

Ohio 2010 Integrated Report

## **Section A**

# **Summary of Improvements and Results**



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The 2010 edition of the Ohio Integrated Water Quality Monitoring and Assessment Report is marked by substantial process changes, the final reporting on a key Ohio water quality goal, and the introduction of new water quality goals. This section summarizes the significant changes and highlights the results.

## **A1. Changes in How Data Are Processed and Results Are Reported**

While the overall approach to data analysis in the 2010 Integrated Report is the same as for the past few reporting cycles, Ohio EPA has made several significant improvements. Altogether, these changes provide for more detailed reporting of water quality conditions in Ohio. The major modifications are as follows:

- Listing by beneficial use
- Size of assessment units
- Recreation use methodology
- Human health methodology
- Report format and content.

The modifications are discussed in the following sections. The overall effect of the modifications on Ohio's 303(d) list is a "correction" of the list to inject the more detailed results and to remove areas where there are no data. This does not imply less environmental vigilance, but rather a refinement of the list to provide a sharper focus on where problems exist. The revised list should allow a more targeted discussion of what the problems are, how to solve them, and how effectively resources have been expended to do so."

### **Listing by Beneficial Use**

The most profound change to the 2010 Integrated Report is the change from listing by assessment unit to listing by each of the four beneficial uses within an assessment unit. In past reports, an impairment of one beneficial use caused the assessment unit to be listed as impaired (category 5) regardless of the status of other uses. In the 2010 report, Ohio is listing by beneficial use within each assessment unit, so uses that are attaining water quality standards and those with no data to assess are being removed from the list of impaired waters (i.e., "delisted").

Ohio adapted U.S. EPA's five-category listing structure to list by beneficial uses. Two other notable changes are the creation of the "0" category, assigned to assessment units that do not contain a public drinking water intake, and the introduction of subcategories to give more information about a water's status, as shown in Table A-1.

In general, listing by use allows more information to be transmitted and presents a more accurate picture of water quality in Ohio. The new approach results in a large number of delistings in the 2010 report because the refined list indicates which specific beneficial uses are impaired in each assessment unit, not simply that a use (any or all of the four) is impaired. A few delistings based on this modification are expected to linger in the 2012 and subsequent reports. Listing by beneficial use is illustrated more fully in Section J1.

**Table A-1. Category definitions for the 2010 Integrated Report and 303(d) list.**

Category <sup>1</sup>		Subcategory	
0	No waters currently utilized for water supply		
1	Use attaining	h	Historical data
		x	Retained from 2008 IR
2	Not applicable in new (2010) Ohio system		
3	Use attainment unknown	h	Historical data
		i	Insufficient data
		x	Retained from 2008 IR
4	Impaired; TMDL not needed	A	TMDL complete
		B	Other required control measures will result in attainment of use
		C	Not a pollutant
		h	Historical data
		n	Natural causes and sources
		x	Retained from 2008 IR
5	Impaired; TMDL needed	M	Mercury
		h	Historical data
		x	Retained from 2008 IR

<sup>1</sup> Shading indicates categories defined by U.S. EPA; additional categories and subcategories are defined by Ohio EPA.

### Size of Assessment Units

Ohio continues to use a watershed-based listing approach, first used in 2002, but is shifting from a larger watershed assessment unit (11-digit hydrologic unit) to a smaller (12-digit hydrologic unit) watershed assessment unit size. Some of the large river units are also being split into smaller pieces. Reporting at a finer scale allows a more refined picture of water quality in Ohio – just as a photograph with more “pixels” results in a clearer picture. To accommodate this change, methodologies for each of the listed uses – aquatic life, recreation, human health (via fish tissue), public drinking water supply – were revised. Additional changes to the recreation and human health uses were made as described below.

Ohio EPA had hoped to change to smaller watershed size in the 2008 Integrated Report, but a major overhaul of watershed coding was underway. In 2008, federal government agencies completed a project to redraw all hydrologic unit boundaries for Ohio according to a new coding method. This project was part of a nationwide initiative to develop a nationally consistent dataset of watershed coding numbers (the Watershed Boundary Dataset). The Natural Resources Conservation Service (NRCS) maintains the Watershed Boundary Dataset (NRCS, 2010a, b). More information about the Watershed Boundary Dataset can be found at <http://www.ncgc.nrcs.usda.gov/products/datasets/watershed/index.html>. The Ohio information can be downloaded at <http://www.oh.nrcs.usda.gov/technical/12-digit/>. The former coding method used 11 digits and 14 digits, respectively, to describe larger and smaller watersheds. In the new method, 11-digit codes have been converted to 10-digit codes and 14-digit codes have been converted to 12-digit codes. In addition, to make the size of the smaller watersheds more consistent across the state, some of the small hydrologic units were combined or split. To do

this, each hydrologic unit boundary was meticulously examined and redrawn, if necessary, to follow ridge lines more closely.

Near the borders of the state of Ohio, the old codes were not consistent with neighboring states. Therefore, those hydrologic units were renumbered in some cases to better line up with neighboring states' hydrologic unit codes. Many hydrologic units were also renamed to standardize naming across the state.

