ILLINOIS INTEGRATED WATER QUALITY REPORT AND SECTION 303(d) LIST, 2016

Clean Water Act Sections 303(d), 305(b) and 314

Water Resource Assessment Information and List of Impaired Waters

Volume I: Surface Water

July 2016

Illinois Environmental Protection Agency
Bureau of Water

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

PART A. INTRODUCTION 6

A-1. Reporting Requirements 6

A-2. Major Changes from Previous Reports 8

A-3. Primary Data Sources, Data Quality and Time Periods Covered 9
Data Used for this Assessment Cycle 9
Solicitation of Information 10

PART B. BACKGROUND 11

B-1. Total Surface Waters 11

B-2. Surface Water Pollution Control Program 13
Illinois Surface-Water Quality Standards 13
Narrative Standards and Antidegradation Regulations 16
Derived Water Quality Criteria 16

B-3. Cost/Benefit Assessment 16
Cost of Pollution Control and Water Protection Activities 17
General Surface Water Improvements 17

PART C. SURFACE-WATER MONITORING AND ASSESSMENT 18

C-1. Monitoring Program 18

C-2. Assessment Methodology 20
Water Body Segments 20
Levels of Use Support 21
Aquatic Life – Streams 21
Aquatic Life – Freshwater Lakes 31
Aquatic Life – Lake Michigan 37
Indigenous Aquatic Life 40
Fish Consumption – Streams, Freshwater Lakes and Lake Michigan 43
Primary Contact – Streams and Freshwater Lakes 48
Primary Contact – Lake Michigan Open Waters and Shoreline Waters 50
Secondary Contact – Streams, Freshwater Lakes and Lake Michigan 52

Public and Food Processing Water Supply – Streams, Freshwater Lakes and Lake Michigan 52
Aesthetic Quality – Streams: 58
Aesthetic Quality – Freshwater Lakes 59
Aesthetic Quality – Lake Michigan Open Waters 63
Aesthetic Quality – Lake Michigan Harbors and Shoreline Waters 65
Identifying Potential Sources of Impairment for All Uses and Water Body Types 67

C-3. Assessment Results 70
Five-Part Categorization of Surface Waters 70
Section 303(d) List 71
Prioritization of the Illinois Section 303(d) List 72
Scheduling of TMDL Development 72
Removal of Waters on Illinois' 2012 Section 303(d) List 73
TMDL Development and Implementation Status 76
Statewide Summary of Designated Use Support 78
Streams 78
Freshwater Lakes 82
Lake Michigan 86

C-4. Wetlands Condition Assessment 89

C-5. Public Health Issues 105

PART D. PUBLIC PARTICIPATION 107

REFERENCES 108

VOLUME I APPENDICES:

APPENDIX A – Illinois' 2016 303(d) List and TMDL Information

Appendix A-1: Illinois' 2016 303(d) List and Prioritization

Appendix A-2: Illinois' 2016 303(d) List, Sorted Alphabetically by Water Body Name

Appendix A-3: Illinois' Two-Year Schedule for TMDL Development, 2016 – 2018

Appendix A-4: Segments/Causes removed from Illinois' 2012 Section 303(d) List

Appendix A-5: 2016 303(d) Listed Waters Maps

Appendix A-6: Status of TMDL Development in Illinois

Appendix A-7: Illinois EPA Projects in TMDL Watersheds

Appendix A-8: Illinois Waters in Category 4C (Impairment not caused by pollutants).

APPENDIX B – Water Body-Specific Assessment Information for Illinois, 2016

Appendix B-1: Figure 1. Illinois EPA Basins

Appendix B-2: Specific Assessment Information for Streams, 2016

Appendix B-3: Specific Assessment Information for Freshwater Lakes, 2016

Appendix B-4: Specific Assessment Information for Lake Michigan Open Waters, Harbors, and Shoreline Waters, 2016

APPENDIX C – Statewide Resource-Quality Summary for Significant Publicly Owned Lakes

APPENDIX D – Changes in Assessment Unit IDs between 2014 and 2016

APPENDIX E - Form for Evaluating Compliance with Offensive Conditions

APPENDIX F – Illinois' TMDL Vision

APPENDIX G – Responsiveness Summary

EXECUTIVE SUMMARY

The Integrated Report format is based on federal guidance for meeting the requirements of Sections 305(b), 303(d) and 314 of the Clean Water Act. The 2016 Integrated Report is divided into two volumes: Volume I covering surface water and Volume II covering groundwater.

The basic purpose of this report (Volume I) is to provide information to the federal government and the citizens of Illinois on the condition of surface water in the state. This information is provided in detail in the appendices and is summarized in Section C-3.

Streams

For this 2016 cycle report, 18,056 stream miles, or 15.0 percent of the total 119,244 stream miles in Illinois have been assessed for at least one designated use. Overall, the percent of stream miles assessed has remained relatively consistent over the last eight cycles – about 13 to 15 percent.

The degree of support of a designated use in a particular stream segment is determined by an analysis of various types of information, including biological, physicochemical, physical habitat, and toxicity data. When sufficient data are available, each applicable designated use in each segment is assessed as Fully Supporting (good), Not Supporting (fair), or Not Supporting (poor). Waters in which at least one applicable use is not fully supported are called "impaired."

A comparison of the percent of stream miles assessed as good, fair and poor for each use in 2014 versus 2016 are shown below in Table ES-1. The percent of stream miles rated Fully Supporting (good) for *aquatic life* use decreased slightly from to 60.8 percent in 2014 to 57.8 percent in the 2016 reporting cycle. Although only 9.6 percent of Illinois stream miles were assessed for *aesthetic quality* use in 2016, 96.1 percent of assessed miles were considered Fully Supporting (good). There was a slight increase in the percent of stream miles rated as Fully Supporting (good) for *indigenous aquatic life* use and *public and food processing water supply* use. There was also a slight decrease in the percent of stream miles assessed as Fully Supporting (good) for *primary contact* use. No new data were available this cycle to update assessments of *fish consumption* use in streams, inland lakes or Lake Michigan.

Slight differences in assessment numbers may be attributable to random changes or differences in how and where *aquatic life* use assessments were performed between the 2014 and 2016 cycles. For example, given that many *aquatic life* use assessments in streams are updated on a five-year cycle, it is possible that statewide comparisons at any shorter time period (e.g., between each consecutive reporting cycle) actually reflect the regional subset of waters most recently updated rather than a statewide pattern. Also, it is possible that improvements in assessment information, methods or stream mile calculations contribute to year-to-year differences.

For Illinois streams, the major potential causes of impairment, based on number of miles affected, are: fecal coliform bacteria impairing *primary contact* use (e.g., swimming, water skiing); mercury and polychlorinated biphenyls (PCBs) in fish tissue impairing *fish consumption* use; low dissolved oxygen, phosphorus, excessive siltation, physical-habitat alterations, and total suspended solids impairing *aquatic life* use; and, atrazine, iron and nitrate impairing *public and food processing water supply* use (Tables C-35 and C-45). Important potential sources of

impairment include atmospheric deposition of toxics, agriculture, hydromodification such as channelization, municipal point sources, and urban runoff/storm sewers (Table C-36).

Table ES-1. Percent of Illinois Stream Miles Assessed as Good, Fair and Poor in 2016 compared to 2014

Designated Use	Miles Assessed	Percent Assessed	Percent Fully Supporting (Good) (2)		Percent Not Supporting (Fair) (2)		Percent Not Supporting (Poor) (2)		Percent Not Assessed	
Year:	2016	2016	2014	2016	2014	2016	2014	2016	2014	2016
Aesthetic Quality	11,475	9.6	95.4	96.1	0.0	0.0	4.6	3.9	94.4	90.4
Aquatic Life	17,783	14.9	60.8	57.8	34.0	37.3	5.2	4.9	85.4	85.1
Fish Consumption	4,170	3.5	0.0	0.0	93.4	93.3	6.6	6.7	96.5	96.5
Indigenous Aquatic Life	90	100.0	13.9	15.1	23.1	20.9	62.9	63.9	0.0	0.0
Primary Contact	4,492	3.8	18.6	16.8	29.5	32.8	51.9	50.4	96.2	96.2
Public and Food Processing Water Supply	924	100.0	63.6	65.2	36.4	34.8	0.0	0.0	0.0	0.0
Secondary Contact(1)	753	0.6	100.0	100.0	--	--	--	--	99.3	99.4

Note: Numbers and percentages may not add up due to slight rounding errors.

1. Assessment guidelines are not yet fully developed; see section C-2 Assessment Methodology. By definition, Secondary Contact Use is "Fully Supporting" in all waters in which Primary Contact Use is "Fully Supporting.
2. Percentages of Good, Fair and Poor indicate the percent of miles assessed.

Freshwater Lakes

For this 2016 cycle report, a total of 151,435 lake acres were assessed for at least one designated use. This represents 47.5 percent of total lake and pond acreage (318,477) in the state. Overall, the percent of lake acres assessed has remained relatively consistent over the last ten cycles – about 46 to 49 percent.

As with streams, each lake is assessed as Fully Supporting (good), Not Supporting (fair), or Not Supporting (poor) for each applicable designated use. A comparison of the percent of lakes (acres and numbers) assessed as good, fair and poor for each use in 2014 versus 2016 are shown below in Table ES-2. Of the 145,648 lake acres assessed for *aquatic life* use in 2016, 90.8 percent were rated as Fully Supporting as compared to 92.2 percent rated as Fully Supporting in 2014. There was a slight increase in the percent of lake acres assessed as Fully Supporting (good) for aesthetic quality use from 10.6% in 2014 to 10.7% in 2016. There was also a slight increase in the lake acres rated Fully Supporting (good) for *public and food processing water supply* use in 2016 (93.0%) compared to 2014 (90.1%). No new data were available this cycle to update assessments of *fish consumption* use in streams or lakes.

Table ES-2. Percent of Illinois Lakes Assessed as Good, Fair and Poor in 2016 compared to 2014

Designated Use[1]	Statewide Acres Designated[1]	Acres Assessed	Percent of Assessed Acres as Fully Supporting (Good)		Percent of Assessed Acres as Not Supporting (Fair)		Percent of Assessed Acres as Not Supporting (Poor)		Percent of Statewide Acres Not Assessed		Percent of Statewide Acres as Insufficient Information	
Year:	**2016**	**2016**	**2014**	**2016**	**2014**	**2016**	**2014**	**2016**	**2014**	**2016**	**2014**	**2016**
Aesthetic Quality	318,477	145,690	10.6	10.7	82.4	71.4	7.0	17.9	52.4	52.3	2.1	2.0
Aquatic Life	316,877	145,648	92.2	90.9	7.8	9.1	0.0	0.0	52.4	52.0	2.1	2.0
Fish Consumption	318,477	93,103	7.4	7.4	92.0	92.0	0.6	0.6	70.8	70.8	0.0	0.0
Indigenous Aquatic Life	1,600	1,600	100	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Primary Contact	316,877	1,814	60.2	60.2	39.8	39.8	0.0	0.0	99.4	99.4	0.0	0.0
Public and Food Processing Water Supply	74,709	74,536	90.1	93.0	9.9	7.0	0.0	0.0	0.2	0.2	0.0	0.0
Secondary Contact[2]	318,477	1,092	100	100.0	--	--	--	--	99.7	99.7	0.0	0.0
Designated Use[1]	**Number of Lakes Assessed**	**Percent of Statewide Lakes Assessed**	**Percent of Assessed Lakes Fully Supporting (Good)**		**Percent of Assessed Lakes Not Supporting (Fair)**		**Percent of Assessed Lakes Not Supporting (Poor)**		**Percent of Statewide Lakes Not Assessed**		**Percent of Statewide Lakes as Insufficient Information**	
Year:	**2016**	**2016**	**2014**	**2016**	**2014**	**2016**	**2014**	**2016**	**2014**	**2016**	**2014**	**2016**
Aesthetic Quality	375	0.4	15.9	16.0	73.4	71.5	10.7	12.5	99.6	99.5	0.1	0.1
Aquatic Life	374	0.4	91.0	90.6	8.7	9.1	0.3	0.3	99.6	99.5	0.1	0.1
Fish Consumption	133	0.1	1.5	1.5	96.2	96.2	2.3	2.3	99.9	99.9	0.0	0.0
Indigenous Aquatic Life	1	100.0	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Primary Contact	15	0.0	46.7	46.7	53.3	53.3	0.0	0.0	100.0	100.0	0.0	0.0
Public and Food Processing Water Supply	65	97.0	71.2	83.1	28.8	16.9	0.0	0.0	2.7	3.0	0.0	0.0
Secondary Contact[2]	7	0.0	100.0	100.0	--	--	--	--	100.0	100.0	0.0	0.0

Note: Numbers and percentages may not add up due to slight rounding errors.
1. Statewide, in the time period covered by this summary, Illinois had 91,456 lakes and ponds designated for general uses, one lake designated for Indigenous Aquatic Life Use, and 67 lakes designated for Public and Food Processing Water Supply Use.
2. By definition, Secondary Contact Use is "Fully Supporting" in all waters in which Primary Contact Use is "Fully Supporting."

The major potential causes of impairment based on number of lake acres affected are total suspended solids, phosphorus (total), low dissolved oxygen, and aquatic algae, impairing *aquatic life* and *aesthetic quality* uses; nitrate and manganese impairing *public and food processing water supply use*; and, mercury and polychlorinated biphenyls (PCBs) in fish tissue impairing *fish consumption* use (Tables C-38 and C-45). Important potential sources of impairment include agriculture, littoral and shoreline modifications, runoff from forest/grassland/parkland, other recreational pollution sources, atmospheric deposition of toxics, and urban runoff/storm sewers (Table C-39).

Lake Michigan

The State of Illinois has jurisdiction over, and assesses the quality of three Lake Michigan water types: Lake Michigan Open Waters, Lake Michigan Shoreline and Lake Michigan Harbors, all bordering Cook and Lake Counties in the northeastern corner of the state.

For assessments in Lake Michigan Open Waters, Illinois EPA uses data collected from the Lake Michigan Monitoring Program nearshore component. A single assessment unit is bounded by the Wisconsin-Illinois border to the North, the Indiana-Illinois border to the South, the shoreline to the West, and 5km offshore to the East. This nearshore assessment unit contains a total of 196 square miles of Lake Michigan Open Water, which represents about 12.8% of the approximately 1,526 square miles of Lake Michigan waters in Illinois. The remaining 1,330 square miles in Illinois's jurisdiction are currently unassessed.

The Lake Michigan Shoreline is comprised of 51 assessment units which span the entire 64 miles of contiguous Illinois Lake Michigan shoreline (excluding harbors and harbor entrances). The Lake Michigan Shoreline is assessed for *primary contact* use using beach closure data collected at beaches within the 51 assessment units, in Lake and Cook counties. The closures are determined from *E. coli* bacteria samples collected by municipal and county agencies that manage the beaches.

For assessments in Lake Michigan Harbors, Illinois EPA uses data collected from the Lake Michigan Monitoring Program harbor component. Currently, four of the 13 harbors along Illinois' Lake Michigan coastline are assessed. Additional harbors may be assessed in future years, as more data becomes available.

A summary of use-support for all Lake Michigan-basin waters and uses is shown below in Table ES-3. The entire 196 square miles of assessed Lake Michigan open waters were rated as Fully Supporting for the following uses: *aquatic life*, *primary contact* (e.g., swimming, water skiing), *secondary contact*, and *public and food processing water supply*. However, *fish consumption* use in the Illinois portion of Lake Michigan is assessed as Not Supporting (Poor) due to contamination from polychlorinated biphenyls (PCBs) and mercury. Also, *aesthetic quality* use in Lake Michigan open waters was assessed as Not Supporting due to exceedances of the Lake Michigan open water standard for total phosphorus. These exceedances of the water quality standard for total phosphorus in the open waters of Lake Michigan do not necessarily indicate that there are offensive conditions in the lake due to unnatural aquatic plant or algal growth. In addition, 5.5 miles of Lake Michigan shoreline in Illinois were assessed as Fully Supporting (good) for *primary contact* use while the remaining 58.6 miles were assessed as Not Supporting (poor) due to contamination from *Escherichia coli* bacteria. This is the first cycle since 2004 that any Lake Michigan shoreline segments have been assessed as Fully Supporting *primary contact* use.

Table ES-3. Statewide Individual Use-Support Summary for Lake Michigan-Basin Waters, 2016

Lake Michigan Harbors; Units: Square Miles

Designated Use	Total Size	Total Assessed		Size Fully Supporting (Good)	Size Not Supporting (Fair)	Size Not Supporting (Poor)	Size Not Assessed
		Size	%				
Aesthetic Quality	3.88	0.18	4.6	0.12	0	0.06	3.70
Aquatic Life	3.88	3.88	100	3.82	0	0.06	0.00
Fish Consumption	3.88	2.62	67.5	0	0	2.62	1.26
Primary Contact	3.88	0	0	0	0	0	3.88
Secondary Contact(1)	3.88	0	0	0	0	0	3.88

Lake Michigan Open Water; Units: Square Miles

Designated Use	Total Size	Total Assessed		Size Fully Supporting (Good)	Size Not Supporting (Fair)	Size Not Supporting (Poor)	Size Not Assessed
		Size	%				
Aesthetic Quality	1,526	196	12.8	0	0	196	1,330
Aquatic Life	1,526	196	12.8	196	0	0	1,330
Fish Consumption	1,526	196	12.8	0	0	196	1,330
Primary Contact	1,526	196	12.8	196	0	0	1,330
Public and Food Processing Water Supplies	196	196	100	196	0	0	0
Secondary Contact(1)	1,526	196	12.8	196 (2)	0(2)	0(2)	1,330

Lake Michigan Shoreline; Units: Miles

Designated Use	Total Size	Total Assessed		Size Fully Supporting (Good)	Size Not Supporting (Fair)	Size Not Supporting (Poor)	Size Not Assessed
		Size	%				
Aesthetic Quality	64	0	0.0	0	0	0	64
Aquatic Life	64	0	0.0	0	0	0	64
Fish Consumption	64	64	100	0	0	64	0
Primary Contact	64	64	100	5.5	0	58.5	0
Secondary Contact(1)	64	5.5	8.6	5.5	0	0	58.5

1. .Illinois has jurisdiction over 1,526 square miles of Lake Michigan open water, and 64 miles of Lake Michigan shoreline, which are covered under the Lake Michigan Basin Water Quality Standards. Also, 196 square miles of Lake Michigan are designated for Public and Food Processing Water Supply Use.

2. By definition, Secondary Contact Use is "Fully Supporting" in all waters in which Primary Contact Use is "Fully Supporting."

PART A: INTRODUCTION

A-1. Reporting Requirements

The 2016 Integrated Report is primarily based on guidance from the U. S. Environmental Protection Agency (USEPA) and is intended to satisfy, in a single report, the requirements of sections 305(b), 303(d) and 314 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and subsequent amendments (hereafter, collectively called the "Clean Water Act" or "CWA"). Illinois' Integrated Report is divided into two volumes: Volume I covering surface water and Volume II covering groundwater.

According to Section 305(b) of the Clean Water Act, each state, territory, tribe, and interstate commission (hereafter collectively called "state") must submit to USEPA "a report which shall include—

(A) a description of the water quality of all navigable waters in such State during the preceding year;

(B) an analysis of the extent to which all navigable waters of such State provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water;

(C) an analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality which provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water, have been or will be achieved by the requirements of this Act, together with recommendations as to additional action necessary to achieve such objectives and for what waters such additional action is necessary;

(D) an estimate of (i) the environmental impact, (ii) the economic and social costs necessary to achieve the objective of this Act in such State, (iii) the economic and social benefits of such achievement, and (iv) an estimate of the date of such achievement; and

(E) a description of the nature and extent of nonpoint sources of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the costs of implementing such programs."

Illinois EPA Reports the resource quality of its waters in terms of the degree to which the beneficial uses[1] of those waters are supported and the reasons (causes and sources) beneficial uses may not be supported. In addition, states are required to provide an assessment of the water quality of all publicly owned lakes, including the status and trends of such water quality as specified in Section 314(a)(1) of the Clean Water Act.

Section 303(d) of the Clean Water Act and corresponding regulations in Title 40 of the Code of Federal Regulations, require states to:

[1] Beneficial uses, also called designated uses, are discussed in more detail in Section B-2 Water Pollution Control Program, Illinois Surface Water Quality Standards.

- Identify water quality-limited waters where effluent limitations and other pollution control requirements are not sufficient to implement any water quality standard;
- Identify pollutants causing or expected to cause water quality standards violations in those waters;
- Establish a priority ranking for the development of Total Maximum Daily Load[2] (TMDL) calculations including waters targeted for TMDL development within the next two years; and,
- Establish TMDLs for all pollutants preventing or expected to prevent the attainment of water quality standards.

This list of water quality limited waters is referred to as the "303(d) List" in this report.

The Integrated Report process has two major phases corresponding to the requirements noted above. In the first phase use support assessments are conducted for all waters and all designated uses for which data are available to make assessments. As part of that process all potential causes (both "pollutant" and "nonpollutant" causes) and potential sources of impairment are identified. These assessment results, which include all use support assessments and all potential causes and potential sources of use impairment for all assessed waters, are shown in Appendices B-2, B-3 and B-4.

The next phase involves categorizing waters based on whether any uses are impaired, whether pollutant or nonpollutant causes are identified and whether or not a TMDL is required. **A subset of all assessed waters and causes of impairment is identified as the 303(d) List (Appendices A-1 and A-2)**. It includes only those waters which have uses that are impaired by pollutants and which require a TMDL. Each entry on the 303(d) List is a unique combination of a water body segment (also known as an assessment unit[3]) and pollutant cause of impairment that requires a separate loading calculation. Also, as part of this second phase, each assessment unit-pollutant combination on the 303(d) List is prioritized for TMDL development and a two-year schedule for TMDL development is created. TMDLs are only conducted for causes of impairment which are classified as pollutants such as metals or pesticides. Nonpollutant causes of impairment such as habitat degradation are not a component of Illinois' 303(d) List submission.

