2010 IR Data range: 2004-2008	47 of 75 (63%) state park beaches met target Source: 2018 IR Data range: 2013-2017
	Percent of assessed stream sites meeting seasonal geometric mean <i>E. coli</i> criteria, using most recent five 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: 13 of 256 (15%) Source: 2018 IR Data range: 2013-2017

² Using the proposed criteria listed in Table H-1.

Goal	Statistic to be Tracked	Baseline	Update
Maintain adequate monitoring coverage on Ohio's watersheds, large rivers and beaches	Number of sites assessed (bacteria data in five-year period)	Watersheds: 472 of 1,538 (31%) assessed Large rivers: 15 of 38 (40%) assessed Beaches: 22 of 22 (100%) assessed (note: one beach from 2010 report is no longer public) Source: 2010 IR Data range: 2004-2008	Watersheds: 156 of 1,538 (10%) assessed Large rivers: 6 of 38 (16%) assessed Beaches: 65 of 65 (100%) assessed Source: 2018 IR Data range: 2013-2017
Aquatic Life Use			
100% full aquatic life use attainment on all Ohio large rivers by 2020	Percent 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 1,227 (69%) Source: 2010 IR Data range: 1999-2008	87.5% (1,089 of 1,243 large river miles assessed) Total large river miles assessed: 1,243 of 1,248 (99.7%) Source: 2018 IR Data range: 2003-2016
80% full aquatic life use attainment on Ohio's principal streams and small rivers by 2020	Percent 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	69.3% (1,079 of 1,558 principal stream and small river sites assessed) Source: 2018 IR Data range: 2007-2016
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	3,212 field verified EWH miles, (current as of WQS use designation rulemakings effective 9/18/2017, plus additional field verifications of existing and recommended EWH use in select basins sampled from 2009-2016). Net new miles since 2010 IR baseline: 990 (154 recommended or field verified EWH stream and river reaches) For this cycle, 401 miles (58 recommended or field verified EWH stream or stream reaches) Source: Ohio WQS (OAC 3745-1) and basin TSDs
Maintain adequate monitoring coverage on Ohio's principal and small rivers	Number 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	1,558 sites Source: 2018 IR Data range: 2007-2016

Goal	Statistic to be Tracked	Baseline	Update
Monitoring Load Reduction Progress for Lake Erie and the Ohio River			
Develop and begin to implement a strategy for adequate monitoring coverage to calculate loadings from all significant watersheds to Lake Erie and the Ohio River	Number of sites at or near the mouths of major watersheds that have flow gages and water quality sampling frequently enough to calculate loads with an acceptable degree of certainty (for example, following Northeast-Midwest Institute or GLWQA Annex 4 recommendations)	Nine watersheds currently have flow gages and daily monitoring near the mouth of the watershed: Maumee, Portage, Sandusky, Cuyahoga, Muskingum, Scioto and the Great Miami. Two watersheds may have adequate data now but are funded by short-term grants: Vermillion and Black.	Goal established 2016. Flow gages and nutrient monitoring have been added near the mouth of the Huron River and Grand River.