Separate from this watershed effort, Ohio EPA decided to split some of the large river assessment units (the lengths of river that drain 500 square miles or more) into smaller segments to make the LRAUs a more uniform length. All LRAUs are now generally between 25-45 miles; previously the range was from 8 miles to 177 miles. Divisions were made at 8-digit HUC boundaries where available, or at major tributaries. No changes were made in Ohio River units; Ohio EPA continues to rely on the 305(b) report of the Ohio River Valley Sanitation Commission (ORSANCO) to indicate impaired areas on the Ohio River (see ORSANCO, 2008).

The number of watershed assessment units has increased from 331 to 1,538 and there are now 38 large river assessment units. The three Lake Erie nearshore assessment units did not change. The combination of smaller assessment units and listing by individual use results in a 17-fold increase in the amount of information being reported in 2010 compared with past reports, from 357 "results" to 6,316 "results."

Table A-2 compares the old system of coding watersheds and large rivers in Ohio to the new system. Table A-3 shows the new subdivided large river assessment units.

**Table A-2. Comparison of old and new coding systems for watersheds and large rivers in Ohio.**

	Old system	New system
<b>Larger watersheds</b>		
Number of watersheds	331 <sup>1</sup>	331
Average size of watershed	130 square miles	130 square miles
<b>Smaller watersheds</b>		
Number of watersheds	1756	1,538 <sup>2</sup>
Average size of watershed	24 square miles	27 square miles
<b>Large rivers</b>		
Number of large river segments	23 <sup>1</sup>	38 <sup>2</sup>
Average length of segment	54.6 miles	32.3 miles

<sup>1</sup> Assessment unit in 2008 and previous reports.

<sup>2</sup> Assessment unit in 2010 report.

**Table A-3. New large river assessment unit subdivisions for the 2010 report.**

Large River Assessment Units	Length (miles)
<b>Not subdivided</b>	
Tiffin River (Brush Cr. to mouth)	19.67
Auglaize River (Ottawa R. to mouth; excluding Defiance Power Dam Resv.)	12.86
Blanchard River (Dukes Run to mouth)	35.65
Cuyahoga River (Brandywine Cr. to mouth; including old channel)	25.34
Grand River (Mill Cr. to mouth)	41.28
Mahoning River (Eagle Cr. to PA border)	37.00

<b>Large River Assessment Units</b>	<b>Length (miles)</b>
Mohican River (all)	27.58
Walhonding River (all)	23.19
Wills Creek (Salt Fork to mouth; excluding Wills Creek Lake)	44.06
Licking River (all; excluding Dillon Lake)	30.21
Paint Creek (Rocky Fork to mouth)	37.12
Stillwater River (Greenville Cr. to mouth)	32.38
Mad River (Donnels Cr. to mouth)	18.38
Whitewater River (all in OH)	8.26
Raccoon Creek (L. Raccoon Cr. to mouth)	37.55
<b>Subdivided</b>	
<b>Maumee River</b>	
IN border to Tiffin River: RMs 107.87-65.76	42.11
Tiffin River to Beaver Creek: RMs 65.76-31.32	34.44
Beaver Creek to Maumee Bay: RMs 31.32-0.00 (15.0 mi. lacus.)	31.32
<b>Sandusky River</b>	
Tymochtee Creek to Wolf Creek: RMs 65.73-22.73	43.00
Wolf Creek to Sandusky Bay: RMs 22.73-0.00 (15.8 mi. lacus.)	22.73
<b>Hocking River</b>	
Scott Creek to Margaret Creek: RMs 68.96-36.38	32.58
Margaret Creek to mouth: RMs 36.38-0.00	36.38
<b>Tuscarawas River</b>	
Chippewa Creek to Sandy Creek: RMs 103.22-73.10	30.12
Sandy Creek to Stillwater Creek: RMs 73.10-47.05	26.05
Stillwater Creek to mouth: RMs 47.05-0.00	47.05
<b>Muskingum River</b>	
Tuscarawas/Walhonding confluence to Licking River: RMs 111.14-76.20	34.94
Licking River to Meigs Creek: RMs 76.20-29.42	46.78
Meigs Creek to mouth: RMs 29.42-0.00	29.42
<b>Scioto River</b>	
L. Scioto River to Olentangy River: RMs 177.35-132.22 (excluding O'Shaughnessy Reservoir and Griggs Reservoir)	32.70
Olentangy River to Big Darby Creek: RMs 132.22-100.80	31.42
Big Darby Creek to Paint Creek: RMs 100.80-63.50	37.30
Paint Creek to Sunfish Creek: RMs 63.50-26.82)	36.68
Sunfish Creek to mouth: RMs 26.82-0.00	26.82
<b>Great Miami River</b>	
Tawawa Creek to Mad River: RMs 130.41-81.48	48.93
Mad River to Fourmile Creek: RMs 81.48-38.38	43.10
Fourmile Creek to mouth: RMs 38.38-0.00	38.38
<b>Little Miami River</b>	
Caesar Creek to O'Bannon Creek: RMs 50.92-24.00	26.92
O'Bannon Creek to mouth: RMs 24.00-0.00	24.00

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## Recreation Use Methodology

Several significant changes have been made to the recreation use methodology. First, the methodology is changing from a pooled to a site-by-site analysis, similar to that used for the aquatic life use. The indicator organism is shifting from fecal coliform to *E. coli*, which aligns with Ohio's new water quality standards for recreation use. The recreation use evaluation also contains a new index score to gage relative impairment. The recreation use methodology is described in detail in Section F.