The distinction between "pollutant" and "nonpollutants" is critical in this process. Section 502(6) of the Clean Water Act, defines a pollutant as *"dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water."* In general, pollutants are substances, chemicals, materials or wastes and their components that are discharged into the water. Pollution, as defined by the Clean Water Act Section 502(19), is *''the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of a water body.''* This is a broad term that encompasses many types of changes to a water body, including alterations that do not result from the introduction of a specific pollutant or the presence of pollutants at a level that causes impairment. In other words, all waters impaired by human

[2] Total Maximum Daily Load calculations determine the amount of a pollutant a water body can assimilate without exceeding the state's water quality standards or impairing the water body's designated uses.
[3] A lake, a stream segment, or an open-water area, harbor or shoreline segment of Lake Michigan for which a use attainment assessment is made.

intervention suffer from some form of pollution. In some cases, the pollution is caused by the presence of a pollutant, and a TMDL is required. For assessment purposes, Illinois EPA classifies almost all causes of impairment as pollutants. The classification of each cause of impairment is shown in the guidelines for identifying potential causes of impairment related to each use. Some nonpollutant causes may in turn be caused by pollutants. Whenever nonpollutant causes are identified we attempt to determine if pollutants are ultimately responsible for the impairment, and what those pollutants are.

While pollutant causes of impairment are addressed by Illinois EPA's TMDL program, nonpollutant causes are addressed by other agency programs such as Clean Water Act Section 319 grants for nonpoint source pollution control activities and other grant programs.

To the extent possible, the 2016 Illinois Integrated Report is based on USEPA's *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* issued July 29, 2005 and additional guidance contained in USEPA memorandums from the Office of Wetlands, Oceans and Watersheds regarding Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions.

A-2. Major Changes from Previous Report Methodology and Format

For this cycle *aesthetic quality* use has been associated with waters covered under the Secondary Contact and Indigenous Aquatic Life standards. Where sufficient data were available, assessments of *aesthetic quality* use have been made for these waters, based on compliance with the narrative standard in 35 Ill. Adm. Code 302.403.

No other significant changes have been made to the methodology used in the previous (2014) Integrated Report.

A-3. Primary Data Sources, Data Quality and Time Periods Covered

Data Used for This Assessment Cycle

Surface water assessments in this 2016 report are based primarily on biological, water, physical habitat, and fish-tissue information collected through 2013 from various monitoring programs (Illinois EPA 2014). These programs include: the Ambient Water Quality Monitoring Network, Intensive Basin Surveys, Facility-Related Stream Surveys, the Fish Contaminant Monitoring Program, the Ambient Lake Monitoring Program, the Illinois Clean Lakes Monitoring Program, the Volunteer Lake Monitoring Program, the Lake Michigan Monitoring Program, TMDL monitoring and other outside sources. Use attainment was updated for surface waters where sufficient new information became available. In addition, assessments were updated when errors were discovered in previous assessments. Older assessments are based on the most recent data available, which, in some cases, may be over 15 years old. Although the Intensive Basin Monitoring program generally revisits each major basin in the state on a five year basis, limited state resources make it impossible to monitor all water bodies in each basin every five years.

In 2016, stream assessments of *aquatic life* use and *aesthetic quality* use, which rely primarily on data from Intensive Basin Surveys, were updated for stream segments in these basins: Pecatonica River, Fox River, La Moine River, Kaskaskia River, Shoal Creek, Little Wabash River, Rock River, Des Plaines River, Sangamon River, South Fork Sangamon River, Salt Creek, and the Big Muddy River basins. These basins were sampled in 2012 and 2013. In a few cases, where other data were available for waters outside these basins, we used those data to update assessments as well. Water chemistry data from the Ambient Water Quality Monitoring Network from 2011 through 2013 were also used in some of those assessments. Some assessments of *aquatic life* use in streams were updated based on Facility-Related Stream Survey data from 2012 and 2013.

All use attainment assessments on Lake Michigan were updated with Lake Michigan Monitoring Program data through 2013.

Assessments of *indigenous aquatic life* use in streams were updated in this cycle using water data from 2012 and 2013 from various sources. *Indigenous aquatic life* use was not updated this cycle for Lake Calumet because no new data were available.

Assessments of *primary contact* use and *secondary contact* use in streams were updated with Ambient Water Quality Monitoring Network data from 2009 through 2013. Because there were no new fecal coliform samples collected in lakes since the last report, no new assessments of *primary contact* use or *secondary contact* use were made for freshwater lakes.

Assessments of *fish consumption* use were not updated in this cycle because no new data were available.

Aquatic life use and *aesthetic quality* use in lakes were updated with Ambient Lake Monitoring Program and Illinois Clean Lakes Monitoring Program data from 2012 and 2013.

Public and food processing water supply use in streams was updated from a variety of data sources covering a period of 2010 through 2013. *Public and food processing water supply* use assessments in freshwater lakes were updated using data from a variety of sources from 2011 through 2013.

Non-agency data sources such as the Illinois Department of Natural Resources, the Lake County Health Department, the Metropolitan Water Reclamation District of Greater Chicago, the U.S. Geological Survey, TMDL contractors and others are considered and may be used for the assessment of various uses and water bodies.

Solicitation of Information

For assessing Illinois surface waters, Illinois EPA routinely considers data from two outside sources including: biological data (from streams) collected by the Illinois Department of Natural Resources as part of the cooperative Intensive Basin Survey program and physicochemical water data provided by the Lake County Public Health Department (freshwater lake data). We also retrieve data from the United States Geological Survey's Long Term Resource Monitoring Program (*http://www.umesc.usgs.gov*) that focuses on the Upper Mississippi River and from the Survey's National Stream Water Quality Network monitoring program (*http://nwis.waterdata.usgs.gov*) for use in assessments.

On May 21, 2014, Illinois EPA updated the "*Guidance for Submission of Surface Water Data For Consideration in Preparing the 2016 Integrated Report on Illinois Water Quality, including the List of Clean Water Act Section 303(d) Impaired Waters*" and associated data-solicitation information on the Illinois Environmental Protection Agency website (*www.epa.state.il.us/water/water-quality/guidance.html*). The guidance describes the required format for data packages and associated quality assurance documentation and provides instructions on how and when (by August 15, 2014) to submit data for consideration for assessments in this report.

Data sets and other information were received from three external organizations: 1) the Illinois State Water Survey – Fox River Study Group (Fox River water quality data); 2) the Illinois State Water Survey (Fox River Study Group monitoring and low flow dissolved oxygen monitoring; monitoring for Phase 1 TMDL development for Canton Lake, Vermont City Reservoir, and Sugar Creek watersheds; and Upper Des Plaines River monitoring) and 3) the Metropolitan Water Reclamation District of Greater Chicago (ambient water quality monitoring data). No other data sets and other information were received by the August 15, 2014, deadline.

All submitted data met Illinois EPA Quality Assurance/Quality Control requirements and were evaluated and considered for assessments in this report.

PART B: BACKGROUND INFORMATION

B-1. Total Surface Waters

Illinois has abundant water resources (Table B-1). The U. S. Geological Survey's National Hydrography Dataset (NHD 1:24,000 scale) shows approximately 119,244 miles of streams within the state's borders, including major rivers such as the Big Muddy, Cache, Des Plaines, Embarras, Fox, Illinois, Kankakee, Kaskaskia, Little Wabash, Rock, Sangamon, and Vermilion rivers. In addition, the NHD shows 911 miles of large rivers forming the state's western (Mississippi River), eastern (in part, Wabash River), and southern (Ohio River) borders. Throughout this document, we refer to all flowing waters of all sizes as streams.

More than 91,400 freshwater lakes and ponds exist in Illinois, 3,256 of which have a surface area of six acres or more (Illinois Department of Natural Resources 1999). The term freshwater lake is used for any Illinois lake other than Lake Michigan and its harbors. About three-fourths of Illinois' freshwater lakes are man-made, including dammed stream and side-channel impoundments, strip-mine lakes, borrow pits, and other excavated lakes. Natural lakes include glacial lakes in the northeastern counties, sinkhole ponds in the southwest, and oxbow and backwater lakes along major rivers.

Illinois is bordered by one of the Great Lakes, Lake Michigan. The state has jurisdiction over approximately 1,526 square miles of Lake Michigan open water and 64 miles of Lake Michigan shoreline, bordering Cook and Lake counties in the northeastern corner of the state. Lake Michigan is the third largest of the Great Lakes and is the largest body of fresh water located entirely within the boundaries of the United States. With the exception of the polar ice caps, the Great Lakes form the largest freshwater system on earth.

Table B-1. Illinois Atlas.

Topic	Value	Scale	Source
State Population in year 2010	12,830,632		US Census Bureau
State Surface Area (sq. mi.)	56,250		
Major Watersheds	33		USGS
Total Stream Miles	119,244	1:24,000	NHD
Interior Stream Miles	118,333	1:24,000	NHD
Perennial Streams	25,019	1:24,000	NHD
Intermittent Streams	78,245	1:24,000	NHD
Ditches and Canals	3676	1:24,000	NHD
Other	11,393	1:24,000	NHD
Border Stream Miles	911	1:24,000	NHD
Mississippi River	582	1:24,000	NHD
Ohio River	131	1:24,000	NHD
Wabash River	198	1:24,000	NHD
Freshwater Lakes and Ponds	91,456	(1)	(1)
Total Acreage	318,477	(1)	(1)
Total Freshwater Lakes (6 acres and more)	3,256	(1)	(1)
Total Freshwater Lake Acreage (6 acres and more)	253,224	(1)	(1)
Publicly Owned Freshwater Lakes	1,279	(1)	(1)
Publicly Owned Lake Acreage	154,333	(1)	(1)
Freshwater Lakes over 5,000 Acres	4	(1)	(1)
Acreage of Freshwater Lakes over 5,000 Acres	61,545	(1)	(1)
Lake Michigan		(1)	(1)
Illinois Shoreline Miles[2]	63.95	1:24,000	NHD
Illinois Square Miles	1,526	(1)	(1)
Total Shallow Water Wetlands Acreage	720,000	(1)	(1)

NHD = National Hydrography Dataset

1. 1999 Inventory of Illinois Surface Water Resources, Illinois Department of Natural Resources, Division of Fisheries, April 2000.
2. The length of Lake Michigan Shoreline Segments were recalculated in 2014 based on the high resolution (1:24,000 scale) NHD (see Appendix D).

B-2. Surface Water Pollution Control Program

Illinois Surface Water Quality Standards

Water pollution control programs are designed to protect the beneficial uses of the water resources of the state. Each state has the responsibility to set water quality standards that protect these beneficial uses, also called "designated uses." Illinois waters are designated for various uses including aquatic life, wildlife, agricultural use, primary contact (e.g., swimming, water skiing), secondary contact (e.g., boating, fishing), industrial use, public and food-processing water supply, and aesthetic quality. Illinois' water quality standards provide the basis for assessing whether the beneficial uses of the state's waters are being attained.

The Illinois Pollution Control Board is responsible for setting water quality standards to protect designated uses. The Illinois EPA is responsible for developing scientifically based water quality standards and proposing them to the Illinois Pollution Control Board for adoption into state rules and regulations. The federal Clean Water Act requires the states to review and update water quality standards every three years. Illinois EPA, in conjunction with USEPA, identifies and prioritizes those standards to be developed or revised during this three-year period.

The Illinois Pollution Control Board has established four primary sets (or categories) of narrative and numeric water quality standards for surface waters. The standards are available at the Pollutions Control Board website: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx. Each set of standards is intended to help protect various designated uses established for each category (Table B-2).

- *General Use Standards* (35 Ill. Adm. Code Part 302, Subpart B) - These standards apply to almost all waters of the state and are intended to protect aquatic life, wildlife, agricultural, primary contact, secondary contact, and most industrial uses. *Primary contact* use is defined as "*any recreational or other water use in which there is prolonged and intimate contact with the water* [where the physical configuration of the water body permits it] *involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing*" (35 Ill. Adm. Code 301.355). Secondary contact is "*any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, commercial and recreational boating, and any limited contact incident to shoreline activity*" (35 Ill. Adm. Code 301. 380). These General Use standards are also designed to ensure the aesthetic quality of the state's aquatic environment and to protect human health from disease or other harmful effects that could occur from ingesting aquatic organisms taken from surface waters of the state.

- *Public and Food Processing Water Supply Standards* (35 Ill. Adm. Code Part 302, Subpart C) - These standards protect surface waters of the state for human consumption or for processing of food products intended for human consumption. These standards apply at any point at which water is withdrawn for treatment and distribution as a potable water supply or for food processing.

- *Secondary Contact and Indigenous Aquatic Life Standards* (35 Ill. Adm. Code 302, Subpart D) - These standards are intended to protect limited uses in waters not suited for general use activities. Secondary Contact and Indigenous Aquatic Life standards apply only to waters in which the General Use Standards and the Public and Food Processing Water Supply Standards do not apply. The Secondary Contact and Indigenous Aquatic Life Standards currently apply to portions of the Chicago, Calumet, and Lower Des Plaines river drainages that were altered—in various stages during the mid 1800s into the mid 1900s—to promote commercial navigation and to eliminate untreated sewage from flowing into Lake Michigan. These waters remain impacted by hydromodification, alteration in flow, and-storm-water and wastewater discharges from the urban development of the Chicago area. In the early 1970s, it was believed that these waters could not meet the interim goals of the Clean Water Act. Since the adoption of the Secondary Contact and Indigenous Aquatic Life Standards in the 1970s, water quality has improved, which has generated consideration for revising the applicable uses and standards. Two Use Attainability Analyses (UAA) were conducted: one on the lower Des Plaines River (AquaNova International, Ltd. and Hey & Associates, Inc. 2003), and one on the Chicago Area Waterway System (Camp, Dresser and McKee 2007). The main purpose of the UAAs was to determine the potential of these waters with respect to the aquatic-life and human-contact goals of the Clean Water Act. Using the two UAAs and other information, Illinois EPA filed (in October 2007) a proposal-with the Illinois Pollution Control Board to revise the uses and water-quality standards for these waters. The complete proposal can be found on the Illinois Pollution Control Board website at http://www.ipcb.state.il.us/documents/dsweb/Get/Document-59147/. Some aspects of this rulemaking are still pending.

- *Lake Michigan Basin Water Quality Standards* (35 Ill. Adm. Code 302, Subpart E) - These standards protect the beneficial uses of the open waters, harbors, waters within breakwaters, and the waters within Illinois jurisdiction tributary to Lake Michigan, except for the Chicago River, North Shore Channel, and Calumet River.

Illinois' Groundwater Quality Standards are discussed in Volume II.

Table B-2. Illinois Designated Uses and Applicable Water Quality Standards.

Illinois EPA Designated Uses Assessed in 2016	Illinois Waters in which the Designated Use and Standards Apply[1]	Applicable Illinois Water Quality Standards[1]
Aquatic Life	Streams, Freshwater Lakes	General Use Standards
	Lake Michigan-basin waters	Lake Michigan Basin Standards
Aesthetic Quality	Streams, Freshwater Lakes	General Use Standards
	Lake Michigan-basin waters	Lake Michigan Basin Standards
	Specific Chicago Area Waters	Secondary Contact and Indigenous Aquatic Life Standards
Indigenous Aquatic Life[2]	Specific Chicago Area Waters	Secondary Contact and Indigenous Aquatic Life Standards
Primary Contact	Streams, Freshwater Lakes	General Use Standards
	Lake Michigan-basin waters	Lake Michigan Basin Standards
Secondary Contact[2]	Streams, Freshwater Lakes	General Use Standards
	Lake Michigan-basin waters	Lake Michigan Basin Standards
	Specific Chicago Area Waters	Secondary Contact and Indigenous Aquatic Life Standards
Public and Food Processing Water Supply	Streams, Freshwater Lakes, Lake Michigan-basin waters	Public and Food Processing Water Supply Standards
Fish Consumption	Streams, Freshwater Lakes	General Use Standards (Human Health)
	Lake Michigan-basin waters	Lake Michigan Basin Standards (Human Health)
	Specific Chicago Area Waters	Secondary Contact and Indigenous Aquatic Life Standards

1. As defined in 35 Ill. Adm. Code Parts 302 and 303: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx
2. For more information, see "*Secondary Contact and Indigenous Aquatic Life Standards*" on the previous pages.

Narrative Standards and Antidegradation Regulations

Water quality standards generally consist of three components: designated uses, a set of numeric and narrative criteria to protect those uses, and an antidegradation statement. In Illinois, the antidegradation statement (35 Ill. Adm. Code 302.105) is separate and covers all designated uses. This component of Illinois' water quality standards describes regulations which protect "*existing uses of all waters of the State of Illinois, maintain the quality of waters with quality that is better than water quality standards, and prevent unnecessary deterioration of waters of the State*."

All Illinois water quality standards include a narrative description of their intent, and nearly all also have associated numeric components for applying the concepts of the narrative component. For example, narrative language in the General Use standard at 35 Ill. Adm. Code 302.210 protects against toxic substances, "harmful to human health, or to animal, plant or aquatic life." A well-defined quantitative methodology then follows for how to derive numeric criteria intended to provide this protection. Only a few Illinois water-quality standards are exclusively narrative, i.e., having no explicit numeric component in the standard to apply them. For example, the standard at 35 Ill. Adm. Code 302.203 called "Offensive Conditions" simply comprises language that prohibits "sludge or bottom deposits, floating debris, visible oil, odor, plant or algal growth, color or turbidity of other than natural origin" in all "general use" waters of the state. Because of revisions that were made to 35 Ill. Adm. Code 302.203, 302.403 and 302.515 by the Illinois Pollution Control Board in 1990 and 1997, these exclusively narrative standards apply only to the protection of aesthetic quality in Illinois waters.

Derived Water Quality Criteria

The narrative standards in Title 35 of the Illinois Administrative Code, Section 302.210 and in Subpart F for General Use Waters and at 302.540 and elsewhere in Subpart E allow the Illinois EPA to derive numeric water quality criteria values for any substance that does not already have a numeric standard in the Illinois Pollution Control Board regulations. These criteria serve to protect aquatic life, human health or wildlife, although wildlife based criteria have not yet been derived. Illinois EPA derived criteria can be found at following the web site: http://www.epa.state.il.us/water/water-quality-standards/water-quality-criteria.html.

B-3. Cost/Benefit Assessment

Section 305(b) requires the state to report on the economic and social costs and benefits necessary to achieve Clean Water Act objectives. Information on costs associated with water quality improvements is complex, and not readily available for developing a complete cost/benefit assessment. The individual program costs of pollution control activities in Illinois, the general surface water quality improvements made, and the average groundwater protection program costs follow.

Cost of Pollution Control and Water Protection Activities

The Illinois EPA Bureau of Water distributed a total of $400.8 million in loans during 2014 for construction of municipal wastewater treatment facilities. Other Water Pollution Control program and Groundwater/Source Water Protection costs for Bureau of Water activities conducted in 2014 are summarized in Table B-3.

Table B-3. Water Pollution Control Program Costs for the Illinois Environmental Protection Agency's Bureau of Water, 2014

Activity	Total
Monitoring	$6,472,875
Planning	$204,250
Point Source Control Programs	$11,571,448
Nonpoint Source Control Programs	$7,811,213
Groundwater/Source-Water Protection	$2,262,733
Total	$28,322,519

General Surface Water Quality Improvements

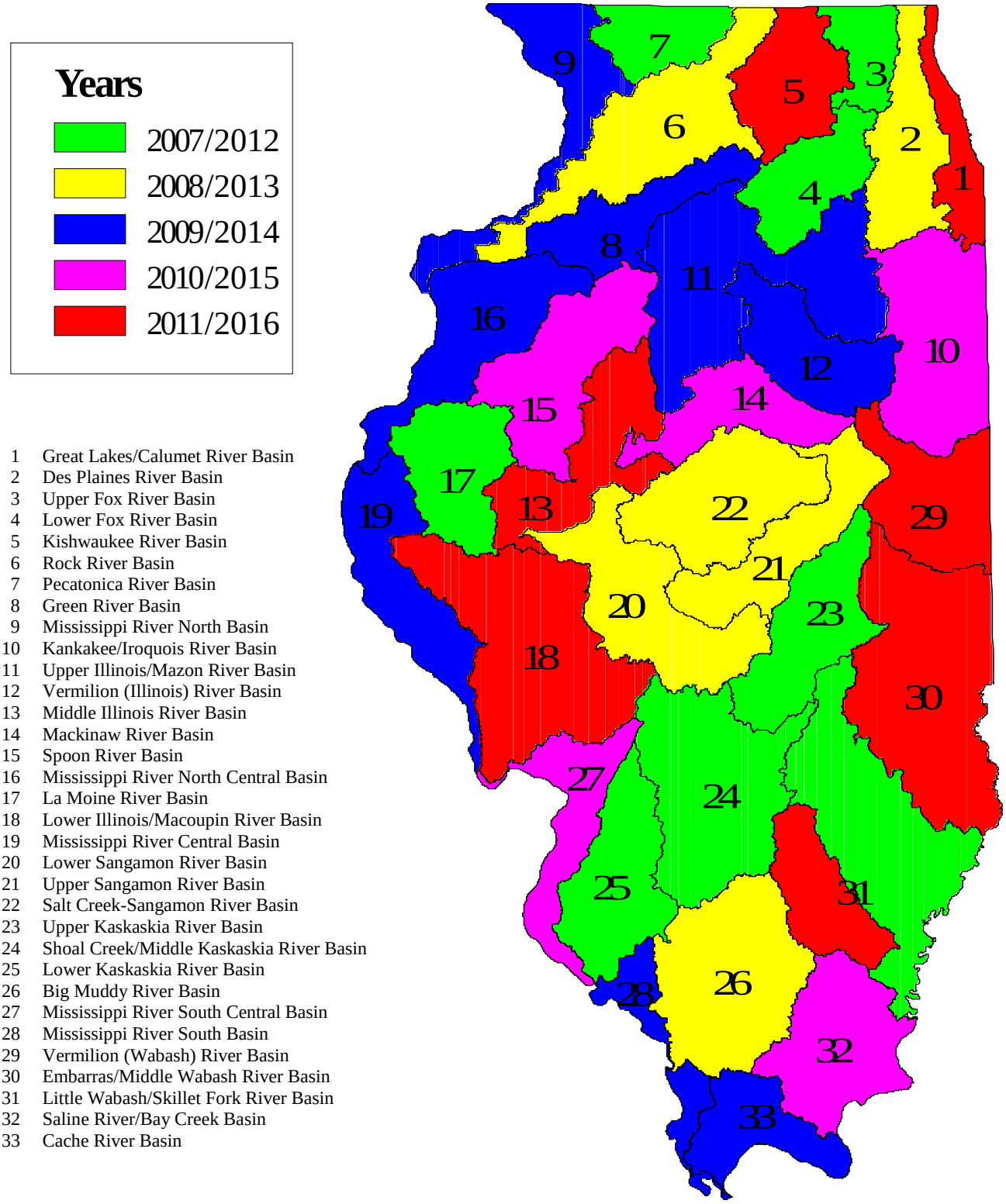
Economic benefits of water quality improvements, while difficult to quantify, include increased opportunities for water-based recreational activities, enhanced commercial and sport fisheries, recovery of damaged aquatic environments, and reduced costs of water treatment to various municipal and industrial users. Assessment methods have improved over time, making comparisons with previous years' assessments difficult to interpret. However, the summaries of attainment of *aquatic life* use in streams and freshwater lakes indicate improvement in these waters. The number of assessed stream miles reported in good condition has improved from 34.7 percent in 1972 to 57.8 percent in 2016, while during that same period, the miles reported in poor condition declined from 11.3 percent to 4.9 percent. The lake acreage assessed in good condition for *aquatic life* use has also improved from 17.8 percent in 1972 to 90.9 percent in 2016. During the same time period, the lake acreage assessed in poor condition has declined from 27.8% in 1972 to 0 percent in 2016.