## Human Health Methodology

The methodology for the human health use (using fish tissue contaminant samples) was changed to be consistent with the methodology described in U.S. EPA's 2009 guidance for implementing the methylmercury water quality criterion. More discussion of this methodology is contained in Section E.

## Report Format and Content

Having more assessment units necessitates a change in how the report is presented. Past reports included about 100 pages of text, about 100 pages of summary tables, and detailed summary sheets for each of the 357 assessment units (watershed, large river and Lake Erie). Most people viewed the report online at Ohio EPA's web site, but printing the document was feasible. For the 2010 report, the detailed summaries of assessment units alone would number more than 1,600 pages.

The report will continue to be available both in paper and electronic formats. The detailed assessment unit information will be available only online. The web site (<http://www.epa.ohio.gov/dsw/tmdl/2010IntReport/index.aspx>) allows two ways to search for information on individual assessment units:

- By drilling down from larger to smaller watersheds or large rivers, ending at the assessment unit, where the summary page displays.
- By searching for a stream by name; search results then display, along with a link to relevant assessment unit summary pages.

Finally, more statewide results maps are presented in Section K. Listing by beneficial use rather than an overall category makes the mapping of results more useful.

For the first time in many years, the report includes a section on ground water quality in Ohio (see Section N). The report also previews a potential methodology for including lakes in aquatic life use listing decisions, possibly as soon as 2012. Looking further into the future, the report includes more discussion of wetlands, including potential pathways for including wetlands in future listing decisions (see Section I).

## A2. Summary of Results

### Better Reporting on Water Quality

As mentioned earlier, the combination of listing by use and using smaller assessment units allows for more detailed reporting of water quality status. Figure A-1 illustrates the result in the

Paint Creek watershed in south central Ohio. In past reports, the status of this watershed was reported in terms of 10 subwatersheds (map at left). In the 2010 report, the Paint Creek watershed is reported in terms of 41 subwatersheds (map at right).

The effects of this reporting are discussed in more detail in Section J, and similar examples are found throughout the report. The maps in Section K are particularly revealing.

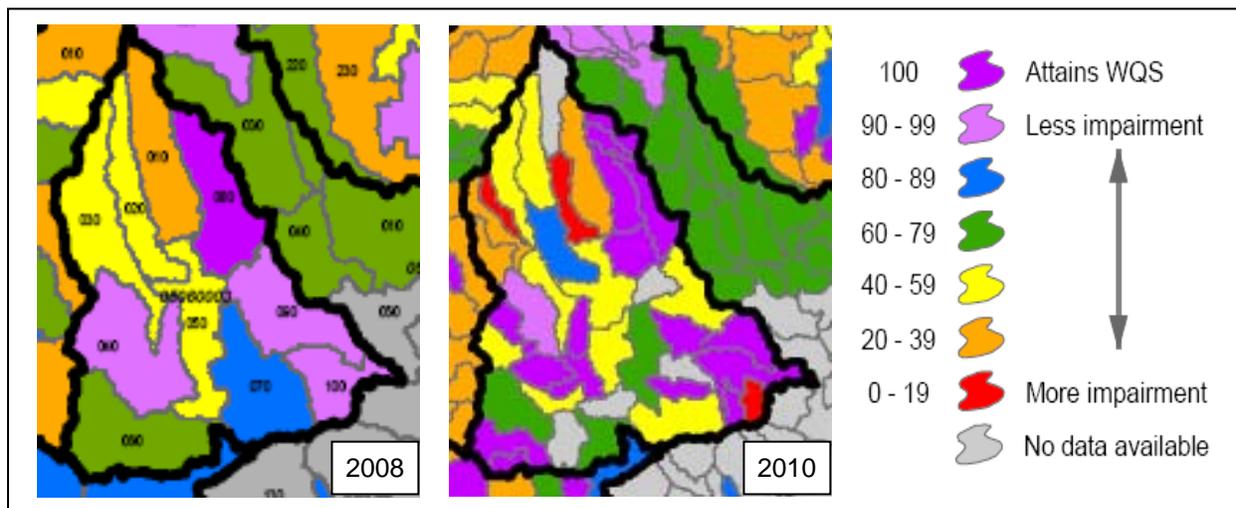


Figure A-1. Comparison of reporting detail in 2008 and 2010.

### Summary of Water Quality Results

For the 2010 Integrated Report, new data collected in 2007 and 2008 were available for analysis (see Figure A-2). Watersheds intensively monitored during these years included the lower Little Miami River, Ohio Brush Creek, upper Grand River, Kokosing River, Mohican River, upper Great Miami River, Licking River, Portage River, Moxahala Creek, Salt Creek (Muskingum), and Pymatuning Creek basins. Large rivers intensively sampled included the Little Miami, Mohican River, Walhonding River, Licking River, Whitewater River, and Great Miami River (uppermost unit). Detailed watershed survey reports for many of these watersheds are or will be available soon (see Biological and Water Quality Report Index, [http://www.epa.ohio.gov/dsw/document\\_index/psdindx.aspx](http://www.epa.ohio.gov/dsw/document_index/psdindx.aspx)).

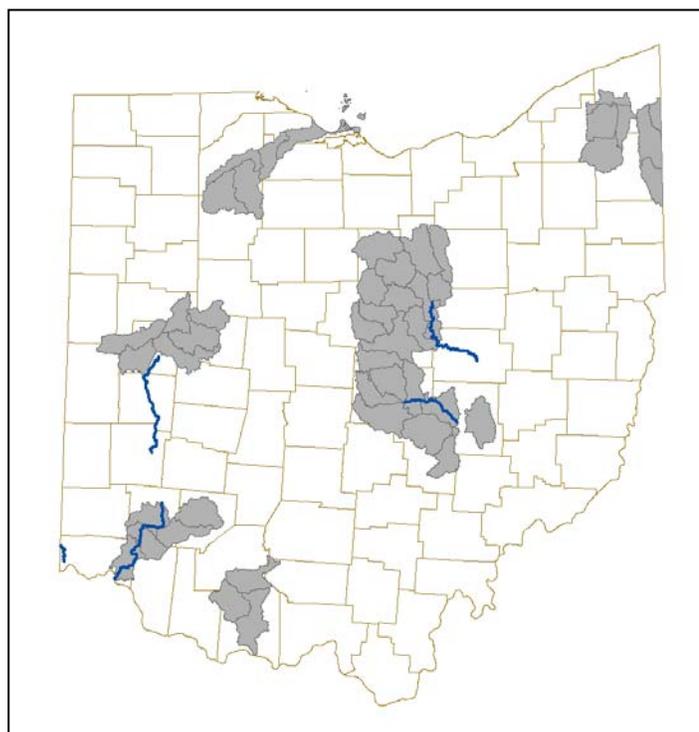


Figure A-2. Watersheds monitored in 2007 and 2008.

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With so many changes in reporting protocols from the 2008 to the 2010 reports, it is difficult to parse out detailed reasons for changes in results. However, some coarse analysis is possible. Ignoring the 2008 overall category (applied across all uses) and focusing instead on the 2008 use results allows a comparison with the 2010 use results (see Figures A-3 and A-4 for watersheds and large rivers, respectively). There are no changes between the 2008 and 2010 use results in the Lake Erie nearshore assessment units.

Beginning with watersheds, as might be expected given the number of changes to methodology, indicator, and data availability, the recreation use results show the most difference (compare third and fourth columns in Figure A-3). The major drivers are the change in indicator which meant that less data are available in the 2010 analysis, so the “unknown” category (3, gray) increased. In both the recreation and aquatic life uses, the increase in the number of TMDLs completed is apparent (category 4A, violet). The percentage of watershed units attaining the aquatic life use nearly tripled.<sup>1</sup> The growth of the “0” category (indicating assessment units that do not contain a public drinking water intake) is primarily the result of the change in assessment unit size which allows for more detailed reporting.

For large rivers, the results are similar to the watersheds, based on the same reasons. The increase in the number of large rivers attaining the aquatic life use reflects the results of new data in several rivers.

#### Human Health Use (Fish Tissue)

The 2010 human health use (fish tissue) results are not appreciably different from the 2008 results. Fish tissue data have been assessed in nearly every major (8 digit) hydrologic unit in Ohio. Between one quarter and one third of the watershed assessment units assessed for human health use are in attainment of that use. PCB contamination, primarily a result of historic industrial sources and old landfill discharges, is the cause of most of the human health use impairments. Mercury is the second leading cause of human health use impairments after PCBs.

#### Recreation Use

Less data are available for analysis because point source dischargers are not yet monitoring using *E. coli*, but this situation should improve beginning in the 2012 report. Approximately 10,400 *E. coli* bacteria records were used in the 2010 analysis.

Data were available for about one-third of the watershed assessment unit watersheds in the state; about two-thirds are not assessed. Of the third that have data, only 13% attain the recreation use (the swimmable goal of the Clean Water Act) and the remaining 87% do not. Looking at data at individual sites instead of the watershed units, 44% of all the sites on the most important primary contact recreation waters (Class A) are in attainment of the recreation use.

For the large rivers, data are available for 15 of 38 units (40%). Of these, two (Paint Creek and Walhonding River) attain the recreation use (13%) while the remaining 13 (87%) do not. However, about one-half of the non-attaining units have an index score of 89 or higher,

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<sup>1</sup> A note of caution concerning the aquatic life use results: Because not all data for the aquatic life use are available in a new database yet, a full re-analysis of results for this use is not possible for the 2010 report. The 2008 aquatic life use results are retained in many watershed units.

indicating that they are close to attaining the use. The lower Tuscarawas River (Stillwater Creek to the mouth) had the lowest index score (38) followed by the Cuyahoga River (45).