PART C: SURFACE WATER MONITORING AND ASSESSMENT

C-1. Monitoring Program

Illinois EPA's "Surface Water Monitoring Strategy" (Illinois EPA 2014) provides a detailed discussion of all agency monitoring programs. Field, laboratory, and data-management procedures are explained in the Illinois EPA Bureau of Water's "Quality Assurance Project Plan" (Illinois EPA 1994). Specific programs that contribute data to the assessment of streams include the Ambient Water Quality Monitoring Network, the Pesticide Monitoring Subnetwork, Facility-Related Stream Surveys, Intensive Basin Surveys (Figure C-1) and the Fish Contaminant Monitoring Program. Programs that contribute data to freshwater lake assessments include the Ambient Lake Monitoring Program, Clean Lakes Program Intensives and the Volunteer Lake Monitoring Program. The Lake Michigan Monitoring Program provides data for the assessment of Lake Michigan. More specific information regarding all of these programs can be found in the Surface Water Monitoring Strategy cited above at http://www.epa.state.il.us/water/water-quality/monitoring-strategy/monitoring-strategy-2015-2020.pdf.

Figure C-1. IEPA/IDNR Intensive Basin Survey Schedule, 2007-2016



C-2. Assessment Methodology

This section explains how Illinois EPA uses various criteria (including, but not limited to, Illinois water quality standards) to assess the level of support (attainment) of the following applicable designated uses in the waters of the state: *aquatic life*, *indigenous aquatic life*, *fish consumption*, *primary contact*, *secondary contact*, *public and food processing water supply* and *aesthetic quality*. Assessments of designated uses are based on water-body-specific monitoring data believed to accurately represent existing resource conditions. The methodology for the assessment of use attainment and causes of impairment is explained below for each use and each water body type. At the end of Section C-2, we explain guidelines for identifying potential sources of impairment.

Water Body Segments

Illinois EPA uses the National Hydrography Dataset (1:24,000 scale) as the basis for mapping and calculating the length of streams and Lake Michigan shoreline segments. Mapping and area calculations of freshwater lakes and Lake Michigan are based on Illinois data (see Table B-1). While assessments of designated uses are based on data from individual monitoring stations, the data are extrapolated to represent larger water body segments (i.e., a stream segment, a freshwater lake, an open water area in Lake Michigan), also called assessment units. Assessment units delineated for *aquatic life* use are typically used as the basis for all other assessed uses.

For streams, monitoring data are extrapolated to linear segments depending on the size of the stream (USEPA 1997). Assessments of *aquatic life* use typically apply approximately 10 miles upstream and downstream from the sampling site for wadable streams, about 25 miles upstream and downstream for unwadable streams (i.e., generally $\geq 7^{th}$ order, $\geq$ 3.5 ft. average depth and fish sampled with an electrofishing boat) and approximately 50 miles upstream and downstream for large rivers (i.e., Illinois and Wabash rivers). However, the final extent of any particular segment is determined by considering significant influences such as point or nonpoint source inputs; changes in watershed characteristics such as land use; changes in riparian vegetation, stream banks, slope or channel morphology; stream confluence or diversions; or hydrologic modifications such as channelization or dams. This process can result in segments that are either longer or shorter than the general numeric guidelines above. On the Mississippi River, the segments mostly reflect a September 2003 interstate memorandum of understanding between five states (Illinois, Iowa, Minnesota, Missouri and Wisconsin) designed to improve the assessment process on the Mississippi River (UMRBA 2003). http://www.umrba.org/wq.htm). On the Ohio River, segmentation is based on Ohio River Sanitation Commission assessments.

In the case of lakes, monitoring data are typically used to assign an assessment to the entire lake acreage as a single assessment unit.

For assessments in Lake Michigan Open Waters, Illinois EPA uses data collected from the Lake Michigan Monitoring Program nearshore component. A single assessment unit is bounded by the Wisconsin-Illinois border to the North, the Indiana-Illinois border to the South, the shoreline to the West, and 5km offshore to the East. This nearshore assessment unit contains a total of 196 square miles of Lake Michigan Open Water, which represents about 12.8% of the approximately

1,526 square miles of Lake Michigan waters in Illinois. The remaining 1,330 square miles in Illinois's jurisdiction are currently unassessed.

The Lake Michigan Shoreline is comprised of 51 assessment units which span the entire 64 miles of contiguous Illinois Lake Michigan shoreline (excluding harbors and harbor entrances).

For assessments in Lake Michigan Harbors, Illinois EPA uses data collected from the Lake Michigan Monitoring Program harbor component. Currently, four of the 13 harbors along Illinois' Lake Michigan coastline are assessed.

Assessments of *fish consumption* use are generally extrapolated to include the entire named water body.

Changes made to 2014 assessment units are described in Appendix D.

Levels of Use Attainment

The Illinois EPA determines the resource quality of each assessment unit by determining the level of support (i.e., attainment) of each applicable designated use. For each assessment unit and for each designated use applicable to that assessment unit, an Illinois EPA assessment concludes one of two possible use-support levels: "Fully Supporting" or "Not Supporting." Fully Supporting means that the designated use is attained; Not Supporting means the use is not attained. To facilitate communicating these results, Illinois EPA also refers to Fully Supporting status (for a use) as Good resource quality; Not Supporting status is called Fair or Poor resource quality, depending on the degree to which the use is not attained. Uses determined to be Not Supporting are called "impaired," and waters that have at least one use assessed as Not Supporting are also called impaired. For each impaired use in each assessment unit, Illinois EPA attempts to identify potential causes and sources of the impairment as explained below.

Aquatic Life - Streams

Aquatic life use assessments in streams are typically based on the interpretation of biological information, physicochemical water data and physical-habitat information from the Intensive Basin Survey, Ambient Water Quality Monitoring Network or Facility-Related Stream Survey programs. The primary biological measures used are the fish Index of Biotic Integrity (fIBI; Karr et al. 1986; Smogor 2000, 2005), the macroinvertebrate Index of Biotic Integrity (mIBI; Tetra Tech 2004) and the Macroinvertebrate Biotic Index (MBI; Illinois EPA 1994). Physical-habitat information used in assessments includes quantitative or qualitative measures of stream-bottom composition and qualitative descriptors of channel and riparian conditions. Physicochemical water data used include measures of "conventional" parameters (e.g., dissolved oxygen, pH and temperature), priority pollutants, non-priority pollutants, and other pollutants (USEPA 2002 and www.epa.gov/waterscience/criteria/wqcriteria.html). In a minority of streams for which biological information is unavailable, *aquatic life* use assessments are based primarily on physicochemical water data. Physicochemical data and habitat information play primary roles in identifying potential causes and sources of *aquatic life* use impairment.

All biological indices are divided into three ranges: a range which indicates no impairment; a range which indicates moderate impairment, and, a range which indicates severe impairment (Table C-2). Water-chemistry data are also evaluated to determine whether the potential for impairment of *aquatic life* use is indicated (Table C-3). In addition, several conditions of physical habitat are used to indicate the potential for impairment of *aquatic life* use (Table C-4).

Table C-1 shows a decision matrix which illustrates how biological data (fIBI, mIBI, and MBI), physicochemical water data (i.e., water chemistry), and physical-habitat information are integrated and interpreted to guide the assessment of *aquatic life* use.

The last stage of the assessment process is a final review of the assessment conclusion (Table C-1, cell 8). In this review, Illinois EPA biologists carefully examine all available biological, water chemistry and habitat data and also use their site-specific knowledge and other information about the environmental setting of the stream segment. This additional information includes field notes and observations, knowledge of the nature of the stream and its biological potential, the existence of potential sources of pollution, and riparian or watershed information. Based on this review, the biologist may modify the use-attainment decision indicated in any cell in Table C-1. For example, conflicting biological information may require case-specific interpretation, including analysis of possible error or ambiguity in an IBI score, especially when scores are near the threshold values in Table C-2. Also, physicochemical, physical-habitat and other information are examined for corroborating or refuting evidence of *aquatic life* use attainment. In some cases, after careful review, it may be determined that the current data are not adequate to make a new assessment. In these cases, the previous assessment status remains unchanged. Illinois EPA believes that this final review helps improve the accuracy of *aquatic life* use assessments.

When a stream segment is determined to be Not Supporting *aquatic life* use, generally, one exceedance of an applicable Illinois water quality standard (related to the protection of aquatic life) results in identifying the parameter as a potential cause of impairment (Table C-5). Additional guidelines used to determine potential causes of impairment include site-specific standards (35 Ill. Adm. Code 303, Subpart C), or adjusted standards (published in the Illinois Pollution Control Board's *Environmental Register* at http://www.ipcb.state.il.us/ecll/environmentalregister.asp).

Category 4C. In some cases, biological data indicate that aquatic life use in streams is impaired but no pollutant cause of impairment is identified. If, after further review of all data, the assessor determines that the segment is not impaired by any pollutant, the segment is placed in category 4C, depending on the results of other use-attainment assessments (see Section C-3, Five-Part Categorization of Surface Waters, and Appendix A-8). In each of these cases, water data is available but reveals no violation of an Illinois Water Quality Standard[4]. Illinois EPA does not place water bodies in Category 4C unless sufficient water chemistry data is available for review. In addition, the assessor considers all of the information related to the segment, including the amount of water-chemistry data available, the nature of the stream, the degree of impairment, the existence of potential pollution sources, NPDES permits, other relevant watershed information,

[4] In some segments a TMDL study has determined that violations of the dissolved oxygen standard are not caused by a pollutant. These segments may be included in category 4C.

and whether the impairment is explained by the presence of degraded habitat or other non-pollutant causes. If the assessor judges that an unidentified pollutant is contributing to the impairment, then Cause Unknown is identified as an additional cause and the segment is placed in Category 5 (the 303(d) List).

Table C-1. Decision Table for Assessing Attainment of Aquatic Life Use in Illinois Streams. Each table cell shows the preliminary assessment conclusions based primarily on biological data: fish Index of Biotic Integrity (fIBI), macroinvertebrate Index of Biotic Integrity (mIBI), and Macroinvertebrate Biotic Index (MBI). See Table C-2 for how to interpret these biological indicators. See Tables C-3 and C-4 for how to interpret surrogate water-chemistry data or habitat data. The final review in table cell 8 applies to every preliminary assessment conclusion.

Biological Indicator Indicates:	**A. fIBI Indicates No Impairment fIBI ≥ 41**	**B. fIBI Indicates Moderate Impairment fIBI < 41 and > 20**	**C. fIBI Indicates Severe Impairment fIBI ≤ 20**	**D. fIBI is Unavailable**
1. mIBI Indicates No Impairment mIBI ≥ 41.8	*Fully Supporting (Good)* (Water chemistry and other data are considered during final review) (See cell 8 below.)	If water-chemistry data or habitat data indicate a potential for impairment, then *Not Supporting (Fair)*. Otherwise, *Fully Supporting (Good)*.	*Not Supporting (Poor)*	If water-chemistry data indicate a potential for severe impairment, then *Not Supporting (Fair)* Otherwise, *Fully Supporting (Good)*.
2. mIBI Indicates Moderate Impairment mIBI < 41.8 and > 20.9	If water-chemistry data or habitat data indicate a potential for impairment, then *Not Supporting (Fair)* Otherwise, *Fully Supporting (Good)*.	*Not Supporting (Fair)*	*Not Supporting (Poor)*	*Not Supporting (Fair)*
3. mIBI Indicates Severe Impairment mIBI ≤ 20.9	*Not Supporting (Poor)*	*Not Supporting (Poor)*	*Not Supporting (Poor)*	*Not Supporting (Poor)*
4. mIBI is Unavailable and MBI Indicates No Impairment MBI ≤ 5.9	*Fully Supporting (Good)*	*Not Supporting (Fair)*	*Not Supporting (Poor)*	If water-chemistry data indicate a potential for moderate impairment, then *Not Supporting (Fair)*. If water-chemistry data and sufficient habitat data [1] indicate no impairment, then *Fully Supporting (Good).* Otherwise, no assessment is made [2].

Biological Indicator Indicates:	A. fIBI Indicates No Impairment fIBI ≥ 41	B. fIBI Indicates Moderate Impairment fIBI < 41 and > 20	C. fIBI Indicates Severe Impairment fIBI ≤ 20	D. fIBI is Unavailable
5. mIBI is Unavailable and MBI Indicates Moderate Impairment MBI > 5.9 and ≤ 8.9	If water-chemistry data or habitat data indicate a potential for impairment, then *Not Supporting (Fair)*. Otherwise, *Fully Supporting (Good)*.	*Not Supporting (Fair)*	*Not Supporting (Poor)*	*Not Supporting (Fair)*
6. mIBI is Unavailable and MBI Indicates Severe Impairment MBI > 8.9	*Not Supporting (Poor)*	*Not Supporting (Poor)*	*Not Supporting (Poor)*	*Not Supporting (Poor)*
7. mIBI and MBI are Unavailable	If water-chemistry data indicate a potential for severe impairment, then *Not Supporting (Fair)* Otherwise, *Fully Supporting (Good)*.	*Not Supporting (Fair)*	*Not Supporting (Poor)*	If water-chemistry data indicate a potential for moderate impairment, then *Not Supporting (Fair)*. If water-chemistry data indicate a potential for severe impairment, then *Not Supporting (Poor)*. If sufficient water-chemistry data [3] and sufficient habitat data [1] indicate no impairment, then *Fully Supporting (Good)*. Otherwise, no assessment is made[2].
8. Final review using site-specific knowledge and considering all available biological, water-chemistry, habitat and other information. This review considers factors such as the extent to which biological-indicator scores exceed or fall short of impairment thresholds, the type and degree of water quality standard exceedances, the type and degree of habitat degradation, and the presence or absence of pollution sources. Based on this review, the biologist may modify the preliminary use-attainment decision. In some cases, after careful review, it may be determined that current data are not adequate to make a new assessment. In these cases the previous assessment status remains unchanged.				

1. "*Sufficient habitat data*" means a dataset at least as representative of physical-habitat conditions as the dataset that is typically available from an Intensive Basin Survey. For a relatively few waters, assessments of *aquatic life* use as *Fully Supporting* may not include consideration of habitat data because appropriate physical-habitat indicators have not yet been fully developed or conditions prevented comprehensive habitat measurements or observations. Typically, these are large-stream locations.
2. If a previous assessment exists, it remains unchanged.
3. "*Sufficient water chemistry data*" means a dataset at least as representative of water-chemistry conditions as the three-year dataset that is typically available from an Ambient Water Quality Monitoring Network station.

Table C-2. Guidelines for Using Biological Information in Table C-1 to Assess *Aquatic Life* Use Attainment in Streams

	No Impairment	Moderate Impairment	Severe Impairment
Biological Indicator	**Fully Supporting *Aquatic Life* Use (Good Resource Quality)**	**Not Supporting *Aquatic Life* Use (Fair Resource Quality)**	**Not Supporting *Aquatic Life* Use (Poor Resource Quality)**
Fish Index of Biotic Integrity (fIBI,)	fIBI $\geq$ 41	fIBI < 41 and > 20	fIBI $\leq$ 20
Macroinvertebrate Index of Biotic Integrity (mIBI)	mIBI $\geq$ 41.8	mIBI < 41.8 and > 20.9	mIBI $\leq$ 20.9
Macroinvertebrate Biotic Index[1] (MBI)	MBI $\leq$ 5.9	MBI > 5.9 and $\leq$ 8.9	MBI > 8.9

1. When the mIBI is available, the MBI is not used independently to assess attainment of *aquatic life* use.

Table C-3. Guidelines for Using Water-Chemistry Data in Table C-1 to Indicate the Potential for Impairment of Aquatic Life Use in Streams

Number of Observa-tions [1]	Type of Parameter	Type of Water Quality Standard	Water Chemistry Condition Indicating Potential for Moderate Impairment of ***Aquatic Life*** Use [2]	Water Chemistry Condition Indicating Potential for Severe Impairment of ***Aquatic Life*** Use [2]
Ten or more observa-tions are available for the applicable water-chemistry parameter	Toxic [3]	Acute	For any single parameter, two observations exceed the applicable standard [4].	For any single parameter, three or more observations exceed the applicable standard.
		Chronic	For any single parameter, there is one exceedances of the applicable standard [5].	For any single parameter, there are two or more independent exceedances of the applicable standard [5].
	Nontoxic [6]	Other	For any single parameter, more than 10% but no more than 25% of observations exceed the applicable standard; or, there is one exceedance of any standard that requires multiple observations to apply.	For any single parameter, more than 25% of observations exceed the applicable standard; or, there are two or more exceedances of any standard that requires multiple observations to apply.
Fewer than 10 observa-tions are available for the applicable water-chemistry parameter	Toxic [3]	Acute	Among all parameters, one observation exceeds an applicable standard.	Among all parameters, two or more observations exceed an applicable standard.
		Chronic	Among all parameters, there is one exceedance of an applicable standard [5].	Among all parameters, there are two or more independent exceedances of an applicable standard [5].
	Nontoxic [6]	Other	Among all parameters, two observations exceed an applicable standard.	Among all parameters, three or more observations exceed an applicable standard.

1. The most recent consecutive three years of data are used. It is not necessary that observations be available for every parameter of each type; the assessment is based on available data. As used in Table C-1, "*sufficient water chemistry data*" means a dataset at least as representative of water-chemistry conditions as the three-year dataset that is typically available from an Ambient Water Quality Monitoring Network station.
2. If conditions in at least one table cell apply, then the potential for impairment is indicated.
3. Includes 2, 4-D, alachlor, atrazine, ammonia, arsenic, barium, benzene, cadmium, chloride, chlorine, chromium (hexavalent and trivalent), copper, cyanazine, cyanide, dicamba, endrin, ethylbenzene, fluoride, iron, lead, manganese, mercury, metolachlor, metribuzin, nickel, selenium, silver, sulfate, terbufos, toluene, xylenes, and zinc or any parameter with an acute or chronic aquatic life criteria derived under 35 IAC 302.210. If no specific chronic water quality standard applies, the standard is interpreted as an acute one.
4. Hereafter in this table, "*applicable standard*" refers to an Illinois General Use Water Quality Standard, 35 IAC 302.208, 302.212 and 303.444and 35 IAC 303.311 through 303.445) or an aquatic life criterion derived according to 35 IAC 302.210 (http://www.epa.state.il.us/water/water-quality-standards/).
5. Chronic standards are applied consistent with 35 IAC 302.208, 302.210, 302.212, and 303.444 as follows. If the chronic standard is exceeded for one or more combinations of four consecutive observations, then the water chemistry condition indicates the potential for impairment of *aquatic life* use. If the chronic standard is exceeded for more than one *independent* set of four consecutive observations, then the water chemistry condition indicates the potential for severe impairment of *aquatic life* use. An *independent* set of four consecutive observations is one that does not share any observations with any other set of four consecutive observations.
6. Includes: water temperature, pH, and dissolved oxygen.

Table C-4. Guidelines for Using Habitat Information in Table C-1[1] to Assess Attainment of *Aquatic Life* Use in Streams

Degraded Habitat Conditions Indicating the Potential for Impairment of *Aquatic Life* Use [2]	Information Sources Used to Determine Degraded Habitat
Moderate to severe habitat alteration by channelization and dredging activities, removal of riparian vegetation, bank failure, heavy watershed erosion or alteration of flow regime (USEPA 1997).	Illinois EPA field observations and notes documenting: new channelization; or, >50% of riparian vegetation is denuded; or, heavy sediment deposition; or, the presence of dams/impoundments. A Qualitative Habitat Evaluation Index (Rankin 1989) assessment indicating: instream cover is "nearly absent" (due to anthropogenic causes); or, there is "recent channelization/no recovery;" or, substrate quality indicates "Silt heavy;" or, there is no riparian width; or, bank erosion is "heavy/severe."

1. As used in Table C-1 "s*ufficient habitat data*" means a dataset at least as representative of physical-habitat conditions as the dataset that is typically available from an Intensive Basin Survey.
2. If any of the conditions exist, the potential for impairment is indicated.