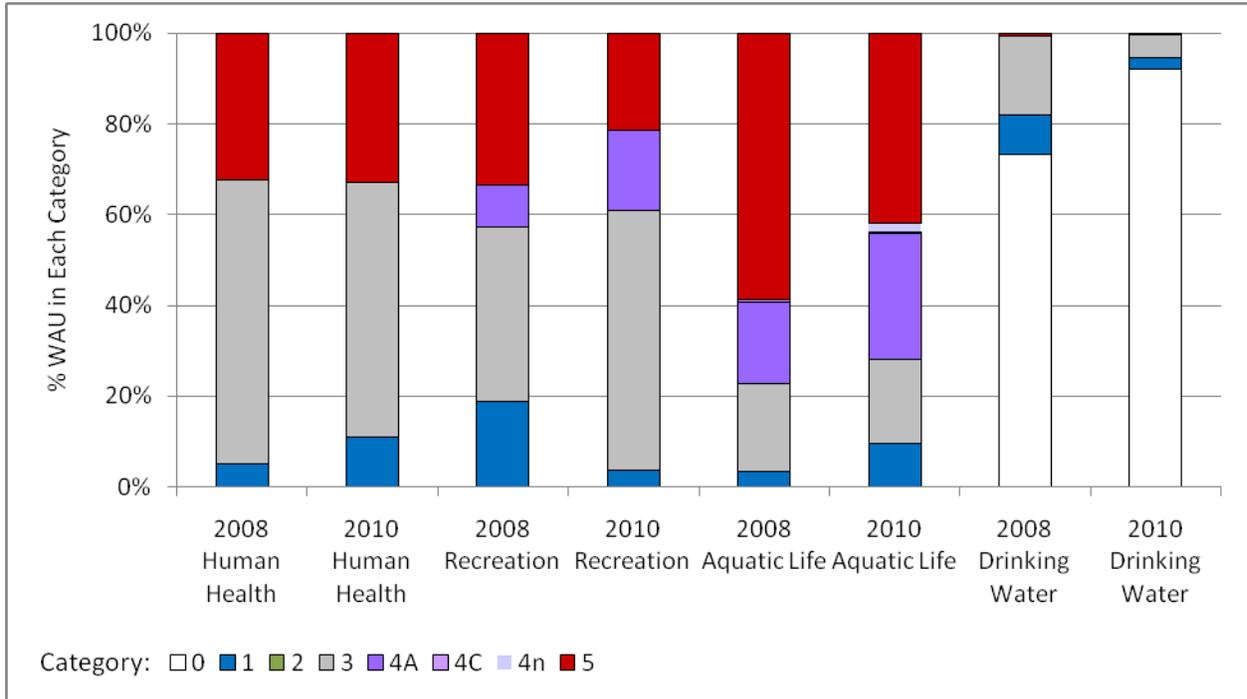


Figure A-3. Comparison of 2008 and 2010 use results for watersheds.

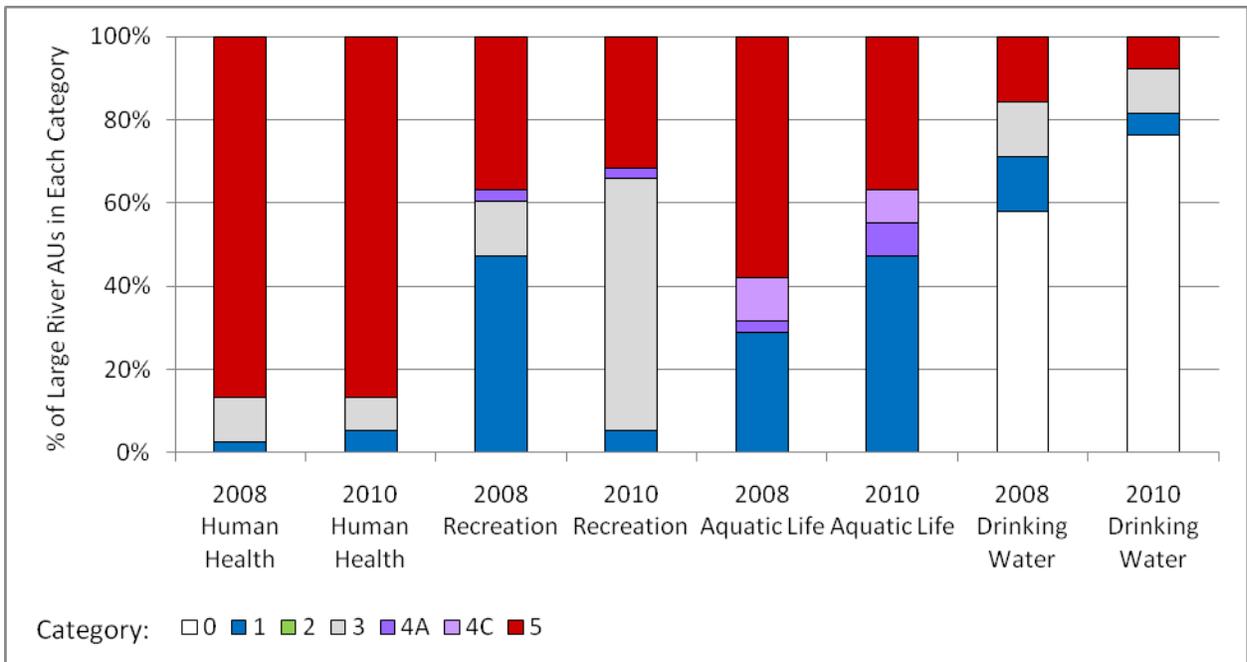


Figure A-4. Comparison of 2008 and 2010 use results for large rivers.