Table C-5. Guidelines for Identifying Potential Causes of Impairment of *Aquatic Life* Use in Illinois Streams

Potential Cause	Basis for Identifying Causes
Pesticides and other Organic Pollutants	**Criteria based on Water Quality Standards [1]**
2,4-D	Acute: 100 μg/L[2], Chronic: 8 μg/L[2]
Alachlor	Acute: 1100 μg/L[2]
alpha-BHC	Acute: 31 μg/L[2], Chronic: 2.5 μg/L[2]
Atrazine	Acute: 82 μg/L[2], Chronic: 9 μg/L[2]
Benzene	Acute: 4200 μg/L, Chronic: 860 μg/L[3]
Cyanazine	Acute: 370 μg/L[2], Chronic: 30 μg/L[2]
Dicamba	Acute: 1500 μg/L[23], Chronic: 150 μg/L[2]
Endrin	Acute: 160 μg/L[2], Chronic: 33 μg/L[2]
Ethylbenzene	Acute: 150 μg/L, Chronic: 14 μg/L[3]
Metolachlor	Acute: 380 μg/L[2], Chronic: 30.4 μg/L[2]
Metribuzin	Acute: 8.4 mg/L[2]
Terbufos	Acute: 0.024 μg/L[2]
Toluene	Acute: 2000 μg/L[3], Chronic: 600 μg/L[3]
Trifluralin	Acute: 26 μg/L[2], Chronic: 1.1 μg/L[2]
Xylenes (total mixed)	Acute: 920 μg/L[3], Chronic: 360 μg/L[3]
Metal Pollutants	**Criteria based on Water Quality Standards [1]**
Arsenic	Acute: 360 μg/L (dissolved)[3], Chronic: 190 μg/L (dissolved)[3]
Barium	Acute: 5000 μg/L[3]
Boron	Acute: 40100 μg/L[3], Chronic: 7600 μg/L[3]
Cadmium	Hardness dependent[3]
Copper	Hardness dependent[3]
Chromium, hexavalent	Acute: 16 μg/L[3], Chronic: 11 μg/L[3]
Chromium, trivalent	Hardness dependent[3]
Iron	Acute: 1000 μg/L (dissolved)[3]
Lead	Hardness dependent[3]
Manganese	Hardness dependent[3]
Mercury	Acute: 2.2 μg/L (dissolved))[3], Chronic: 1.1 μg/L(dissolved)[3]
Nickel	Hardness dependent[3]
Selenium	Acute: 1000 μg/L[3]
Silver	Acute: 5 μg/L[3]
Zinc	Hardness dependent[3]
Other Pollutants[8]	**Criteria based on Water Quality Standards [1]**
Ammonia (Total)	Temperature and pH dependent[3]
Cause Unknown	If the pollutant causing a water quality standard violation is unknown, cause unknown is listed[7]
Chlorides	Acute: 500 mg/L[3]
Chlorine	Acute: 19 μg/L)[3], Chronic: 11 μg/L[3]
Cyanide	Acute: 22 μg/L)[3], Chronic: 5.2 μg/L[3]
Fluoride	Hardness dependent[3]

Table C-5 (continued). Guidelines for Identifying Potential Causes of Impairment of Aquatic Life Use in Illinois Streams

Potential Cause	Basis for Identifying Causes
Other Pollutants (cont.)[8]	**Criteria based on Water Quality Standards [1]**
Oxygen, Dissolved[8]	Seasonal and water body dependent[3]
pH	Acute: <6.5 or >9.0[3]
Sulfate	Hardness and chloride dependent[3]
Temperature, Water *(used only for thermal point sources)*	Dependent on season and 2.8°C maximum rise in water temperature [3][6]
Other Toxic Pollutants	(any pollutant with aquatic life criteria derived under 35 IAC 302.210)[2]
Nonpollutant Causes	**Criteria not based on Water Quality Standards**
Alteration in stream-side or littoral vegetative covers	Observed degradation from alteration in stream-side or littoral vegetative covers [4] [5]
Alteration in wetland habitats	Observed degradation from alteration in wetland habitats [5]
Changes in stream depth and velocity patterns	Observed degradation from alteration/reduction of hydrologic diversity [4] [5]
Fish Kills	Documented fish kill from IDNR or Illinois EPA Records[4]
Fish-Passage Barrier	Observed degradation from fish-passage barrier [4]
Loss of instream cover	Observed degradation from reductions in instream cover[4] [5]
Low flow alterations	Observed degradation from low flow alterations [4] [5]
Non-Native Fish, Shellfish, or Zooplankton	Observed degradation from non-native fish, shellfish or zooplankton [4] [5]
Other flow alterations	Observed degradation from other flow alterations [5]

Unless otherwise indicated, a single exceedance of a water quality standard indicates a potential cause of impairment. For applying these guidelines, Illinois EPA typically uses data from our three primary stream-monitoring programs: Ambient Water Quality Monitoring Network (most recent three years), Intensive Basin Survey (most recent survey), Facility-Related Stream Survey (most recent survey).

1. General Use Water Quality Standards at 35 Ill. Adm. Code 302, Subpart B.
2. Criterion derived according to 35 Ill. Adm. Code 302.210. Derived water quality criteria are available at http://www.epa.state.il.us/water/water-quality-standards/water-quality-criteria.html.
3. Water Quality Standards criteria are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx with further explanation.
4. Physical-habitat criteria are available in Table C-4 with further explanation.
5. Site-specific observation, information, or knowledge.
6. 35 Ill. Adm. Code 302.211.
7. Cause Unknown means unknown pollutant and is used when the pollutant causing a water quality standard violation is not identified or when no causes of any type are identified.
8. In some segments a TMDL study may have determined that violations of the dissolved oxygen standard are not caused by a pollutant. For these specific segments, the cause "Oxygen, Dissolved" is classified as a non-pollutant.

Aquatic Life – Freshwater Lakes

The *Aquatic Life* Use Index (ALI) is the primary tool used for assessing *aquatic life* use in lakes (Tables C-6 and C-7). The Trophic State Index (TSI; Carlson 1977), the percent surface area macrophyte coverage during the peak growing season (June through August), and the median concentration of nonvolatile suspended solids (NVSS) are used to calculate the ALI score. Higher ALI scores indicate increased impairment.

Assessments of *aquatic life* use are based primarily on physical and chemical water quality data collected via the Ambient Lake Monitoring Program, the Illinois Clean Lakes Program, or by non-Illinois EPA persons under an approved quality assurance project plan. The physical and chemical data used for *aquatic life* use assessments include: Secchi disk transparency, chlorophyll *a*, total phosphorus (epilimnetic samples only), nonvolatile suspended solids (epilimnetic samples only), and percent surface area macrophyte coverage. Data are collected a minimum of five times per year (April through October) from one or more established lake sites. Data are considered usable for assessments if meeting the following minimum requirements (Figure C-2): 1) at least four out of seven months (April through October) of data are available; 2) at least two of these months occur during the peak growing season of June through August (this requirement does not apply to NVSS); and 3) usable data are available from at least half of all lake sites within any given lake each month. As outlined in Figure C-2, a whole-lake TSI value is calculated for the median Secchi disk transparency, median total phosphorus (epilemnetic sample depths only), and median chlorophyll *a* values. A minimum of two parameter-specific TSI values are required to calculate parameter-specific use support determinations. An assessment is then made based on the parameter-specific use support determinations. The 0.05 mg/L Illinois General Use Water Quality Standard for total phosphorus in lakes (35 Ill. Adm. Code 302.205) has been incorporated into the weighting criteria used to assign point values for the ALI.

Table C-6. Aquatic Life Use Index

Evaluation Factor	Parameter	Weighting Criteria	Points
1. Trophic State Index (TSI)	For data collected April-October: Whole-lake TSI value calculated from median total phosphorus (epilimnetic sample only), median chlorophyll *a*, and median Secchi disk transparency values	a. <60 b. ≥60<85 c. ≥85<90 d. ≥90	a. 40 b. 50 c. 60 d. 70
2. Macrophyte Coverage	Average percentage of lake surface area covered by macrophytes during peak growing season (June through August). Determined by: a. Macrophyte survey conducted during same water year as the chemical data used in the assessment; or b. Average value reported on the VLMP Secchi Monitoring Data form.	a. ≥15<40 b. ≥10<15, ≥40<50; c. ≥5<10, ≥50<70 d. <5, ≥70	a. 0 b. 5 c. 10 d. 15
3. Nonvolatile Suspended Solids (NVSS) Concentration	For data collected April-October: Median epilimnetic sample NVSS concentration (mg/L).	a. <12 b. ≥12<15 c. ≥15<20 d. ≥20	a. 0 b. 5 c. 10 d. 15

Figure C-2. Flow Chart for Assessing Attainment of *Aquatic Life* Use in Lakes

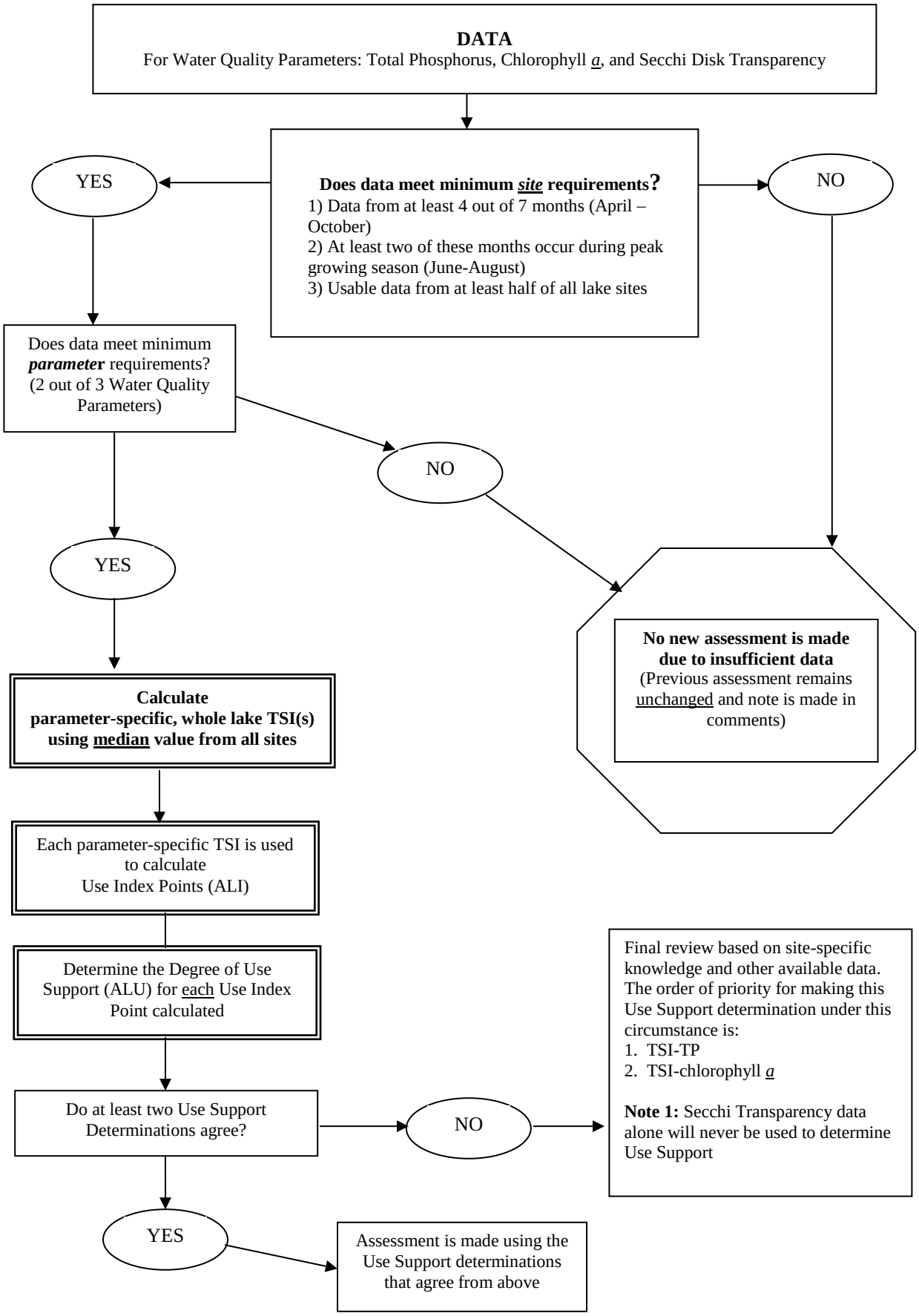


Table C-7. Guidelines for Assessing *Aquatic Life* Use in Illinois Freshwater Lakes

Degree of Use Support	Guidelines
Fully Supporting (Good)	Total ALI points are <75
Not Supporting (Fair)	Total ALI points are ≥75<95
Not Supporting (Poor)	Total ALI points are ≥95

When *aquatic life* use is found to be Not Supporting in a particular lake, potential causes of impairments are identified. Specific guidelines used to determine potential causes of impairment of *aquatic life* use in freshwater lakes are listed in Table C-8. Generally, one exceedance of an applicable Illinois water quality standard results in identifying the parameter as a potential cause of impairment. Additional guidelines used to determine potential causes of impairment include site-specific standards (35 Ill. Adm. Code 303.Subpart C) or adjusted standards (published in the Illinois Pollution Control Board's *Environmental Register* at http://www.ipcb.state.il.us/ecll/environmentalregister.asp). In addition, documented anthropogenic disturbances to lake habitat may also be used as the basis for listing some non-pollutant causes when the biologist believes they contribute to the impairment.

Table C-8. Guidelines for Identifying Potential Causes of Impairment of *Aquatic Life* Use in Illinois Freshwater Lakes

Potential Cause	Basis for Identifying Causes[1]
Pesticides and other Organic Pollutants	**Criteria based on Water Quality Standards [2]**
2,4-D	Acute: 100 μg/L[3] , Chronic: 8 μg/L[3]
Alachlor	Acute: 1100 μg/L[3]
alpha-BHC	Acute: 31 μg/L[3], Chronic: 2.5 μg/L[3]
Atrazine	Acute: 82 μg/L[3], Chronic: 9 μg/L[3]
Benzene	Acute: 4200 μg/L[4], Chronic: 860 μg/L[4]
Cyanazine	Acute: 370 μg/L[3], Chronic: 30 μg/L[3]
Dicamba	Acute: 1500 μg/L[3], Chronic: 150 μg/L[3]
Endrin	Acute: 160 μg/L[3], Chronic: 33 μg/L[3]
Ethylbenzene	Acute: 150 μg/L[4], Chronic: 14 μg/L[4]
Metolachlor	Acute: 380 μg/L [3] , Chronic: 30.4 μg/L [3]
Metribuzin	Acute: 8.4 mg/L[3]
Terbufos	Acute: 0.024 μg/L[3]
Toluene	Acute: 2000 μg/L[4], Chronic: 600 μg/L[4]
Trifluralin	Acute: 26 μg/L[3], Chronic: 1.1 μg/L[3]
Xylenes (total mixed)	Acute: 920 μg/L[4], Chronic: 360 μg/L[4]
Metal Pollutants	**Criteria based on Water Quality Standards [2]**
Arsenic	Acute: 360 μg/L (dissolved)[4], Chronic: 190 μg/L (dissolved)[4]
Barium	Acute: 5000 μg/L[4]
Boron	Acute: 40100 μg/L[3] , Chronic: 7600 μg/L[3]
Cadmium	Hardness dependent[4]
Copper	Hardness dependent [4]
Chromium, hexavalent	Acute: 16 μg/L[4], Chronic: 11 μg/L[4]
Chromium, trivalent	Hardness dependent [4]
Iron	Acute: 1000 μg/L (dissolved)[4]
Lead	Hardness dependent [4]
Manganese	Hardness dependent [4]
Mercury	Acute: 2.2 μg/L (dissolved)[4], Chronic: 1.1 μg/L(dissolved)[4]
Nickel	Hardness dependent[4)]
Selenium	Acute: 1000 μg/L[4]
Silver	Acute: 5 μg/L[4]
Zinc	Hardness dependent [4]
Other Pollutants[9]	**Criteria based on Water Quality Standards [2]**
Ammonia (Total)	Temperature and pH dependent [4]
Cause Unknown	If the pollutant causing a water quality standard violation is unknown, cause unknown is listed[8]
Chlorides	Acute: 500 mg/L[4]
Chlorine	Acute: 19 μg/L[4], Chronic: 11 μg/L[4]
Cyanide	Acute: 22 μg/L[4], Chronic: 5.2 μg/L[4]
Fluoride	Hardness dependent [4]

Table C-8 (continued). Guidelines for Identifying Potential Causes of Impairment of *Aquatic Life* Use in Illinois Freshwater Lakes

Potential Cause	Basis for Identifying Causes[1]
Other Pollutants (cont.)[9]	**Criteria based on Water Quality Standards [2]**
Oxygen, Dissolved[9]	Seasonal and water body dependent[4]
pH	Acute: <6.5 or >9.0[4]
Phosphorus (Total)	Acute: 0.05 mg/L in lakes ≥ 20 acres[4][5]
Sulfate[4]	Hardness and chloride dependent [4]
Temperature, Water *(used only for thermal point sources)*	Dependent on season and 2.8°C maximum rise in water temperature [4][7]
Other Toxic Pollutants	(any pollutant with aquatic life criteria derived under 35 IAC 302.210)[3]
Nonpollutant Causes	**Criteria not based on Water Quality Standards**
Alteration in stream-side or littoral vegetative covers[6]	Observed degradation from alteration in stream-side or littoral vegetative covers[6]
Alteration in wetland habitats	Observed degradation from alteration in wetland habitats[6]
Fish Kills	Documented fish kill from IDNR or Illinois EPA Records[6]
Non-Native Aquatic Plants	Observed degradation from non-native aquatic plants[6]
Non-Native Fish, Shellfish, or Zooplankton[6]	Observed degradation from non-native fish, shellfish or zooplankton[6]

1. In general, a single exceedance of a water quality standard results in listing the parameter as a potential cause of impairment. Determination of causes is normally based on the most recent year of data from the Ambient Lake Monitoring Program, Illinois Clean Lakes Program or Source Water Assessment Program.
2. General Use Water Quality Standards at 35 Ill. Adm. Code 302, Subpart B.
3. Criterion derived according to 35 Ill. Adm. Code 302.210. Derived water quality criteria are available at http://www.epa.state.il.us/water/water-quality-standards/water-quality-criteria.html.
4. Water Quality Standards criteria are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx with further explanation.
5. The total phosphorus standard at 35 Ill. Adm. Code 302.205 applies to lakes of 20 acres or larger.
6. Site-specific observation, information, or knowledge.
7. 35 Ill. Adm. Code 302.211.
8. Cause Unknown means unknown pollutant and is used when the pollutant causing a water quality standard violation is not identified or when no causes of any type are identified.
9. In some lakes, a TMDL study may have determined that violations of the dissolved oxygen standard are not caused by a pollutant. For these specific lakes, the cause "Oxygen, Dissolved" is classified as a non-pollutant.

Aquatic Life – Lake Michigan

Aquatic life use assessments are currently made for Lake Michigan open waters and Lake Michigan harbors. These assessments are based on the applicable Lake Michigan Basin Water Quality Standards. The most-current three years of water quality data are used. Table C-9 provides the guidelines used to assess *aquatic life* use in Lake Michigan open waters and harbors.

Table C-9. Guidelines for Assessing *Aquatic Life* Use in Lake Michigan Open Waters and Harbors

Water Chemistry: Lake Michigan Basin Water Quality Standards exceedances for any one parameter over three-year period. (1)	Fully Supporting (Good)	Not Supporting (Fair)	Not Supporting (Poor)
Conventionals (2) and other pollutants (3) Percent of samples	≤10%	>10≤25%	>25%
Toxics (priority pollutants, including chlorine, metals and un-ionized ammonia) (4) Acute (number of exceedances)	<2	2	>2
Toxics (priority pollutants, including chlorine, metals and un-ionized ammonia) (4) Chronic (percent of samples and mean)	≤10% and mean ≤standard	>10% and mean ≤standard	>10% and mean >standard

1. Based on the most current three years of data from Lake Michigan Monitoring Program (LMMP) sampled three times per year
2. 35 Ill. Adm. Code, 302.502, 302.503, 302.507 including dissolved oxygen, pH, and water temperature
3. 35 Ill. Adm. Code 302.504 (b) including barium, chloride, iron, manganese, and total dissolved solids
4. 35 Ill. Adm. Code 302.504 (a, e), 302.535 (a, b) and 302.540 including ammonia nitrogen/un-ionized ammonia, arsenic, benzene, bis (2-ethylhexyl) phthalate, cadmium, chlorine (total residual), chromium, copper, cyanide, dieldrin, endrin, ethylbenzene, lead, lindane, mercury, nickel, parathion, pentachlorophenol, toluene, xylenes (total) and zinc

After a segment of Lake Michigan is assessed as Not Supporting *aquatic life* use, potential causes of impairments are identified. The guidelines for identifying and listing potential causes of *aquatic life* use impairment are shown in Table C-10. These guidelines are based on Lake Michigan Basin Water Quality Standards. In general, at least one exceedance of a numeric standard within the most current three-year period serves as a guideline for identifying a potential cause of impairment.

Table C-10. Guidelines for Identifying Potential Causes of Impairment of *Aquatic Life* Use in Lake Michigan Open Waters and Harbors

Potential Cause	Basis for Identifying Causes[1]
Pesticides and other Organic Pollutants	**Criteria based on Water Quality Standards[2]**
Benzene	Acute: 3900 μg/L[4], Chronic: 800 μg/L[4]
bis (2-ethylhexyl) phthalate	Acute: 76 μg/L[3], Chronic: 17 μg/L[3]
Dieldrin	Acute: 240 ng/L[4], Chronic: 56 ng/L[4]
Endrin	Acute: 0.086 μg/L[4], Chronic: 0.036 μg/L[4]
Ethylbenzene	Acute: 150 μg/L[4], Chronic: 14 μg/L[4]
Lindane (gamma BHC)	Acute: 0.95 μg/L[4]
Parathion	Acute: 0.065 μg/L[4], Chronic: 0.013 μg/L[4]
Pentachlorophenol (PCP)	pH dependent[4]
Toluene	Acute: 2000 μg/L[4], Chronic: 610 μg/L[4]
Xylenes (total mixed)	Acute: 1200 μg/L[4], Chronic: 490 μg/L[4]
Metal Pollutants	**Criteria based on Water Quality Standards[2]**
Arsenic	Acute: 340 μg/L (dissolved)[4], Chronic 1148 μg/L (dissolved)[4]
Barium	Acute: 5 mg/L[4]
Boron	Acute: 40100 μg/L[3] , Chronic: 7600 μg/L[3]
Cadmium	Hardness dependent [4]
Copper	Hardness dependent [4]
Chromium, hexavalent	Acute: 16 μg/L, Chronic: 11 μg/L[4]
Chromium, trivalent	Hardness dependent [4]
Iron	Acute: 1 mg/L (dissolved)[4]
Lead	Hardness dependent [4]
Manganese	Acute: 1 mg/L[4]
Mercury	Acute: 1700 ng/L (dissolved)[4], Chronic: 910 ng/L (dissolved)[4]
Nickel	Hardness dependent [4]
Selenium	Chronic: 5.0 μg/L (dissolved)[4]
Zinc	Hardness dependent [4]

Table C-10 (continued). Guidelines for Identifying Potential Causes of Impairment of *Aquatic Life* Use in Lake Michigan

Potential Cause	Basis for Identifying Causes[1]
Other Pollutants	**Criteria based on Water Quality Standards[2]**
Ammonia (Total)	Acute: 15 mg/L[4]
Ammonia (Un-ionized)	Temperature and pH dependent [4]
Chlorides	Acute: 500 mg/L[4]
Chlorine	Acute: 19 µg/L, Chronic: 11 µg/L[4]
Cyanide	Acute: 22 µg/L, Chronic: 5.2 µg/L[4]
Fluoride	Acute: 1.4 mg/L[4]
Oxygen, Dissolved	≥90% saturation in open waters, 5.0 mg/L in remainder of basin[4] [6]
pH	Acute: <7.0 or >9 in open waters; <6.5 or >9.0 in remainder of basin[4]
Temperature, Water *(used only for thermal point sources)*	1.7°C maximum rise in water temperature[4]
Total Dissolved Solids	Acute: 1000 mg/L or Conductivity > 1667 umho/cm[4]
Nonpollutant Causes	**Criteria not based on Water Quality Standards[2]**
Alteration in stream-side or littoral vegetative covers	Observed degradation from alteration in stream-side or littoral vegetative covers [5]
Non-Native Aquatic Plants	Observed degradation from non-native aquatic plants[5]
Non-Native Fish, Shellfish, or Zooplankton	Observed degradation from non-native fish, shellfish or zooplankton [5]

1. Generally, a single exceedance of a water quality standard indicates a potential cause of impairment. For applying these guidelines, Illinois EPA typically uses data from the Lake Michigan Monitoring Program (LMMP) (most recent three years).
2. Illinois Lake Michigan Basin Water Quality Standards, 35 Ill. Adm. Code, Subpart E.
3. The criterion was derived according to 35 Ill. Adm. Code 302.540. Derived water quality criteria are available at http://www.epa.state.il.us/water/water-quality-standards/water-quality-criteria.html.
4. Water Quality Standards criteria are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx with further explanation.
5. Site-specific observation, information, or knowledge
6. Dissolved oxygen must not be less than 90% of saturation, except due to natural causes, in the open waters of Lake Michigan. The other waters of the Lake Michigan Basin must not be less than 6.0 mg/L during at least 16 hours of any 24 hour period, nor less than 5.0 mg/L at any time.

Indigenous Aquatic Life

Illinois' Secondary Contact and Indigenous Aquatic Life Standards (35 Ill. Adm. Code, 302, Subpart D) apply to about 86 miles of canals, channels and modified streams and Lake Calumet, in northeastern Illinois (35 Ill. Adm. Code 303.441). The standards are intended to protect *indigenous aquatic life* limited only by the physical configuration of the body of water, characteristics, and origin of the water and the presence of contaminants in amounts that do not exceed these water quality standards.

Fully Supporting status of *indigenous aquatic life* use is intended to represent aquatic-life conditions consistent with conditions judged as reasonably attainable in these waters. Unlike most assessments of *aquatic life* use, assessment of *indigenous aquatic life* use is not based primarily on direct measures of aquatic life; rather, it is based primarily on surrogate water chemistry data. All available water chemistry data are compared to the appropriate Secondary Contact and Indigenous Aquatic Life standards. Assessments of *indigenous aquatic life* use rely on frequency of exceedance guidelines to better represent the true risk of impairment to aquatic life than would a single exceedance of a water quality criterion. Table C-11 provides the guidelines used to assess *indigenous aquatic life* use in applicable streams and in Lake Calumet. Table C-12 provides the guidelines for identifying potential causes of indigenous aquatic life impairment.

Table C-11. Guidelines for Assessing *Indigenous Aquatic Life* Use in Streams and Lake Calumet

Attainment Status:	**Fully Supporting (Good)**	**Not Supporting (Fair)**	**Not Supporting (Poor)**
Exceedances of Secondary Contact and Indigenous Aquatic Life Standards[1]:	For every parameter:	For any single parameter:	For any single parameter:
Conventionals [2] Percent of sample exceedances:	≤10%	>10≤25%	>25%
Chemical Constituents[3] Number of exceedances:	<2	2	>2

1. Illinois Secondary Contact and Indigenous Aquatic Life Water Quality Standards, 35 Ill. Adm. Code, 302, Subpart D
2. Dissolved oxygen, pH, and water temperature.
3. Arsenic, barium, cadmium, copper, chromium hexavalent, chromium trivalent, iron, lead, manganese, mercury, nickel, selenium, silver, zinc, ammonia (un-ionized), cyanide, fluoride, oil and grease, phenols, total dissolved solids (35 Ill. Adm. Code 302.407) and other toxic substances (35 Ill. Adm. Code, 302.410).

Table C-12. Guidelines for Identifying Potential Causes of Impairment of *Indigenous Aquatic Life* Use in Illinois Streams and Lake Calumet

Potential Cause	Basis for Identifying Causes[1]
Metal Pollutants	**Criteria based on Water Quality Standards[2]**
Arsenic (total)	1000 µg/L
Barium (total)	5000 µg/L
Cadmium (total)	150 µg/L
Copper (total)	1000 µg/L
Chromium, hexavalent	300 µg/L
Chromium, trivalent	1000 µg/L
Iron	500 µg/L (dissolved); 2000 µg/L (total)
Lead (total)	100 µg/L
Manganese (total)	1000 µg/L
Mercury (total)	0.5 µg/L
Nickel (total)	1000 µg/L
Selenium (total)	1000 µg/L
Silver (total)	1100 µg/L
Zinc (total)	1000 µg/L
Other Pollutants	**Criteria based on Water Quality Standards[2]**
Ammonia (Un-ionized)[4]	0.1 mg/L[4]
Cyanide[4]	0.1 mg/L
Fluoride	15 mg/L
Oil and Grease	15 mg/L
Oxygen, Dissolved [4] [6]	$\geq$ 4.0 mg/L[4] ($\geq$ 3.0 mg/L in the Cal-Sag Channel)
pH	$\geq$6.0 & $\leq$9.0
Phenols	0.3 mg/L
Temperature, Water[4] *(used only for thermal point sources)*	100° F maximum & shall not exceed 93 ° F more than 5% of time
Total Dissolved Solids	1500 mg/L (Conductivity >2500 umho/cm)
Other Toxic Substances[3]	**Criteria based on Water Quality Standards[2]**
Any toxic substance not listed above[3]	One half the 96 hour median tolerance limit[3]
Nonpollutant Causes	**Criteria not based on Water Quality Standards[5]**
Fish Kills	Documented fish kill from IDNR or Ill. EPA Records[5]
Fish-Passage Barrier	Observed degradation from fish-passage barrier[5]
Low flow alterations	Observed degradation from low flow alterations[5]
Non-Native Fish, Shellfish, or Zooplankton	Observed degradation from non-native species[5]
Other flow alterations	Observed degradation from other flow alterations[5]

Footnotes for Table C-12.

1. Unless otherwise indicated, for numeric criteria serving as guidelines, a single exceedance indicates that the substance is a potential cause of impairment. For applying these guidelines, Illinois EPA typically uses data from our three primary stream-monitoring programs: Ambient Water Quality Monitoring Network (most recent three years), Intensive Basin Surveys (most recent survey), and Facility-Related Stream Surveys (most recent survey).
2. Illinois Secondary Contact and Indigenous Aquatic Life Water Quality Standards, 35 Ill. Adm. Code, 302, Subpart D.
3. 35 Ill. Adm. Code, 302.410.
4. Water Quality Standards criteria are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx with further explanation.
5. Site-specific observation, information, or knowledge.
6. In some segments a TMDL study may have determined that violations of the dissolved oxygen standard are not caused by a pollutant. For these specific segments, the cause "Oxygen, Dissolved" is classified as a non-pollutant.

Fish Consumption – Streams, Freshwater Lakes and Lake Michigan

Fish consumption use is associated with all water bodies in the state. The assessment of *fish consumption* use is based on (1) water body-specific fish-tissue data and (2) fish-consumption advisories issued by the Illinois Fish Contaminant Monitoring Program (FCMP). A list of water bodies having advisories can be found at the Illinois Department of Public Health website (http://www.idph.state.il.us/envhealth/fishadvisory/index.htm). Fish-consumption advisories are incorporated into the process for assessing *fish consumption* use as explained below.

The FCMP uses the U.S. Food & Drug Administration's (FDA) Action Levels as criteria for determining the need for advisories, except for polychlorinated biphenyls (PCBs), mercury, and chlordane. For these contaminants the FDA criteria have been replaced by a risk-based process developed in the *Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory* (Anderson et al. 1993, herein after referred to as the Protocol). The Protocol requires the determination of a Health Protection Value (HPV) for a contaminant, which is then used with five meal consumption frequencies (eight ounces of uncooked filet): 1) Unlimited (140 meals/year); 2) One meal/week (52 meals/year); 3) One meal/month (12 meals/year); 4) One meal/two months (six meals/year); and 5) Do not eat (0 meals/year). The level of contaminant in fish is then calculated that will not result in exceeding the HPV at each meal consumption frequency. The Protocol also assumes a 50% reduction of contaminant levels for organic chemicals (not used for mercury) when recommended cleaning and cooking methods are used. The HPVs, target populations, critical health effects to be protected by the HPVs, and the criteria for PCBs, mercury and chlordane for the various meal frequencies, are listed in Table C-13 as well as the FDA action levels for other contaminants.

Except in extraordinary circumstances, two or more recent sampling events in a water body in two different sampling years finding fish exceeding a level of concern for one or more contaminants are necessary for issuing or changing an advisory (based on data collected since 1985). Similarly, two or more recent samples finding no fish exceeding criteria are necessary for rescinding an advisory. For any contaminant except mercury, the issuance of a fish-consumption advisory for a specific water body provides the basis for a determination that *fish consumption* use is impaired, with the contaminant of concern listed as a cause of impairment. Currently, fish-consumption advisories are in effect only for PCBs, chlordane and mercury. However, a statewide fish-consumption advisory ("no more than one meal per week of predator fish" for pregnant or nursing women, women of childbearing age, and children less than 15 years of age) has been issued for mercury because fish-tissue data indicated widespread contamination above criteria levels throughout the state. This statewide advisory applies to all waters in Illinois even though not all water bodies were sampled and not all samples exceeded the criteria levels for that advisory.

This last sentence represents a fundamental difference between the purpose and methodology for issuing fish-consumption advisories and assessing attainment of *fish consumption* use. Fish-consumption advisories are, as their name implies, advice to the public on how best to avoid a certain level of exposure to contaminants which **may** be present in fish tissue. The purpose of assessing attainment of *fish consumption* use is to identify those specific waters where *fish consumption* use **is** impaired. While statewide or watershed advisories are a justifiable,

conservative approach to the protection of human health, they do not identify the specific waters where contaminants are known to occur and may be overprotective in waters where contaminants do not occur.

Because of this, Illinois EPA does not assess *fish consumption* use as Not Supporting in all waters of the state based on the statewide fish-consumption advisory for mercury. Rather, *fish consumption* use is assessed as Not Supporting only for those specific waters where at least one fish-tissue sample is available and where at least one fish species exceeds the 0.06 mg/kg criterion for mercury. Also, because the statewide advisory is for predator species, *fish consumption* use is only assessed as Fully Supporting in those waters where predator fish-tissue data from the most recent two years do not show mercury contamination above criteria levels. Waters where sufficient fish-tissue data are unavailable are considered Not Assessed.

Table C-14 shows the guidelines used for assessing attainment of *fish consumption* use.

Table C-15 lists guidelines for identifying potential causes of *fish consumption* use impairment. Although all parameters with FDA action levels are listed in the table, only PCBs, mercury and chlordane have ever been detected in Illinois fish samples at levels that would warrant a fish-consumption advisory.

Table C-13. Health Protection Values (HPVs) and Criteria Levels for Sport-Fish-Consumption Advisories for Polychlorinated Biphenyls, Methyl Mercury, and Chlordane; and FDA Action Levels for Other Contaminants

CHEMICAL	HPV (ug/kg/d)	TARGET POPULATION EFFECT	MEAL FREQUENCY	CRITERIA LEVELS (mg/kg)
Polychlorinated biphenyls	0.05	All (emphasis on sensitive[1]) Reproductive/ developmental effects	Unlimited	0 – 0.05
			1 meal/week	0.06 – 0.22
			1 meal/month	0.23 – 0.95
			1 meal/2 months	0.96 – 1.9
			Do not eat	>1.9
Methyl mercury	0.10	Sensitive[1], Reproductive/ developmental effects	Unlimited	0 – 0.05
			1 meal/week	0.06 – 0.22
			1 meal/month	0.23 – 1.0
			Do not eat	>1.0
	0.30	Nonsensitive[1], Nervous system effects	Unlimited	0 – 0.15
			1 meal/week	0.16 – 0.65
			1 meal/month	0.66 – 1.0
			Do not eat	>1.0
Chlordane	0.15	All, Liver effects	Unlimited	0 – 0.15
			1 meal/week	0.16 – 0.65
			1 meal/month	0.66 – 2.8
			1 meal/2 months	2.9 – 5.6
			Do not eat	>5.6

	FDA Action Level (mg/kg)
Aldrin	0.3
DDT (Total)	5.0
Dieldrin	0.3
Endrin	0.3
Heptachlor	0.3
Heptachlor epoxide	0.3
Mirex	0.1
Toxaphene	5.0

1. Sensitive Population includes pregnant or nursing women, women of child-bearing age, and children under 15; Nonsensitive Population includes women beyond child-bearing age and men over 15.

Table C-14. Guidelines for Assessing *Fish Consumption* Use in all Illinois Waters Including Streams, Freshwater Lakes, and Lake Michigan

Degree of Use Support	Guidelines[1]
Fully Supporting[6] (Good)	PCBs are less than 0.06 mg/kg and chlordane is less than 0.16 mg/kg in fish tissue in the two most recent years of samples for each species collected since 1985; and, mercury is less than 0.06 mg/kg in fish tissue in the two most recent years of samples for each species collected since 1985, and those samples include at least one predator species[2] of a "large size class[3]" in two different years.
Not Supporting (Fair)	A water body-specific[4], "restricted consumption[5]" fish-consumption advisory is in effect; or, mercury is greater than or equal to 0.06 mg/kg in fish tissue of any species, in at least one of the two most recent years of samples collected in 1985 or later[7].
Not Supporting (Poor)	A "no consumption" (i.e., "Do Not Eat") fish-consumption advisory, for one or more fish species, is in effect for the general human population; or, a commercial fishing ban is in effect.
Not Assessed	None of the guidelines above apply.

1. In general, all data for each named stream or lake are combined to make the assessment. For larger rivers, assessments may be made for partial river segments.
2. "Predatory species" include northern pike, muskellunge, flathead catfish, chinook salmon, coho salmon, lake trout, brown trout, white bass, striped bass, striped-bass hybrids, smallmouth bass, largemouth bass, spotted bass, sauger, walleye, and saugeye.
3. "Large size class" is dependent on the particular species and the water body where the species is collected.
4. Although a general statewide advisory for mercury exists, Illinois EPA assesses *fish consumption* use as "Not Supporting" only for specific waters from which fish tissue has been collected and analyzed for contaminants and mercury contamination is confirmed. Fish-tissue data needed to confirm the advisory are not available from all waters.
5. Restricted consumption is defined as limits on the number of meals or size of meals consumed per unit time, per fish species. In Illinois, restricted-consumption advisories are: 1 meal/week, 1 meal/month, or 1 meal/2 months.
6. An assessment of Fully Supporting *fish consumption* use requires fish-tissue data from two different years (1985 or later). If more than two years of fish-tissue data are available (1985 or later), only the two most recent years of data (per species) are used in the assessment process.
7. Only one sample of fish tissue (1985 or later) exceeding criteria levels is necessary for an assessment of Not Supporting (Fair). If more than two years of fish-tissue data are available (1985 or later), only the two most recent years of data (per species) are used in the assessment process.

Table C-15. Guidelines for Identifying Potential Causes of Impairment of *Fish Consumption* Use in Illinois Streams, Freshwater Lakes and Lake Michigan

Potential Cause	Basis For Identifying Cause
Aldrin	Fish-consumption advisory or commercial fishing ban is in effect, attributable to any applicable parameter.
Chlordane	
DDT	
Dieldrin	
Endrin	
Heptachlor	
Heptachlor epoxide	
Mirex	
Polychlorinated biphenyls (PCBs)	
Toxaphene	
Mercury	Water body-specific fish-tissue data indicating mercury ≥0.06 mg/kg

Primary Contact – Streams and Freshwater Lakes

According to Illinois water quality standards, "primary contact" means "*...any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing*" (35 Ill. Adm. Code 301.355). The assessment of *primary contact* use is based on fecal coliform bacteria data. The General Use Water Quality Standard for fecal coliform bacteria specifies that during the months of May through October, based on a minimum of five samples taken over not more than a 30-day period, fecal coliform bacteria counts shall not exceed a geometric mean of 200/100 ml, nor shall more than 10 percent of the samples during any 30-day period exceed 400/100 ml (35 Ill. Adm. Code 302.209). This standard protects *primary contact* use of Illinois waters by humans.

Due to limited state resources, fecal coliform bacteria is not normally sampled at a frequency necessary to apply the General Use standard, i.e., at least five times per month during May through October, and very little data available from others are collected at the required frequency. Therefore, assessment guidelines are based on application of the standard when sufficient data is available to determine standard exceedances; but, in most cases, attainment of *primary contact* use is based on a broader methodology intended to assess the likelihood that the General Use standard is being attained.

To assess *primary contact* use, Illinois EPA uses all fecal coliform bacteria from water samples collected in May through October, over the most recent five-year period (i.e., 2009 through 2013 for this report). Based on these water samples, geometric means and individual measurements of fecal coliform bacteria are compared to the concentration thresholds in Tables C-16 and C-17. To apply the guidelines, the geometric mean of fecal coliform bacteria concentration is calculated from the entire set of May through October water samples, across the five years. No more than 10% of all the samples may exceed 400/100 ml for a water body to be considered Fully Supporting.

Some portions of stream segments are exempt from the fecal coliform bacteria water quality standard and *primary contact* use does not apply in these segments (35 Ill. Adm. Code 302.209). Stream miles assessed for *primary contact* use only include those reaches represented by Ambient Water Quality Monitoring Network stations where such exemptions do not apply.

Since Illinois EPA does not collect fecal coliform bacteria samples in lakes and received no fecal coliform data from outside sources during this cycle, there are no new assessments of *primary contact* use for lakes in 2016. However, 1,814 lake acres remain assessed for *primary contact* use based on data received from the Lake County Health Department, Lakes Management Unit prior to 2002.

Table C-16. Guidelines for Assessing *Primary Contact* Use in Illinois Streams and Freshwater Lakes

Degree of Use Support	Guidelines
Fully Supporting (Good)	No exceedances of the fecal coliform bacteria standard in the last five years and the geometric mean of all fecal coliform bacteria observations ≤200/100 ml, and ≤10% of all observations exceed 400/100 ml.
Not Supporting (Fair)	One exceedance of the fecal coliform bacteria standard in the last five years (when sufficient data is available to assess the standard) or The geometric mean of all fecal coliform bacteria observations in the last five years ≤200/100 ml, and >10% of all observations in the last five years exceed 400/100 ml or The geometric mean of all fecal coliform bacteria observations in the last five years >200/100 ml, and ≤25% of all observations in the last five years exceed 400/100 ml.
Not Supporting (Poor)	More than one exceedance of the fecal coliform bacteria standard in the last five years (when sufficient data is available to assess the standard) or The geometric mean of all fecal coliform bacteria observations in the last five years >200/100 ml, and >25% of all observations in the last five years exceed 400/100 ml

Table C-17. Guidelines for Identifying Potential Causes of Impairment of *Primary Contact* Use in Illinois Streams and Freshwater Lakes

Potential Cause	Basis for Identifying Cause - Numeric Standard[1]
Fecal Coliform	Geometric mean of at least five fecal coliform bacteria observations collected over not more than 30 days during May through October >200/100 ml or > 10% of all such fecal coliform bacteria observations exceed 400/100 ml or Geometric mean of all fecal coliform bacteria observations (minimum of five samples) collected during May through October >200/100 ml or > 10% of all fecal coliform bacteria observation exceed 400/100 ml.

1. The applicable fecal coliform standard (35 Ill. Adm. Code, 302, Subpart B, Section 302.209) requires a minimum of five samples in not more than a 30-day period. However, because this number of samples is seldom available in this time frame, the criteria are also based on a minimum of five samples over the most recent five-year period.

Primary Contact – Lake Michigan Open Waters and Shoreline Waters

Primary contact use is assessed in Lake Michigan open waters and Lake Michigan Shoreline waters. This use is not currently assessed in Lake Michigan harbors.

For Lake Michigan open waters, the assessment of *primary contact* use is based on fecal coliform bacteria. Fecal coliform bacteria data are collected in the nearshore segment as part of the Lake Michigan Monitoring Program, but insufficient numbers of samples are collected during a 30-day period to appropriately apply the standard. In addition, these samples are collected in the open lake and may not reflect conditions at shoreline areas. *Primary contact* use in Lake Michigan open waters is assessed by using criteria in Table C-18.

Table C-18. Guidelines for Assessing *Primary Contact* Use in the Open Waters of Lake Michigan

Degree of Use Support	Guidelines [1, 2]
Fully Supporting (Good)	Geometric mean of all fecal coliform bacteria samples <200/100 ml and ≤10% of samples exceed a count of 400/100 ml.
Not Supporting (Fair)	The geometric mean of all fecal coliform bacteria samples <200/100 ml, and >10% of samples exceed a count of 400/100 ml. or The geometric mean of all fecal coliform bacteria samples >200/100 ml and ≤25% of samples exceed a count of 400/100 ml.
Not Supporting (Poor)	The geometric mean of all fecal coliform bacteria samples >200/100 ml and >25% of samples exceed a count of 400/100 ml.