## Aquatic Life Use

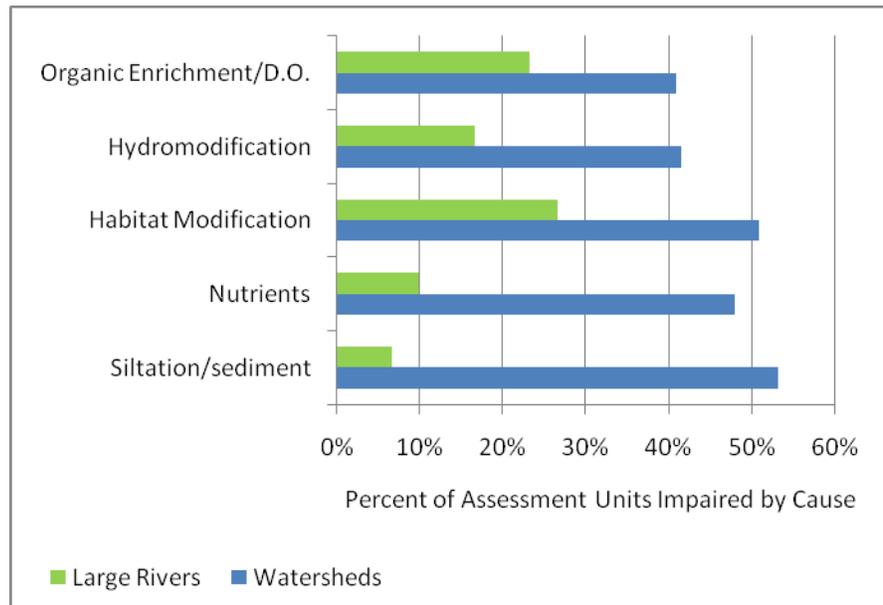
Progress continues to be made in attainment of the aquatic life use. Results are discussed in the goal section (A3).

The top five causes of impairment for the aquatic life use for the period 1999 through 2008 are

- siltation/sediment
- nutrients
- habitat modification
- hydromodification
- organic enrichment / dissolved oxygen (DO).

Figure A-5 summarizes the percentage of assessment units impaired for the top causes.

For watersheds, most impairments are related to modification of the landscape involving agriculture and urban development. These types of impairments have the most impact on smaller streams. Nearly all of the 999 (of 1,538) impaired watershed units had at least one of these causes contributing to impairment and many had three or more of the top five causes listed.



**Figure A-5. Causes of impairment of the aquatic life use.**

## Public Drinking Water Supply Use

A key challenge for increasing the number of PDWS assessments continues to be limited water quality data at drinking water intakes. Ohio EPA has now incorporated PDWS beneficial use sampling in the watershed surveys and within the next few reporting cycles the percent of assessed PDWS waters should continue to grow from the 39% reported on in 2010.

Elevated nitrate continues to be the cause of impairment for three large river assessment units on the Maumee and Sandusky Rivers. Twenty six waters were also placed on the watch list due to elevated nitrate in finished water and source waters, located primarily in the northwest and central portions of the state. The primary sources of elevated nitrate are nonpoint source runoff from agricultural land use and home/commercial fertilizer application, failing septic systems and unsewered areas, and wastewater plant discharges.

Atrazine is a pesticide of concern in Ohio drinking water sources and is the cause of impairment in source waters for three Ohio communities located in the southwestern portion of the state. The primary source of atrazine in these watersheds is nonpoint source runoff from agricultural land use.

## Summary of 303(d) Listing/Delisting Results

While the results do not show a major difference in water quality from 2008, there will be a significant number of delistings from the 303(d) list, due to the use of smaller assessment units and the switch to listing by use instead of an overall category. For the administrative delisting process, the 2008 overall result was distributed to each of the beneficial uses, then the 2010 use results were used to “correct” the 2008 listing. Reasons for each delisting were determined. This conservative process was developed to ensure that listings approved by U.S. EPA in the 2008 303(d) list were not delisted without good cause and that the process is as transparent as possible.