1. Based on most-current three years of data from Lake Michigan Monitoring Program sampled approximately three times per year.
2. 35 Ill. Adm. Code 302.505 (2002).

At 51 Lake Michigan shoreline segments, local agencies collect daily *Escherichia coli* bacteria samples at beaches during the swimming season. Advisories are posted or beaches may be closed by these agencies if samples exceed 235/100 ml *Escherichia coli* bacteria (77 Ill. Adm. Code 820). The Agency uses the advisory information to assess *Primary contact* use in Lake Michigan Shoreline waters based on the criteria in Table C-19.

Criteria for identifying causes of impairment for *primary contact* use in Lake Michigan open waters and Lake Michigan shoreline waters are shown in Table C-20.

Table C-19. Guidelines for Assessing *Primary Contact* Use at Lake Michigan Shoreline waters (USEPA 1997)

Degree of Use Support	Guidelines [1]
Fully Supporting (Good)	For any shoreline segment, on average, less than one bathing area closure/advisory per year of less than one week's duration
Not Supporting (Fair)	For any shoreline segment, on average, one bathing area closure/advisory per year of less than one week's duration
Not Supporting (Poor)	For any shoreline segment, on average, one bathing area closure/advisory per year of greater than one week's duration, or more than one bathing area closure per year

1. Based on most-current three years of data.

Table C-20. Guidelines for Identifying Potential Causes of Impairment of *Primary Contact* Use in Lake Michigan Open Waters and Shoreline Waters

Potential Cause	Basis For Identifying Causes - Numeric Standard[1, 2]
Fecal Coliform	Geometric mean of all fecal coliform bacteria observations (minimum of five samples) collected during the most recent three years >200/100 ml, or >10% of samples exceed a count of 400/100 ml.
Escherichia coli	For any shoreline segment, on average at least one bathing beach closure/advisory per year based on *E. coli* bacteria

1. The applicable fecal coliform standard in 35 Illinois Administrative Code, Part 302, Subpart E, Section 302.505 requires a minimum of five samples in not more than a 30-day period. However, because this number of samples is seldom available in this time frame the criteria are based on a minimum of five samples (May through October) over the most recent three year period.
2. Department of Public Health Bathing Beach Code (77 Ill. Adm. Code 820.400): An *Escherichia coli* count of 235 colonies/100 ml in each of two samples collected on the same day shall require closing the beach. Note: beaches in Lake County and suburban Cook County are closed when one sample exceeds 235/100 ml; beach managers in Chicago post advisories when a geometric mean of two consecutive water samples exceed 235 *E. coli* cfu/100 ml. Beaches in Chicago are closed in the event that sewage is released to Lake Michigan, and remain closed until the geometric mean of two consecutive water samples is less than 235 *E. coli* cfu/100ml..

Secondary Contact – Streams, Freshwater Lakes and Lake Michigan

According to Illinois water quality standards, "secondary contact" means "*...any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, commercial and recreational boating and any limited contact incident to shoreline activity*" (35 Ill. Adm. Code 301.380). Although *secondary contact* use is associated with all waters of the state, no specific assessment guidelines have been developed to assess *secondary contact* use because existing water quality standards have no water quality criterion that specifically address this use. However, consistent with the meanings of these two uses, in any water where *primary contact* use is assessed as Fully Supporting, *secondary contact* use is also assessed as Fully Supporting. In all other circumstances *secondary contact* use is not assessed.

Public and Food Processing Water Supply – Streams, Freshwater Lakes, and Lake Michigan

Attainment of *public and food processing water supply* use is assessed only in waters in which the use is currently occurring, as evidenced by the presence of an active public-water-supply intake. The assessment of *public and food processing water supply* use is based on conditions in both untreated and treated water (Table C-21). By incorporating data through programs related to both the federal Clean Water Act and the federal Safe Drinking Water Act, Illinois EPA believes that these guidelines provide a comprehensive assessment of *public and food processing water supply* use.

Assessments of *public and food processing water supply* use recognize that characteristics and concentrations of substances in Illinois surface waters can vary and that a single assessment guideline may not protect sufficiently in all situations. Using multiple assessment guidelines helps improve the reliability of these assessments. When applying these assessment guidelines, Illinois EPA also considers the water-quality substance, the level of treatment available for that substance, and the monitoring frequency of that substance in the untreated water.

One of the assessment guidelines for untreated water relies on a frequency-of-exceedance threshold (10%) because this threshold represents the true risk of impairment better than does a single exceedance of a water quality criterion. Assessment guidelines also recognize situations in which water treatment that consists only of "*...coagulation, sedimentation, filtration, storage and chlorination, or other equivalent treatment processes*"(35 Ill. Adm. Code 302.303; hereafter called "conventional treatment") may be insufficient for reducing potentially harmful levels of some substances. To determine if a Maximum Contaminant Level (MCL) violation in treated water would likely occur if treatment additional to conventional treatment were not applied (see 35 Ill. Adm. Code 302.305), the concentration of the potentially harmful substance in untreated water is examined and compared to the MCL threshold concentration. If the concentration in untreated water exceeds an MCL-related threshold concentration, then an MCL violation could reasonably be expected in the absence of additional treatment.

Table C-21 provides the guidelines for assessing attainment of *public and food processing water supply* use in Illinois streams, freshwater lakes, and Lake Michigan. In general, compliance with an MCL for treated water is based on a running four-quarter (i.e., annual) average, calculated quarterly, of samples collected at least once per quarter (Jan.-Mar., Apr.-Jun., Jul.-Sep., and Oct.-Dec.). However, for some untreated-water intake locations sampling occurs less frequently than once per quarter. In these locations, statistics comparable to quarterly averages or running four-quarter averages cannot be determined for untreated water. Rather, for substances not known to vary regularly in concentration in Illinois surface waters (untreated) throughout the year, a simple arithmetic average concentration of all available results is used to compare to the MCL threshold. For substances known to vary regularly in concentration in surface waters during a typical year (e.g., atrazine), average concentrations within the relevant sub-annual (e.g., quarterly) periods are used. Table C-22 lists the guidelines for identifying potential causes of *public and food processing water supply* use impairment.

Table C-21. Guidelines for Assessing *Public and Food Processing Water Supply* Use in Illinois Streams, Freshwater Lakes, and Lake Michigan

Degree of Use Support	Guidelines
Fully Supporting (Good)	For each substance in untreated water [1], for the most-recent three years of readily available data or equivalent dataset, a) ≤ 10% of observations exceed an applicable Public and Food Processing Water Supply Standard [2]; and b) for which the concentration is not readily reducible by conventional treatment, i) no observation exceeds by at least fourfold the treated-water Maximum Contaminant Level threshold concentration[3] for that substance; and ii) no quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[3] for that substance; and iii) no running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[4] for that substance, and [4], For each substance in treated water, no violation of an applicable Maximum Contaminant Level [3] occurs during the most recent three years of readily available data.
Not Supporting (Fair)	For any single substance in untreated water, [1] for the most-recent three years of readily available data or equivalent dataset, a) > 10% of observations exceed a Public and Food Processing Water Supply Standard [2]; or b) for which the concentration is not readily reducible by conventional treatment, i) at least one observation exceeds by at least fourfold the treated-water Maximum Contaminant Level threshold concentration[3] for that substance; or ii) the quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[3] for that substance; or iii) the running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[3] for that substance. or, For any single substance in treated water, at least one violation of an applicable Maximum Contaminant Level [3] occurs during the most recent three years of readily available data.
Not Supporting (Poor)	Closure to use as a drinking-water resource (cannot be treated to allow for use).

1. Includes only the untreated-water results that were available in the primary computer database at the time data were compiled for these assessments.
2. 35 Ill. Adm. Code 302.304, 302.306 (http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx).
3. 35 Ill. Adm. Code 611.300, 611.301, 611.310, 611.311, 611.325.
4. Some waters were assessed as Fully Supporting based on treated-water data only.

Table C-22. Guidelines for Identifying Potential Causes of Impairment of *Public and Food Processing Water Supply* Use in Illinois Streams, Freshwater Lakes and Lake Michigan

	Basis For Identifying Cause[1, 4]	
Potential Cause	**Numeric Standard[2]**	**Maximum Contaminant Level[3]**
1,1,1-Trichloroethane	---	0.2 mg/L
1,1,2-Trichloroethane	---	5 µg/L
1,2,4-Trichlorobenzene	---	0.07 mg/L
1,2-Dibromo-3-chloropropane (Dibromochloropropane DBCP)	---	0.2 µg/L
1,2-Dichloroethane	---	5 µg/L
1,2-Dichloropropane	---	5 µg/L
2,3,7,8-Tetrachlorodibenzo-p-dioxin (only)	---	0.03 ng/L
2,4,5-TP (Silvex)	0.01 mg/L	0.05 mg/L
2,4-D	0.1 mg/L	0.01 mg/L
Alachlor	---	2 µg/L
Aldrin	1 µg/L	1 µg/L
Antimony	---	6 µg/L
Arsenic	0.05 mg/L	0.010 mg/L
Asbestos	---	7 MFL[5]
Atrazine	---	3 µg/L
Barium	1.0 mg/L	2 mg/L
Benzene	---	5 µg/L
Benzo[a]pyrene (PAHs)	---	0.2 µg/L
Beryllium	---	4 µg/L
Boron	1.0 mg/L	---
Cadmium	0.010 mg/L	5 µg/L
Carbofuran	---	0.04 mg/L
Carbon tetrachloride	---	5 µg/L
Chlordane	3 µg/L	2 µg/L
Chlorides	250 mg/L	---
Chlorobenzene (mono)	---	0.1 mg/L
Chromium (total)	0.05 mg/L	0.1 mg/L
cis-1,2-Dichloroethylene	---	0.07 mg/L
Cyanide	---	0.2 mg/L
Dalapon	---	0.2 mg/L
DDT	0.05 mg/L	0.05 mg/L
DEHP (di-sec-octyl phthalate) (Di(2-ethylhexyl)phthalate)	---	6 µg/L
Di (2-ethylhexyl) adipate	---	0.4 mg/L
Dichloromethane (methylene chloride)	---	5 µg/L

Table C-22 (cont.). Guidelines for Identifying Potential Causes of Impairment of *Public and Food Processing Water Supply* Use in Illinois Streams, Freshwater Lakes and Lake Michigan

	Basis For Identifying Cause[1, 4]	
Potential Cause	**Numeric Standard[2]**	**Maximum Contaminant Level[3]**
Dieldrin	1 µg/L	1 µg/L
Dinoseb	---	7 µg/L
Diquat	---	0.02 mg/L
Endothall	---	0.1 mg/L
Endrin	0.2 µg/L	2 µg/L
Ethylbenzene	---	0.7 mg/L
Ethylene dibromide	---	0.05 µg/L
Fecal Coliform	geometric mean of five samples in ≤30 days ≥2000 per 100 ml	---
Fluoride	---	4 mg/L
Glyphosate	---	0.7 mg/L
Heptachlor	0.1 µg/L	0.1 µg/L
Heptachlor epoxide	0.1 µg/L	0.1 µg/L
Hexachlorobenzene	---	1 µg/L
Hexachlorocyclopentadiene	---	0.05 mg/L
Iron	0.3 mg/L (dissolved)	1.0 mg/L (for CWS serving ≥1000 people or ≥300 connections)
Lead	0.05 mg/L	---
Lindane	4 µg/L	0.2 µg/L
Manganese	1.0 mg/L	0.15 mg/L (for CWS serving ≥1000 people or ≥300 connections)
Mercury	---	2 µg/L
Methoxychlor	0.1 mg/L	0.04 mg/L
Nitrate/Nitrite (nitrate + nitrite as N)	---	10 mg/L
Nitrogen, Nitrate	10 mg/L	10 mg/L
Nitrogen, Nitrite	---	1 mg/L
o-Dichlorobenzene	---	0.6 mg/L
Oil and Grease	0.1 mg/L	---
Oxamyl (Vydate)	---	0.2 mg/L
Parathion	0.1 mg/L	---
p-Dichlorobenzene	---	0.075 mg/L
Pentachlorophenol (PCP)	---	1 µg/L
Phenols	1 µg/L	---
Picloram	---	0.5 mg/L
Polychlorinated biphenyls (PCBs)	---	0.5 µg/L
Selenium	0.01 mg/L	0.05 mg/L
Simazine	---	4 µg/L

Table C-22 (cont.). Guidelines for Identifying Potential Causes of Impairment of *Public and Food Processing Water Supply* Use in Illinois Streams, Freshwater Lakes and Lake Michigan

	Basis For Identifying Cause[1, 4]	
Potential Cause	**Numeric Standard[2]**	**Maximum Contaminant Level[3]**
Styrene	---	0.1 mg/L
Sulfates	250 mg/L	---
Tetrachloroethylene	---	5 µg/L
Thallium	---	2 µg/L
Toluene	---	1 mg/L
Total Dissolved Solids	500 mg/L	---
Toxaphene	5 µg/L	3 µg/L
trans-1,2-Dichloroethylene	---	0.1 mg/L
Trichloroethylene	---	5 µg/L
Vinyl chloride	---	2 µg/L
Vinylidene chloride (1, 1–Dichloroethylene)	---	7 µg/L
Xylene(s) (total) (mixed)	---	10 mg/L
Zinc	---	5 mg/L

1. In general, for untreated water, a cause is identified if:
   a) 10% or more of the observations exceed the applicable numeric standard; or
   b) for any substance for which the concentration is not readily reducible by conventional treatment,
      i) any observation exceeds by at least fourfold the treated-water Maximum Contaminant Level threshold concentration for the substance; or
      ii) any quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration for the substance; or
      iii) any running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration for that substance.

   For treated water, a cause is identified if there is any violation of the Maximum Contaminant Level for the substance. Identification of causes is based primarily on data from these monitoring programs: Ambient Water Quality Monitoring Network, Intensive Basin Surveys, Ambient Lake Monitoring Program, Illinois Clean Lakes Program, Lake Michigan Monitoring Program, Source Water Assessment Program.
2. The numeric standard is based on 35 Ill. Adm. Code 302, Subpart C: Public and Food Processing Water Supply Standards are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx.
3. Maximum Contaminant Levels are from 35 Ill. Adm. Code 611, Subpart F: Maximum Contaminant Levels (MCLs) and Maximum Residual Disinfectant Levels (MRDLs).
4. All table entries of "---" indicate that a cause guideline is not applicable or is unavailable.
5. MFL – million fibers per liter, for fibers less than 10 microns.

Aesthetic Quality – Streams

Attainment of *aesthetic quality* use in Illinois streams is based on the attainment of the Offensive Conditions (or Unnatural Sludge) narrative standards in 35 Ill. Adm. Code 302.203 (for streams covered under General Use Standards), 35 Ill. Adm. Code 302.403 (for streams covered under Secondary Contact and Indigenous Aquatic Life Standards) or 35 Ill. Adm. Code 302.515 (for streams covered under the Lake Michigan Basin Standards). The assessment of these nearly identical standards is typically performed during Intensive Basin Surveys by Illinois EPA biologists who are experienced with the natural conditions and expectations for the streams in each basin. A form has been developed for use in this assessment process and is shown in Appendix E. Staff has been trained regarding Illinois EPA's responsibilities in applying these narrative standards and how to properly fill out the form. The assessment involves comparing the observed conditions in the stream to the language in the standard. When the standard is judged as not attained, one or more of nine specific conditions are noted as the cause of non attainment. These conditions are based on the language in the standard and include: "sludge, bottom deposits, floating debris, visible oil, odor, plant or algal growth [aquatic macrophytes or aquatic algae], color or turbidity." In addition, whenever plant growth or algal growth is judged to cause non-attainment, phosphorus (total) is listed as a contributing cause. The guidelines for assessing *aesthetic quality* use in Illinois streams are shown in Table C-23. Causes of non-attainment are shown in Table C-24.

Table C-23. Assessing *Aesthetic Quality Use* in Illinois Streams

Use Support Rating	Criteria
Fully Supporting (Good)	Narrative Standard in 35 Ill. Adm. Code 302.203, 35 Ill. Adm. Code 302.403 or 35 Ill. Adm. Code 302.515 is attained
Not Supporting (Poor)	Narrative Standard in 35 Ill. Adm. Code 302.203, 35 Ill. Adm. Code 302.403 or 35 Ill. Adm. Code 302.515 is not attained

Table C-24. Causes of *Aesthetic Quality Use* Impairment in Illinois Streams

Potential Cause	Criteria based on Water Quality Standards[1]
Sludge	The presence of sludge which violates the narrative standard
Bottom Deposits	The presence of bottom deposits which violates the narrative standard
Floating Debris	The presence of floating debris which violates the narrative standard
Visible Oil	The presence of visible oil which violates the narrative standard
Odor	The presence of odor which violates the narrative standard
Specific Odor Causing Pollutant	If identified, the specific pollutant causing odor which violates the narrative standard
Aquatic Plants, Macrophytes	The presence of aquatic macrophytes which violates the narrative standard
Aquatic Algae	The presence of aquatic algae which violates the narrative standard
Phosphorus (total)	When the narrative standard is not attained due in part to aquatic plant or algal growth, phosphorus (total) is listed as a contributing cause
Color	The presence of color which violates the narrative standard
Turbidity	The presence of turbidity which violates the narrative standard

1. The applicable narrative standard in 35 Ill. Adm. Code 302.203, 35 Ill. Adm. Code 302.403 or 35 Ill. Adm. Code 302.515. Water Quality Standards are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx

Aesthetic Quality – Freshwater Lakes

The Aesthetic Quality Index (AQI) (Table C-25) is the primary tool used to assess *aesthetic quality* for freshwater lakes. The AQI represents the extent to which pleasure boating, canoeing, and aesthetic enjoyment are attained at a lake. The Trophic State Index (TSI; Carlson 1977), the percent-surface-area macrophyte coverage during the peak growing season (June through August), and the median concentration of nonvolatile suspended solids are used to calculate the AQI score. Higher AQI scores indicate increased impairment (Table C-26).

Assessments of *aesthetic quality* use are based primarily on physical and chemical water quality data collected by the Illinois EPA through the Ambient Lake Monitoring Program or the Illinois Clean Lakes Program, or by non-Illinois EPA persons under an approved quality assurance project plan. The physical and chemical data used for *aesthetic quality* use assessments include: Secchi disk transparency, chlorophyll *a*, total phosphorus (epilimnetic samples only), nonvolatile suspended solids (epilimnetic samples only), and percent surface area macrophyte coverage. Data are collected a minimum of five times per year (April through October) from one or more established lake sites. Data are considered usable for assessments if meeting the following minimum requirements (Figure C-3): 1) At least four out of seven months (April through October) of data are available, 2) At least two of these months occurs during the peak growing season of June through August (this requirement does not apply to NVSS) and 3) Usable data are available from at least half of all lakes sites within any given lake each month. As outlined in Figure C-3, a whole-lake TSI value is calculated for the median Secchi disk transparency, median total phosphorus (epilimnetic sample depths only), and median chlorophyll *a* values. A minimum of two parameter-specific TSI values are required to calculate a parameter-specific use support determination. An assessment is then made based on the parameter specific use support determinations. The 0.05 mg/L Illinois General Use Water Quality Standard for total phosphorus in lakes (35 Ill. Adm. Code 302.205) has been incorporated into the weighting criteria used to assign point values for the AQI. Table C-27 lists the guidelines for identifying potential causes of *aesthetic quality* use impairment.

Figure C-3. Flow Chart for Assessing Attainment of Aesthetic Quality Use in Lakes.

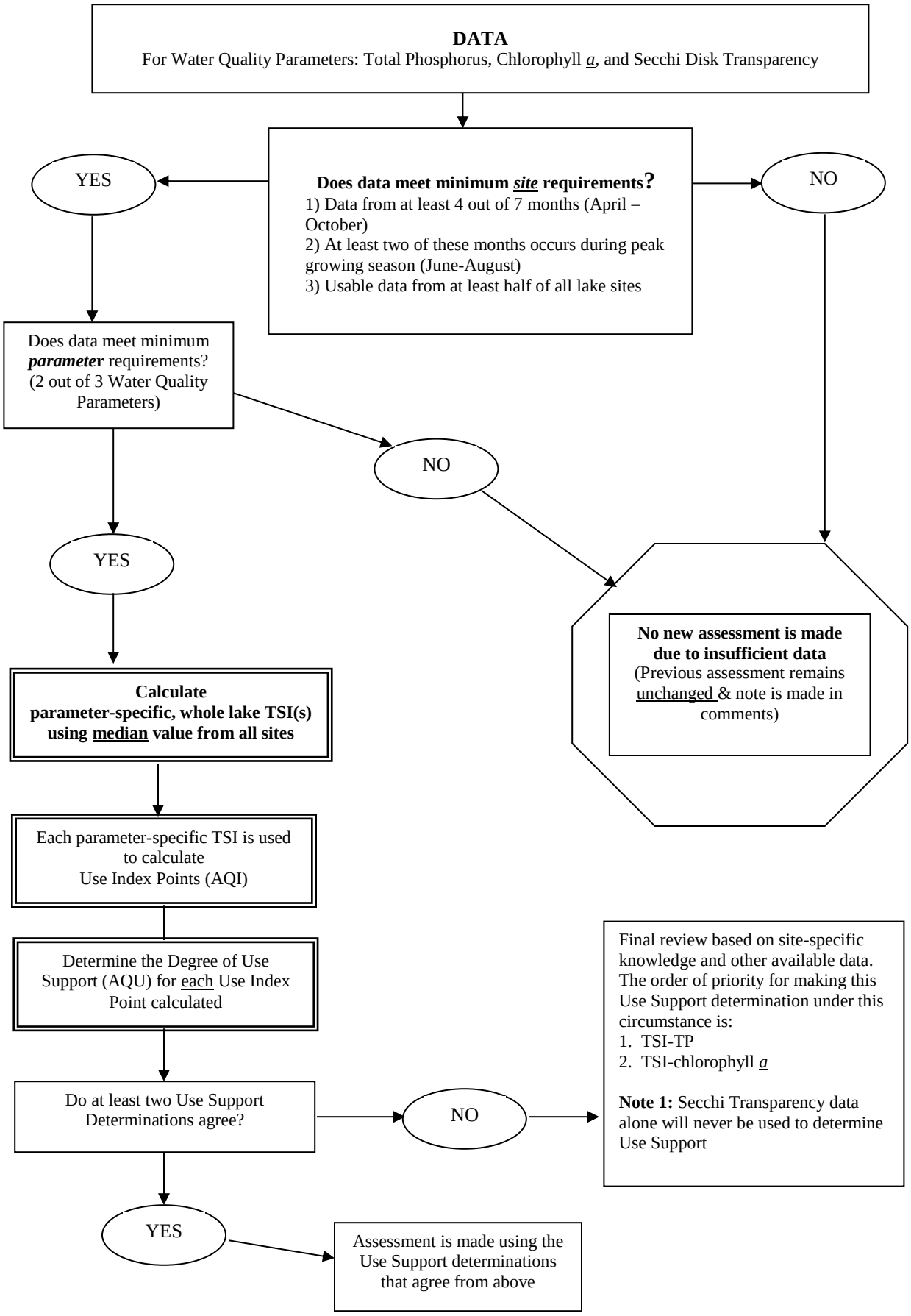


Table C-25. Aesthetic Quality Index

Evaluation Factor	Parameter	Weighting Criteria	Points
1. Median Trophic State Index (TSI)	For data collected May-October: Median lake TSI value calculated from total phosphorus (samples collected at one foot depth), chlorophyll *a*, and Secchi disk transparency	Actual Median TSI Value	Actual Median TSI Value
2. Macrophyte Coverage	Average percentage of lake surface area covered by macrophytes during peak growing season (June through August). Determined by: a. Macrophyte survey conducted during same water year as the chemical data used in the assessment; or b. Average value reported on the VLMP Secchi Monitoring Data form	a. <5 b. ≥5<15 c. ≥15<25 d. ≥25	a. 0 b. 5 c. 10 d. 15
3. Nonvolatile Suspended Solids (NVSS) Concentration	Median lake surface NVSS concentration for samples collected at one foot depth (reported in mg/L)	a. <3 b. ≥3<7 c. ≥7<15 d. ≥15	a. 0 b. 5 c. 10 d. 15

Table C-26. Guidelines for Assessing *Aesthetic Quality* Use in Illinois Freshwater Lakes

Degree of Use Support	Guidelines
Fully Supporting (Good)	Total AQI points are <60
Not Supporting (Fair)	Total AQI points are ≥60<90
Not Supporting (Poor)	Total AQI points are ≥90

Table C-27. Guidelines for Identifying Potential Causes of Impairment of *Aesthetic Quality* Use in Illinois Freshwater Lakes

	Basis for Identifying Causes[1]
Potential Cause	**Criteria based on Water Quality Standards[2]**
Sludge	The presence of sludge which violates the narrative standard[4]
Bottom Deposits	The presence of bottom deposits which violates the narrative standard[4]
Floating Debris	The presence of floating debris which violates the narrative standard[4]
Visible Oil	The presence of visible oil which violates the narrative standard[4]
Odor	The presence of odor which violates the narrative standard[4]
Specific Odor Causing Pollutant	If identified, the specific pollutant causing odor which violates the narrative standard[4]
Aquatic Algae	The presence of aquatic algae which violates the narrative standard[4]
Aquatic Plants (Macrophytes)	The presence of aquatic macrophytes which violates the narrative standard[4]
Phosphorus (Total)	In lakes $\geq$ 20 acres total phosphorus exceeds 0.05 mg/L [3], or In lakes < 20 acres, when the narrative standard[4] is not attained due in part to aquatic plant or algal growth, phosphorus (total) is listed as a contributing cause[3]
Color	The presence of color which violates the narrative standard[4]
Turbidity	The presence of turbidity which violates the narrative standard[4]

1. In general, a single exceedance of the criteria results in listing the parameter as a potential cause of impairment. Determination of causes is normally based on the most recent year of data from the Ambient Lake Monitoring Program (ALMP) or Illinois Clean Lakes Program (ICLP).
2. From Illinois General Use Water Quality Standards 35 Illinois Administrative Code, Part 302, Subpart B. Water Quality Standards are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx.
3. The total phosphorus standard at 35 Ill. Adm. Code 302.205 applies to lakes of 20 acres or larger. In smaller lakes, phosphorus (total) is listed when the narrative standard in 35 Ill. Adm. Code 302.203 is not attained due to aquatic plant or algal growth.
4. The Offensive Condition narrative standard in 35 Ill. Adm. Code 302.203.

Aesthetic Quality – Lake Michigan Open Waters

The open waters of Lake Michigan means all of the waters within Lake Michigan in Illinois jurisdiction lakeward from a line drawn across the mouth of tributaries to Lake Michigan, but not including waters enclosed by constructed breakwaters (35 Ill. Adm. Code 303.443 a). Assessments of *aesthetic quality use* in Lake Michigan open waters employ both the Offensive Conditions narrative standard in 35 Ill. Adm. Code 302.515, and the Lake Michigan Basin open waters total phosphorus standard (35 Ill. Adm. Code 302.504 c) intended to protect aesthetic quality. Attainment of the narrative standard is assessed by trained biologists experienced with the natural conditions and expectations for Lake Michigan open waters. The assessment involves comparing the observed conditions to the specific narrative language in the standard. If the standard is judged as not attained, one or more of nine specific conditions are noted as the cause of non-attainment. These conditions are based on the language in the standard and include: "sludge, bottom deposits, floating debris, visible oil, odor, plant or algal growth [aquatic macrophytes or aquatic algae], color or turbidity of other than natural origin." These conditions are the basis for listing causes of non-attainment. Also, when greater than 10% of the samples exceed the Lake Michigan open water standard for total phosphorus, aesthetic quality use is assessed as Not Supporting and phosphorus is listed as a cause of the impairment. The guidelines for assessing aesthetic quality use in Lake Michigan open waters are shown in Table C-28. Causes for non-attainment are shown in Table C-29.

Table C-28. Assessing *Aesthetic Quality Use* in Lake Michigan Open Waters

Use Support Rating	Criteria
Fully Supporting (Good)	Narrative Standard in 35 Ill. Adm. Code 302.515 is attained; and, $\leq$ 10 % of samples exceed 7 µg/L total phosphorus
Not Supporting (Poor)	Narrative Standard in 35 Ill. Adm. Code 302.515 is not attained; or, > 10 % of samples exceed 7 µg/L total phosphorus

Table C-29. Causes of *Aesthetic Quality Use* Impairment in Lake Michigan Open Waters

Potential Cause	Criteria based on Water Quality Standards[1]
Sludge	The presence of sludge which violates the narrative standard[2]
Bottom Deposits	The presence of bottom deposits which violates the narrative standard [2]
Floating Debris	The presence of floating debris which violates the narrative standard[2]
Visible Oil	The presence of visible oil which violates the narrative[2]
Odor	The presence of odor which violates the narrative standard[2]
Specific Odor Causing Pollutant	If identified, the specific pollutant causing odor which violates the narrative standard[2]
Aquatic Plants, Macrophytes	The presence of aquatic macrophytes which violates the narrative standard[2]
Aquatic Algae	The presence of aquatic algae which violates the narrative standard[2]
Phosphorus (Total)	> 10 % of samples exceed 7 µg/L total phosphorus[3], or When the narrative standard[2] is not attained due in part to aquatic plant or algal growth, phosphorus (total) is listed as a contributing cause
Color	The presence of color which violates the narrative standard[2]
Turbidity	The presence of turbidity which violates the narrative standard[2]

1. Illinois Lake Michigan Basin Water Quality Standards, 35 Ill. Adm. Code, Subpart E. Water Quality Standards are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx.
2. The Offensive Condition narrative standard in 35 Ill. Adm. Code 302.515.
3. For applying these guidelines, Illinois EPA typically uses data from the Lake Michigan Monitoring Program (LMMP) (most recent three years).

Aesthetic Quality – Lake Michigan Harbors and Shoreline Waters

Attainment of *aesthetic quality* use in Lake Michigan harbors and shoreline waters is based on the attainment of the Offensive Conditions narrative standard in 35 Ill. Adm. Code 302.515. Attainment of the narrative standard is assessed by trained biologists experienced with the natural conditions and expectations for these Lake Michigan Basin waters. The assessment involves comparing the observed conditions to the specific narrative language in the standard. If the standard is judged as not attained, one or more of nine specific conditions are noted as the cause of non-attainment. These conditions are based on the language in the standard and include: "sludge, bottom deposits, floating debris, visible oil, odor, plant or algal growth [aquatic macrophytes or aquatic algae], color or turbidity of other than natural origin." These conditions are the basis for listing causes of non-attainment.

The above Lake Michigan waters are not regulated for total phosphorus. However, if aquatic plants or algae are identified as a cause of aesthetic quality impairment, then total phosphorus is listed as a contributing cause.

The guidelines for assessing *aesthetic quality* use in these Lake Michigan basin waters are shown in Table C-30. Causes for non-attainment are shown in Table C-31.

Table C-30. Assessing *Aesthetic Quality Use* in Lake Michigan Harbors and Shoreline Waters

Use Support Rating	Criteria
Fully Supporting (Good)	Narrative Standard in 35 Ill. Adm. Code 302.515 is attained
Not Supporting (Poor)	Narrative Standard in 35 Ill. Adm. Code 302.515 is not attained

Table C-31. Causes of *Aesthetic Quality Use* Impairment in Lake Michigan Harbors and Shoreline Waters

Potential Cause	Criteria based on Water Quality Standards[1]
Sludge	The presence of sludge which violates the narrative standard[2]
Bottom Deposits	The presence of bottom deposits which violates the narrative standard [2]
Floating Debris	The presence of floating debris which violates the narrative standard[2]
Visible Oil	The presence of visible oil which violates the narrative[2]
Odor	The presence of odor which violates the narrative standard[2]
Specific Odor Causing Pollutant	If identified, the specific pollutant causing odor which violates the narrative standard[2]
Aquatic Plants, Macrophytes	The presence of aquatic macrophytes which violates the narrative standard[2]
Aquatic Algae	The presence of aquatic algae which violates the narrative standard[2]
Phosphorus (Total)	When the narrative standard[2] is not attained due in part to aquatic plant or algal growth, phosphorus (total) is listed as a contributing cause.
Color	The presence of color which violates the narrative standard[2]
Turbidity	The presence of turbidity which violates the narrative standard[2]

1. Illinois Lake Michigan Basin Water Quality Standards, 35 Ill. Adm. Code, Subpart E. Water Quality Standards are available at: http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx.
2. The Offensive Condition narrative standard in 35 Ill. Adm. Code 302.515.

Identifying Potential Sources of Impairment for All Uses and Water Types

Once a use is assessed as impaired (Not Supporting) we attempt to identify the sources related to the impairment. Table C-32 contains guidelines for identifying potential sources of use impairment in Illinois streams, freshwater lakes, and Lake Michigan-basin waters. Illinois EPA defines potential sources as known or suspected activities, facilities, or conditions that may be contributing to a cause of impairment of a designated use. Each potential source identified is linked to at least one specific cause of impairment. Information used to identify potential sources of impairment include Facility-Related Stream Survey data, ambient-monitoring data, effluent-monitoring data, facility discharge monitoring reports, review of National Pollutant Discharge Elimination System permits and compliance records, land use data, personal observations, and documented site-specific knowledge.

Table C-32. Guidelines for Identifying Potential Sources of Use Impairment in Illinois Streams, Freshwater Lakes and Lake Michigan-Basin Waters

Potential Source[(2)]	Guidelines
Acid Mine Drainage	Low pH and iron deposition due to mine drainage based upon actual observation and/or other existing data.
Agriculture	General agricultural related activities based upon satellite land use, actual observation and/or other existing data.
Animal Feeding Operations (NPS)	Open area feedlots or animal holding buildings and impervious areas based upon satellite land use, actual observation and/or other existing data.
Aquaculture (Not Permitted) or Aquaculture (Permitted)	Fish production facility based upon actual observation and/or other existing data.
Atmospheric Deposition – Acidity, or Atmospheric Deposition – Nitrogen, or Atmospheric Deposition – Toxics	Atmospheric deposition of nutrients, minerals, etc based upon actual observation and/or other existing data.
Channelization	Straightening of stream meanders based upon actual observation and/or other existing data.
Combined Sewer Overflows	Combined sanitary and storm sewer overflow based upon Facility-Related Stream Survey, Agency effluent monitoring, Discharge Monitoring Reports and/or other existing data.
Contaminated Sediments	High concentrations of metals and organic compounds in sediment based upon actual observation and/or other existing data.
Crop Production (Crop Land or Dry Land)	Nonirrigated crop production based upon satellite land use, actual observation and/or other existing data.
Dam Construction (Other than Upstream Flood Control Projects)	Dam construction activities based upon actual observation and/or other existing data.
Discharges from Biosolids storage, application or disposal	Storage, application or disposal of sludge based upon actual observation and/or other existing data.
Drainage/Filling/Loss of Wetlands	Draining or filling in of wetland areas based upon actual observation and/or other existing data.
Dredge Mining	Underwater mining (e.g., sand and gravel) activities based upon satellite land use, actual observation and/or other existing data.
Dredging (e.g., for Navigation Channels)	Deepening of stream channels based upon actual observation and/or other existing data.
Golf Courses	Golf course runoff directly to water body.

Table C-32 (cont.) Guidelines for Identifying Potential Sources of Use Impairment in Illinois Streams, Freshwater Lakes and Lake Michigan-Basin Waters

Potential Source[(2)]	**Guidelines**
Habitat Modification - other than Hydromodification	General alteration of riparian habitat based upon actual observation and/or other existing data
Highway/Road/Bridge Runoff (Nonconstruction Related)	Salt and pesticide runoff from highways, roads & bridges based upon actual observation and/or other existing data.
Highways, Roads, Bridges, Infrastructure (New Construction)	Highway/road/bridge construction activities based upon actual observation and/or other existing data.
Impacts from Abandoned Mine Lands (Inactive)	Abandoned mining operation based upon actual observation and/or other existing data.
Impacts from Hydrostructure Flow Regulation/Modification	Alteration of normal flow regimes (e.g., dams, channelization, impervious surfaces, water withdrawal) based upon actual observation and/or other existing data.
Inappropriate Waste Disposal	Illegal waste disposal sites based upon actual observation and/or other existing data.
Industrial Land Treatment	Land application of industrial wastes based upon actual observation and/or other existing data.
Industrial Point Source Discharge	Industrial point source discharge based upon Facility-Related Stream Survey, Agency effluent, DMR and/or other existing data.
Irrigated Crop Production	Irrigated crop production based upon satellite land use, actual observation and/or other existing data.
Lake Fertilization	Artificial fertilization activities (e.g., addition of triple super-phosphate to create algal blooms for macrophyte control or enhance lake fertility) based upon actual observation and/or other existing data.
Landfills	Leachate and/or runoff from landfills based upon actual observation and/or other existing data.
Leaking Underground Storage Tank Leaks	Leaks from storage tanks based upon actual observation and/or other existing data.
Livestock (Grazing or Feeding Operations	Riparian and/or upland pastureland grazing based upon satellite land use, actual observation and/or other existing data
Loss of Riparian Habitat	Removal of riparian vegetation based upon actual observation and/or other existing data.
Marina Boat Construction, or Marina Boat Maintenance, or Marina Dredging Operations, or Marina Fueling Operations, or Marina-related Shoreline Erosion, or Marina/Boating Pumpout releases, or Marina/Boating Sanitary On-vessel Discharges	In-water and on-land releases based upon actual observation and/or other existing data.
Mill Tailings	Milling operations based upon satellite land use, actual observation and/or other existing data.
Mine Tailings	Mine processing activities (e.g., gob piles) based upon satellite land use, actual observation and/or other existing data.
Municipal Point Source Discharges	Municipal point source discharge based upon Facility-Related Stream Survey, Agency effluent, DMR and/or other existing data.
Natural Sources [(1)]	See source methodology notes [(1)] below.
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	Septic system leachate or surface runoff based upon actual observation and/or other existing data.
Other Recreational Pollution Sources	Other recreational impacts based upon actual observation and/or other existing data.

Table C-32 (cont.) Guidelines for Identifying Potential Sources of Use Impairment in Illinois Streams, Freshwater Lakes and Lake Michigan-Basin Waters

Potential Source[(2)]	Guidelines
Other Spill Related Impacts	Accidental spills based upon actual observation and/or other existing data.
Permitted Silvicultural Activities	General forest management related runoff based upon satellite land use, actual observation and/or other existing data.
Pesticide Application	Herbicide/algicide applications (e.g., eradication of a beneficial macrophyte community, reduced dissolved oxygen. levels after application) based upon actual observation and/or other existing data.
Petroleum/Natural Gas Activities	Oil and gas production activities based upon satellite land use, actual observation and/or other existing data.
RCRA Hazardous Waste Sites	Hazardous waste leachate or surface runoff based upon actual observation and/or other existing data.
Runoff from Forest/Grassland/Parkland	Watershed related nonpoint source runoff other than from previously specified sources (e.g., lawn or parkland fertilization, leaf litter/forest bed runoff) based upon actual observation and/or other existing data.
Salt Storage Sites	Salt storage for winter highway maintenance based upon actual observation and/or other existing data.
Sanitary Sewer Overflows (Collection System Failures)	Broken sanitary sewer line or overflow based upon Facility-Related Stream Survey, Agency effluent and/or other existing data.
Septage Disposal	Disposal of septic tank sludge based upon actual observation and/or other existing data.
Site Clearance (Land Development or Redevelopment)	New residential/commercial construction activities based upon actual observation and/or other existing data.
Source Unknown	No identifiable source based upon available information.
Specialty Crop Production	Truck farming, orchards, or horticultural areas based upon satellite land use, actual observation and/or other existing data.
Streambank Modifications/Destabilization or Littoral/Shore Area Modifications (Nonriverine)	Shoreline modification/destabilization activities (e.g., bank erosion, rip rap, loss of habitat) based upon actual observation and/or other existing data.
Subsurface (Hardrock) Mining	Subsurface coal mining activities based upon satellite land use, actual observation and/or other existing data.
Surface Mining	Surface mining (e.g., coal, limestone) activities based upon satellite land use, actual observation and/or other existing data.
Unpermitted Discharge (Domestic Wastes)	Wildcat sewer discharge based upon Facility-Related Stream Survey, Agency effluent and/or other existing data.
Upstream Impoundments (e.g., Pl-566 NRCS Structures)	Upstream impoundment based upon actual observation and/or other existing data.
Urban Runoff/Storm Sewers	Urban and storm sewer runoff based upon actual observation and/or other existing data
Waterfowl	Nutrient enrichment from waterfowl wastes based upon actual observation and/or other existing data.

1. The Natural Sources category is reserved for waters impaired due to naturally occurring conditions (i.e., not caused by or related to past or present human activity) or due to catastrophic conditions. Clearly defined cases include: 1) metals due to naturally occurring deposits, 2) dissolved oxygen or pH associated with poor aeration or natural organic materials, where no human-related sources are present, 3) habitat loss or pollutant loads due to catastrophic floods, which are excluded from water quality standards or other regulations, and 4) high temperature, low dissolved oxygen, or high concentrations of pollutants due to catastrophic droughts with flows less than the average minimum seven-day low flow which occurs once every 10 years.
2. Other rare or uncommon sources in addition to those listed here are available in the Assessment Database and may be used when appropriate.

C-3. Assessment Results

This section presents the results of Illinois' surface water assessments, including the five-part categorization of all surface waters, the Section 303(d) List, state level summaries of designated use support, and CWA Section 314 (Lakes Program) reporting requirements.

Five-Part Categorization of Surface Waters

USEPA's latest Integrated Report guidance (USEPA 2005) calls for all waters of the state to be reported in a five category system as below. Although the guidance allows waters to be placed into more than one category, Illinois EPA treats all categories as mutually exclusive.

Category 1: Segments are placed into Category 1 if all designated uses are supported, and no use is threatened. (Note: Illinois does not assess any waters as threatened)

Category 2: Segments are placed in Category 2 if some, but not all of the designated uses are supported. (All other uses are reported as Not Assessed or Insufficient Information)

Category 3: Segments are placed in Category 3 when there is insufficient available data and/or information to make a use-support determination for any use.

Category 4: Contains segments which have at least one impaired use but a TMDL is not required. Category 4 is further subdivided as follows based on the reason a TMDL is not required.

Category 4a: Segments are placed in Category 4a when a TMDL to address a specific segment/pollutant combination has been approved or established by USEPA. Illinois EPA places water bodies in category 4a only if TMDLs have been approved for all pollutant causes of impairment.

Category 4b: Segments are placed in Category 4b if technology-based effluent limitations required by the Act, more stringent effluent limitations required by state, local, or federal authority, or other pollution control requirements (e.g., best management practices) required by local, state or federal authority are stringent enough to implement applicable water quality standards (see 40 CFR 130.7(b)(1)) within a reasonable period of time.

Category 4c: Segments are placed in Category 4c when the state demonstrates that the failure to meet an applicable water quality standard is not caused by a pollutant, but instead is caused by other types of pollution (i.e. only nonpollutant causes of impairment). Water bodies placed in this category are usually those where aquatic life use is impaired by habitat related conditions. (See discussion in Section C-2 Assessment Methodology, Aquatic Life-Streams)

Category 5: Segments are placed in Category 5 if available data and/or information indicate that at least one designated use is not being supported and a TMDL is needed. Water bodies

in Category 5 (and their pollutant causes of impairment) constitute the 303(d) List that USEPA will review and approve or disapprove pursuant to 40 CFR 130.7.

Category 5-alt: Waters are placed in category 5-alt when alternative restoration approaches are used to address impairments instead of traditional TMDLs: An alternative restoration approach is a plan or a set of actions pursued in the near-term designed to attain water quality standards. Waters in category 5-alt remain on the 303(d) list until water quality standards are achieved or a TMDL is developed. When a State decides to pursue an alternative restoration approach for waters on its 303(d) list, USEPA expects the State to provide documentation that such an approach is designed to meet water quality standards and is a more immediately beneficial or practicable way to achieve water quality standards than the development of a TMDL in the near future. USEPA considers the adequacy of the State's documentation for pursuing an alternative restoration approach in determining whether to give credit to such an approach. For this cycle, Illinois has no waters in category 5-alt.