Most delistings are due to the change from reporting using a single overall category to reporting by each use, either use alone or combined with new methodology and/or new data, as shown in Figure A-6 (for watershed assessment units). Completion of TMDLs was also a significant

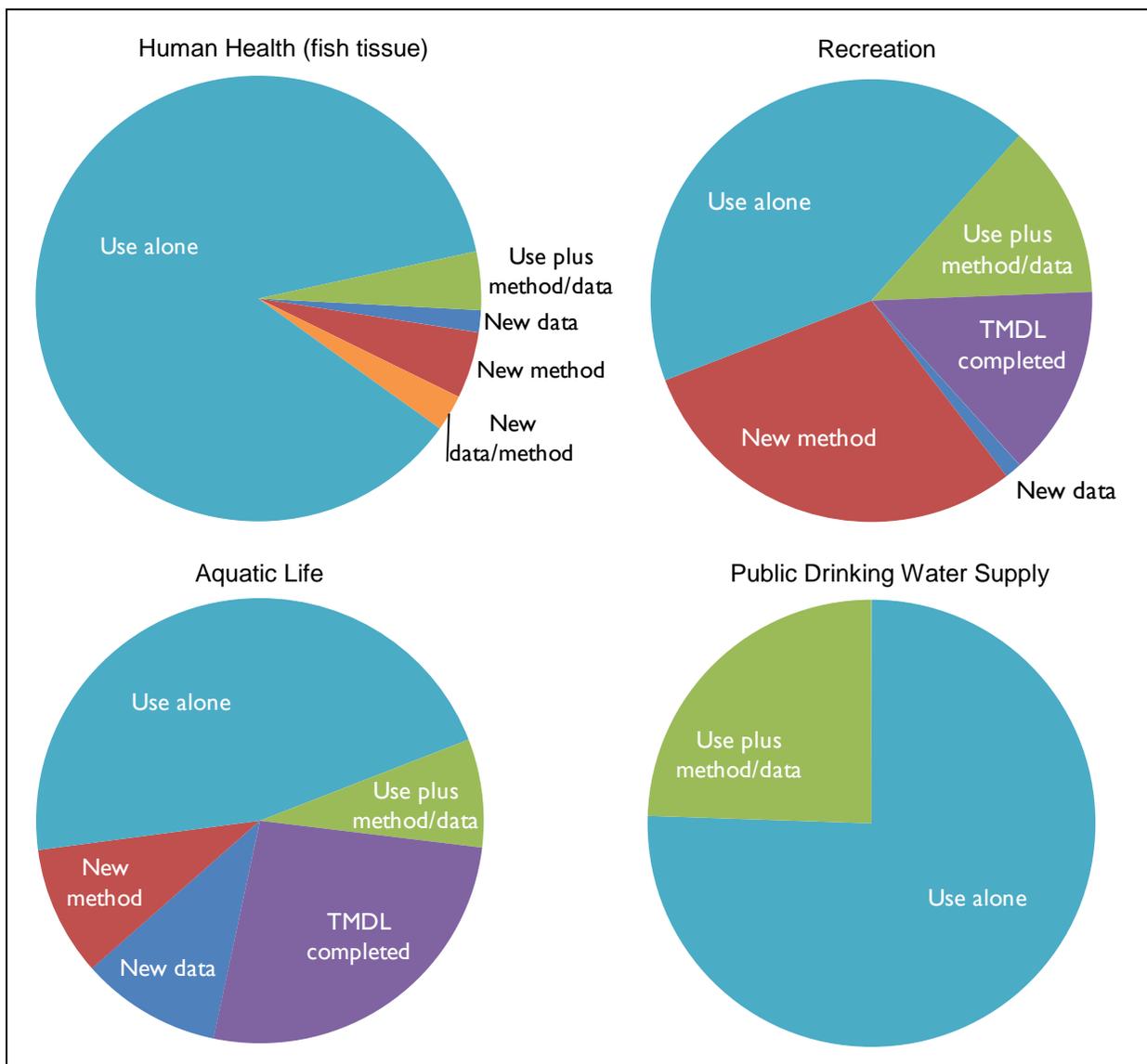


Figure A-6. Reasons for delisting of watershed assessment units, by beneficial use.

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factor. A total of 3,239 watershed assessment unit/uses are being delisted, and 124 are being added to the 303(d) list. A total of 75 large river assessment unit/uses are being delisted; two are being added (due to new data). Four assessment unit/uses are being delisted for the Lake Erie nearshore units; none is being added.

Section J presents more comparisons of 2008 and 2010 results and lays out the delisting process and results. Tables detailing the fate of each assessment unit with respect to delisting status and reason are provided in Section M.

### **A3. Water Quality Goals, Old and New**

In the early 1990s, Ohio EPA established a goal of fully attaining the designated aquatic life use 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 marks the final accounting of "80 by 2010" goal progress and introduces new 2020 goals for the aquatic life beneficial use. Goals for the other beneficial uses are being developed and will be introduced in the 2012 Integrated Report.

#### **The "80 by 2010" Aquatic Life Use Goal**

Ohio EPA evaluates the "80 by 2010" goal at three different stream sizes: the watershed assessment units, the large river assessment units, and a middle size that includes the 254 principal streams and large rivers in Ohio that drain watersheds of 50 square miles or greater. The current large river full attainment statistic now stands at 93.1%, while the average watershed score is 58.5 and the principal streams and large rivers statistic stands at 70.8% (see Figure A-7).

The significant increase in full attainment for the large rivers from the 2008 to the 2010 cycle is largely because of new 2007 and 2008 intensive assessments of the Little Miami River, Mohican River, Walhonding River, Great Miami River (upper LRAU), Licking River, and Cuyahoga River. The water quality in all of these rivers showed considerable improvement over prior surveys conducted during the mid- to late-1990s, and many more miles of full aquatic life attainment were identified. Aiding this highly positive trend was the exclusion of two large rivers (Great Miami River and the Maumee River) because available data exceeded 10 years in age and are not considered to be current. Using the most recent data from all the large rivers irrespective of age, the attainment statistic stands at 79.6%, essentially achieving the "80 by 2010" goal. Using either statistic, the "80 by 2010" goal has been met for the large river assessment units in Ohio.

Much like the large river trend, the average watershed score has steadily, but slowly, increased over the last 10 years. While the final 2010 average WAU score of 58.5 fell well short of the "80 by 2010" goal, the score has shown steady progress (about 2.5 points per reporting cycle).

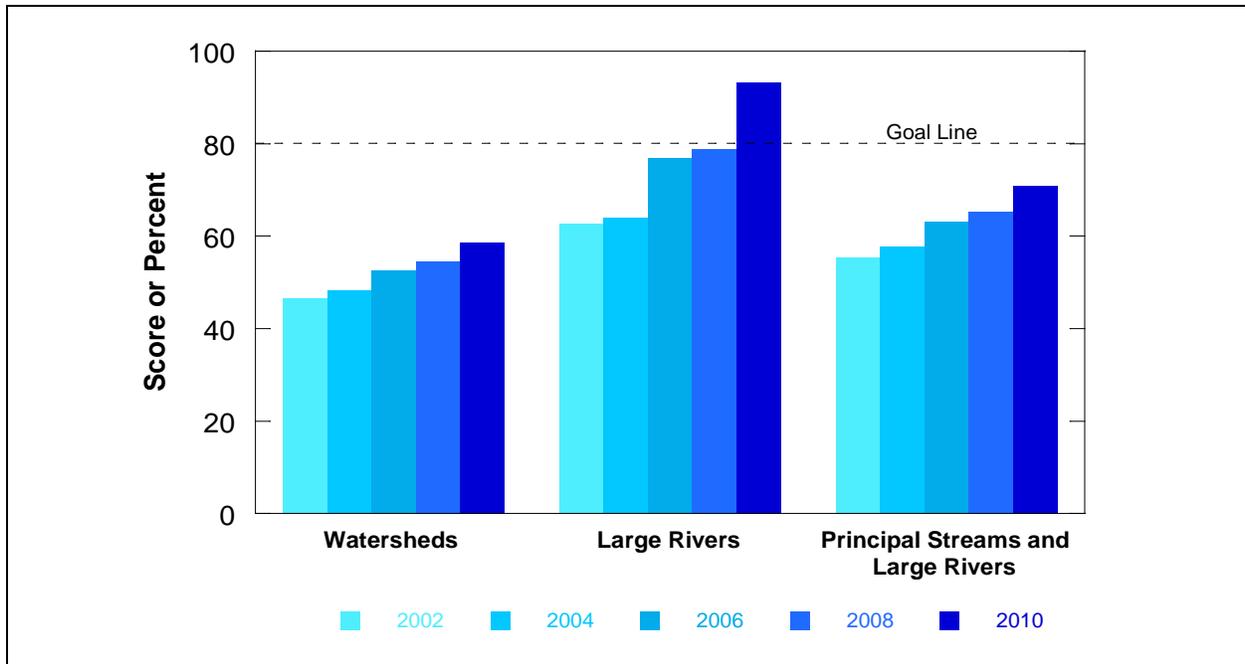


Figure A-7. Final accounting of the “80 by 2010” aquatic life use goal.

### New Goals for a New Decade

Two primary water quality aquatic life use goals for 2020 are proposed, one for large rivers and one for watersheds. Two secondary goals for the large river assessment units are to measure overall monitoring status and to redesignate the base aquatic life use (WWH) to a higher tier (EWH) in more large rivers.

#### Primary Goals

- 2020 Goal for Large River Assessment Units: 100% full aquatic life use attainment in all 38 large river assessment units / 23 rivers / 1227 river miles
  - 2010 Benchmark – 93.1% full aquatic life use attainment in 30 LRAUs covering 18 rivers and 852 river miles.
- 2020 Goal for Watershed Assessment Units: 80% full aquatic life use attainment at wading and principal stream and river sites (sites > 20 mi<sup>2</sup> and < 500 mi<sup>2</sup>)
  - 2010 Benchmark – 1,538 Ohio stream and river sites with assessments based on data collected from 1999-2008; 944 sites in full aquatic life use attainment (61.4%).

#### Secondary Goals

- 2020 Goal: Monitor and reassess all 38 LRAUs / 23 rivers between 2009 and 2018
  - 2010 Benchmark – The current 2010 IR schedule reflects monitoring and reassessment for 27 segments covering 16 rivers between 2009 and 2018.
- 2020 Goal: Designate an additional 75 miles of Warmwater Habitat (WWH) river miles to Exceptional Warmwater Habitat (EWH) river miles
  - 2010 Benchmark - Current EWH designations promulgated in 10 LRAUs covering 9 rivers and 297.48 river miles.