Table C-33 shows the results of this categorization for all Illinois surface waters. The category for each individual water body is shown in Appendices B2-B4

Table C-33. Size of Surface Waters Assigned to Reporting Categories[(1)]

Water Body Type	Category							Total in State	Total Assessed
	1	2	3	4a	4b	4c	5		
Streams: miles	0	6,757	101,188	450	0	718	10,131	119,244	18,056
Freshwater Lakes: acres	0	5,248	167,042	1408	0	0	144,780	318,477	151,436
Lake Michigan Harbors: sq. miles	0	1.26	0	0	0	0	2.62	3.88	3.88
Lake Michigan Open Waters: sq. miles	0	0	1330	0	0	0	196	1,526	196
Lake Michigan Shoreline: miles	0	0	0	0	0	0	64	64	64

1. Categories are mutually exclusive. Illinois does not report water bodies in more than one category.

Section 303(d) List

The Clean Water Act and USEPA regulations require states to submit a list of water-quality-limited waters still requiring TMDLs, pollutants causing the impairment, and a priority ranking for TMDL development (including waters targeted for TMDL development within the next two years. This integrated report combines all of the requirements of sections 305(b), 303(d) and 314 into a single document.

Category 5 waters constitute Illinois' 303(d) List. The complete list is found in Appendix A-1 and A-2. The development of this list is based on the assessment methodology for determining attainment of designated uses for each water body segment as described previously in Section C-2. Those waters which have at least one Not Supporting designated use and at least one pollutant cause of impairment are included on the 303(d) List unless they fall under the specific exceptions

described in categories 4a, 4b or 4c. Waters included on previous lists are also included on the current list unless new information is available to update the assessment or there is other "good cause" for delisting them (see below). A complete list of all water bodies, all use attainment assessments, all identified potential causes of impairment (both pollutant and nonpollutant), and potential sources of impairment is found in Appendices B2-B4.

Prioritization of the Illinois Section 303(d) List

All pollutant causes of impairment associated with impaired designated uses require TMDL development. USEPA regulations at 40 CFR Part 130.7(b)(4) require establishing a priority ranking of 303(d) listed waters for the development of TMDLs that accounts for the severity of pollution and the designated uses. The prioritization of Illinois Section 303(d) List was done on a watershed basis instead of on individual water body segments. Illinois EPA watershed boundaries are based on USGS ten-digit hydrologic units (HUC). Developing prioritization for severity of pollution at the watershed scale provides Illinois with the ability to address watershed issues at a manageable level and document improvements to a watershed's health. The Illinois Section 303(d) List was prioritized based on the steps listed below:

Step 1- A high priority is given to waters where public water supply use is impaired by atrazine, simazine or nitrate. For those waters, TMDLs will be developed based on the entire watershed, whether smaller or larger than a ten-digit HUC.

Step 2- Watersheds with no approved or ongoing TMDLs were given medium priority. Ranking within this group is based on the total number of potential causes in each watershed that require TMDL development. The more potential causes of impairment identified, the higher the priority given to the watershed.

Step 3- Watersheds that have approved or ongoing TMDLs are given the lowest priority. However, TMDL implementation still occurs in watersheds with a low priority. The prioritization process for TMDL development does not affect TMDL implementation.

Illinois Section 303(d) waters are listed in order of priority in Appendix A-1.

Scheduling of TMDL Development

In accordance with USEPA regulations under 40 CFR Part 130.7(b)(4), "the priority ranking shall specifically include the identification of waters targeted for TMDL development in the next two years." In addition, USEPA guidance encourages states to ensure that the schedule provides that all TMDLs for every pollutant-segment combination listed on previous Section 303(d) Lists be established in a time frame that is no longer than 8 to 13 years from the time the pollutant-segment combination is first identified in Category 5.

In Illinois, development of TMDLs will be conducted on a watershed basis (i.e. USGS 10 digit hydrologic units) meaning that impaired waters upstream of a particular segment will have all

TMDLs conducted at the same time. In order to insure that all TMDLs are completed in a reasonable time frame, Illinois' TMDL development schedule calls for the initiation of efforts in approximately six TMDL watersheds in each year in the next 13 years. Appendix A-3 shows the watersheds, water bodies and pollutants for which TMDLs will be developed in the next two years. The TMDL development schedule provided in Appendix A-3 replaces all schedules previously submitted by the Illinois EPA to USEPA. The schedule will be reviewed and updated in the future, as needed, to ensure timely development of TMDLs, given available resources.

The Illinois EPA's long-term schedule for TMDL development for all waters on the 2016 Section 303(d) List, projected over a 13-year period, is consistent with other Illinois EPA program cycles which are typically five years, including statewide monitoring programs such as the rotational intensive river basin surveys and issuance of NPDES permits. The long-term TMDL development schedule will be reviewed and revised, as needed, in conjunction with future Section 303(d) Lists submitted to USEPA.

In August of 2011, USEPA's Office of Water, in cooperation with the Association of Clean Water Administrators (ACWA), and the Environmental Law Institute (ELI), started developing the frame work for the Long-Term Vision for Assessment, Restoration, and Protection under the CWA Section 303(d) Program (a.k.a, "Vision" see Appendix F). The Vision is intended to help states, tribes, and territories prioritize impaired waterbodies for TMDL development, or use alternative approaches, and adaptive implementation plans for waterbodies to meet their designated uses and applicable water quality standards. Illinois EPA is working with USEPA to develop the Vision prioritization goals for the TMDL development program in Illinois.

Illinois EPA's draft Vision for Assessment, Restoration and Protection under the CWA Section 303(d) Program is two-fold. The two strategies are referred as:

1) **TMDL Development/Alternative Approach - Short-Term Vision Goal (2015-2018)**
2) **Nutrient Priority Watersheds - Long-Term Vision Goal (2016-2022**

The logic behind each of these two strategies and the way each strategy will be implemented are discussed in detail in the ***LONG-TERM VISION FOR ASSESSMENT, RESTORATION, AND PROTECTION UNDER THE CWA SECTION 303(d) PROGRAM (The Vision)*** report that will be available in December 2015 at the Agency's TMDL website**:**
http://www.epa.illinois.gov/topics/water-quality/watershed-management/tmdls/index

Removal of Waters on Illinois' 2014 Section 303(d) List

USEPA's Integrated Report guidance explains what constitutes good cause for not including in the current submission, segments that were included on the previous Section 303(d) List. These include:

1. The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable WQS(s) is being met.

2. The results of more sophisticated water quality modeling demonstrate that the applicable WQS(s) is being met.

3. Flaws in the original analysis of data and information led to the segment being incorrectly listed.

4. A demonstration pursuant to 40 CFR 130.7(b)(1)(ii) that there are effluent limitations required by state or local authorities that are more stringent than technology-based effluent limitations, required by the CWA, and that these more stringent effluent limitations will result in the attainment of WQSs for the pollutant causing the impairment.

5. A demonstration pursuant to 40 CFR 130.7(b)(1)(iii) that there are other pollution control requirements required by state, local, or federal authority that will result in attainment of WQSs for a specific pollutant(s) within a reasonable time (i.e., 4b).

6. Documentation that the state included on a previous Section 303(d) List an impaired segment that was not required to be listed by EPA regulations, (e.g., segments where there is no pollutant associated with the impairment).

7. Approval or establishment by USEPA of a TMDL since the last Section 303(d) List.

8. A state inappropriately listed a segment that is within Indian country, as defined in 18 U.S.C. Section 1151.

9. Other relevant information that supports the decision not to include the segment on the Section 303(d) List.

All water body/pollutant combinations on Illinois' Section 303(d) List from 2014 are included on the 2016 Section 303(d) List except the water body/pollutant combinations removed under the criteria cited above. Illinois EPA delists entire water bodies if all the designated uses are assessed as fully supporting or if all pollutant causes of impairment have been addressed by approved TMDLs. Listed causes of impairment may change when uses are reassessed even if the water is still considered impaired.

In a few instances when pollutant causes are delisted, there is a potential for an entire water body segment to be moved from Category 5 (the 303d List) to Category 4C (waters impaired by pollution but not by any pollutant, Appendix A-8). When any delisting results in a water body being moved from Category 5 to Category 4C, a review is conducted to determine whether any pollutant may still be causing impairment in that water body. If it is suspected that the water body is still impaired by a pollutant, cause unknown is listed and the water body remains on the 303(d) List.

Illinois' 2008 Section 303(d) list was partially disapproved by USEPA on October 22, 2008. Illinois EPA objected to the partial disapproval and sent a letter to USEPA on February 11, 2009, explaining in detail the reasons for those objections. The three main issues were: 1) Illinois'

removal of total nitrogen from its 2008 303(d) List as a cause of aquatic life use impairment; 2) a change in one of the guidelines Illinois uses to identify sedimentation/siltation as a cause of aquatic life use impairment which resulted in the removal of some listings of sedimentation/siltation; and 3) the reclassification of dissolved oxygen as a nonpollutant cause of impairment and the subsequent removal of this cause from Illinois' 2008 303 (d) List. In the 2012 cycle, Illinois reclassified dissolved oxygen as a pollutant and all dissolved oxygen impairments appear on Illinois' 2016 List unless covered by an approved TMDL or determined to be caused by non-pollutant issues. Since USEPA has yet to make a final determination on the remaining issues, most of the other disputed waters and causes that Illinois removed from its 2008 303(d) List have not been included on subsequent Lists including Illinois' 2016 303(d) List.

Illinois EPA's 2008 Integrated Report, USEPA's decision document and Illinois EPA's detailed comments and legal analysis regarding USEPA's partial disapproval of the 2008 303(d) list and proposal to list additional waters are available on the Agency's website at http://www.epa.state.il.us/water/tmdl/303d-list.html.

Appendix A-4 lists all segment/pollutant combinations included in Illinois' 2014 303(d) List (submitted to USEPA on March 24, 2014) but not included on the 2016 303(d) List submission.

TMDL Development and Implementation Status

In Illinois, most TMDLs are developed by individual contractors that have been selected through a competitive bidding process. Illinois EPA personnel manage the contracts. There are three stages in the TMDL development process.

Stage 1- Watershed Characterization, Data Analysis and Methodology Selection

- Description of the watershed
- Collection/analysis of available data
- Identify methodologies, procedures and models
- Determine if additional data is needed

Stage 2- Data Collection (optional stage)*

- Evaluate Stage 1 and collect additional data as needed
- The Agency or a contractor will collect data

Stage 3- Model calibration, TMDL Scenarios, Implementation Plan

- Develop TMDLs with data from Stages 1 and 2
- Develop and evaluate several scenarios
- Develop an implementation plan

*Stage 2 was added in the 2003 round of TMDLs. If Stage 1 identifies data as lacking, additional data may be collected for a more accurate TMDL development.

Appendix A-6 shows the implementation status of all TMDLs for the state of Illinois and includes the TMDL watersheds in progress. We anticipate that TMDL development for each watershed will be completed approximately three years from the initiation date. Stage 1 is scheduled to take a maximum of 12 months. Stage 2 is optional and the time frame will depend on the type and quantity of additional data required. Stage 3 has a maximum time frame of 18 months. To date, contractors are doing most of the TMDL development work for Illinois EPA.

The Illinois EPA views TMDLs as a tool for developing water-quality-based solutions that are incorporated into an overall watershed management approach. The TMDL establishes the link between water quality standards attainment and water-quality-based control actions. For these control actions to be successful, they must be developed in conjunction with local involvement, which incorporates regulatory, voluntary and incentive-based approaches with existing applicable laws and programs. The four Illinois programs that have provided funds for implementation of TMDL watersheds include: Illinois EPA's Nonpoint Source Management Program, Illinois Clean Lakes Program (ICLP), Illinois Priority Lake and Watershed Implementation Program (PLWIP), as well as the Illinois Department of Agriculture's Conservation Practices Program (CPP).

The Illinois EPA administers the Illinois Nonpoint Source Management Program, the ICLP and the PLWIP. The Illinois Nonpoint Source Management Program was developed to meet the requirements of Section 319 of the Clean Water Act (CWA). Section 319 projects can include educational programs and nonpoint source pollution control projects such as Best Management

Practices (BMPs). The ICLP is a financial assistance grant program for lakes with public access that supports interest and commitment to long-term, comprehensive lake management and ultimately results in improved water quality and enhanced lake use. The PLWIP supports lake protection/restoration activities at priority lakes where causes and sources of problems are apparent, project sites are highly accessible, project size is relatively small, and local entities are in a position to quickly implement needed treatments. Appendix A-7 shows past and present projects in TMDL watersheds funded under these programs.

Beginning in July of 2002, the Illinois Department of Agriculture began shifting a portion of its CPP funds to Soil and Water Conservation Districts to more directly address water quality concerns within TMDL watersheds. This program gives incentive payments to landowners/operators within that watershed to promote the use of management practices that reduce/control the movement of pollutants causing the water quality impairment.

Statewide Summary of Designated Use Support

Streams

Aquatic life, *fish consumption*, *primary contact*, *secondary contact*, *indigenous aquatic life*, and *public and food processing water supply* uses were individually assessed for degree of use support (Table C-34). Of the total 119,244 stream miles in Illinois, 18,044 stream miles (15.0%) were assessed for at least one of these six uses. *Aquatic life* use was Fully Supporting in 57.8 percent of the stream miles assessed for this use.

Table C-34. Statewide Individual Use-Support Summary for Streams, 2016

Designated Use	Statewide Miles Designated	Miles Assessed	Miles Fully Supporting (Good)	Miles Not Supporting (Fair)	Miles Not Supporting (Poor)	Miles Not Assessed
Aesthetic Quality	119,244	11,475	11,011	11,025	0	450
Aquatic Life	119,154	17,783	10,272	10,283	6,631	870
Fish Consumption	119,244	4,170	0	0	3,892	278
Indigenous Aquatic Life	90	90	14	14	19	57
Primary Contact	118,571	4,492	753	753	1,474	2,265
Public and Food Processing Water Supply	924	924	602	602	321	0
Secondary Contact(1)	119,244	753	753	--	--	118,491
Designated Use	**Miles Assessed**	**Percent of Statewide Miles Assessed**	**Percent of Assessed Miles as Fully Supporting (Good)**	**Percent of Assessed Miles as Not Supporting (Fair)**	**Percent of Assessed Miles as Not Supporting (Poor)**	**Percent of Statewide Miles Not Assessed**
Aesthetic Quality	11,461	9.6	96.1	0.0	3.9	90.4
Aquatic Life	17,762	14.9	57.8	37.3	4.9	85.1
Fish Consumption	4,167	3.5	0.0	93.3	6.7	96.5
Indigenous Aquatic Life	90	100.0	15.1	20.9	63.9	0.0
Primary Contact	4,492	3.8	16.8	32.8	50.4	96.2
Public and Food Processing Water Supply	924	100.0	65.2	34.8	0.0	0.0
Secondary Contact(1)	753	0.6	100.0	--	--	99.4

Note: Numbers and percentages may not add up due to slight rounding errors.

1. By definition, Secondary Contact Use is "Fully Supporting" in all waters in which Primary Contact Use is "Fully Supporting."

Potential causes of impairment for all designated uses in streams are summarized in Table C-35. Potential sources of impairment for all designated uses in streams are summarized in Table C-36. Results of individual use assessments are available in Appendix B-2.

Table C-35. Summary of Potential Causes for All Use Impairments in Streams, 2016

Potential Cause of Impairment	Stream Miles Impaired
Oxygen, Dissolved	4,713
Fecal Coliform	3,739
Mercury	3,277
Polychlorinated biphenyls	3,037
Alteration in stream-side or littoral vegetative covers	2,808
Phosphorus (Total)	2,097
Sedimentation/Siltation	1,809
Loss of Instream Cover	1,712
Total Suspended Solids (TSS)	1,004
Changes in Stream Depth and Velocity Patterns	912
Other flow regime alterations	797
Manganese	765
Cause Unknown	734
Iron	657
pH	508
Chloride	506
Aquatic Algae	467
Bottom Deposits	307
Atrazine	214
Temperature, water	186
Fish-Passage Barrier	167
Aldrin	162
Hexachlorobenzene	156
Aquatic Plants (Macrophytes)	142
Arsenic	136
Dioxin (including 2,3,7,8-TCDD)	131
Methoxychlor	129
Chlordane	99
DDT	98
Odor	98
Nickel	78
Sulfates	70
Copper	64
Nitrogen, Nitrate	59
Endrin	58
Total Dissolved Solids	56
Zinc	56
Low flow alterations	51
Silver	46
Ammonia (Total)	45

Potential Cause of Impairment	Stream Miles Impaired
Boron	45
Barium	43
Sludge	38
Cadmium	35
Turbidity	32
Color	31
Nonnative Fish, Shellfish, or Zooplankton	31
Phenols	31
Alterations in wetland habitats	28
Visible Oil	28
Oil and Grease	24
Simazine	23
Terbufos	22
Lindane	21
Dieldrin	17
Chromium (total)	17
Fluoride	15
Chlorine	14
Heptachlor	13
Debris/Floatables/Trash	11
Lead	11
Petroleum Hydrocarbons	11
.alpha.-BHC	8
Ammonia (Un-ionized)	6
Ethanol	6
Fish Kills	4

Table C-36. Summary of Potential Sources of All Use Impairments in Streams, 2016

Potential Source of Impairment	Stream Miles Impaired
Atmospheric Deposition - Toxics	3,058
Crop Production (Crop Land or Dry Land)	3,024
Channelization	2,755
Agriculture	2,442
Loss of Riparian Habitat	1,762
Municipal Point Source Discharges	1,273
Urban Runoff/Storm Sewers	1,237
Natural Sources	658
Animal Feeding Operations (NPS)	644
Streambank Modifications/destabilization	644
Impacts from Hydrostructure Flow Regulation/modification	561
Dam or Impoundment	492
Contaminated Sediments	461
Surface Mining	345
Livestock (Grazing or Feeding Operations)	318
Habitat Modification - other than Hydromodification	301
Combined Sewer Overflows	296
Site Clearance (Land Development or Redevelopment)	230
Acid Mine Drainage	215
Petroleum/natural Gas Activities	184
Impacts from Abandoned Mine Lands (Inactive)	183
Upstream Impoundments (e.g., Pl-566 NRCS Structures)	155
Highway/Road/Bridge Runoff (Non-construction Related)	146
Irrigated Crop Production	125
Non-irrigated Crop Production	85
Drainage/Filling/Loss of Wetlands	63
Sediment Resuspension (Contaminated Sediment)	59
Mine Tailings	52
Industrial Point Source Discharge	46
Runoff from Forest/Grassland/Parkland	46
Coal Mining (Subsurface)	35
Sanitary Sewer Overflows (Collection System Failures)	35
Inappropriate Waste Disposal	31
Municipal (Urbanized High Density Area)	29
Golf Courses	24
Pesticide Application	22
Silviculture Harvesting	22
Dredging (E.g., for Navigation Channels)	20
Subsurface (Hardrock) Mining	13
Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)	13
Other Recreational Pollution Sources	10
Dredge Mining	9
Industrial Land Treatment	7
Unpermitted Discharge (Domestic Wastes)	7
Highways, Roads, Bridges, Infrastructure (New Construction)	6
Landfills	4
Rcra Hazardous Waste Sites	4
Managed Pasture Grazing	3
Spills from Trucks or Trains	3
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	1

Freshwater Lakes

Aquatic life, *fish consumption*, *primary contact*, *secondary contact*, *public and food processing water supply*, *aesthetic quality*, and *indigenous aquatic life* uses were individually assessed in lakes for degree of use support as shown in Table C-37. Of the total 318,477 acres of lakes and ponds in Illinois, 151,435 acres (403 lakes) were assessed for at least one of these seven uses. *Aquatic life* use was Fully Supporting in 90.9 percent of the lake acres assessed for this use.

Table C-37. Statewide Individual Use-Support Summary for Inland Lakes, 2016

Designated Use	Statewide Acres Designated(1)	Acres Assessed	Acres Fully Supporting (Good)	Acres Not Supporting (Fair)	Acres Not Supporting (Poor)	Acres Not Assessed	Acres as Insufficient Information
Aesthetic Quality	318,477	145,690	15,582	104,065	26,043	166,488	6,299
Aquatic Life	316,877	145,648	132,328	13,302	18	164,930	6,299
Fish Consumption	318,477	93,103	6,840	85,669	594	225,374	0
Indigenous Aquatic Life	1,600	1,600	1,600	0	0	0	0
Primary Contact	316,877	1,814	1,092	722	0	315,063	0
Public and Food Processing Water Supply	74,709	74,536	69,317	5,220	0	173	0
Secondary Contact(2)	318,477	1,092	1,092	--	--	317,385	0
Designated Use	**Acres Assessed**	**Percent of Statewide Acres Assessed**	**Percent of Assessed Acres as Fully Supporting (Good)**	**Percent of Assessed Acres as Not Supporting (Fair)**	**Percent of Assessed Acres as Not Supporting (Poor)**	**Percent of Statewide Acres Not Assessed**	**Percent of Statewide Acres as Insufficient Information**
Aesthetic Quality	145,690	45.7	10.7	71.4	17.9	52.3	2.0
Aquatic Life	145,648	46.0	90.9	9.1	0.0	52.0	2.0
Fish Consumption	93,103	29.2	7.4	92.0	0.6	70.8	0.0
Indigenous Aquatic Life	1,600	100.0	100.0	0.0	0.0	0.0	0.0
Primary Contact	1,814	0.6	60.2	39.8	0.0	99.4	0.0
Public and Food Processing Water Supply	74,536	99.8	93.0	7.0	0.0	0.2	0.0
Secondary Contact(2)	1,092	0.3	100.0	--	--	99.7	0.0
Designated Use	**Number of Lakes Assessed**	**Percent of Statewide Lakes Assessed(1)**	**Percent of Assessed Lakes Fully Supporting (Good)**	**Percent of Assessed Lakes Not Supporting (Fair)**	**Percent of Assessed Lakes Not Supporting (Poor)**	**Percent of Statewide Lakes Not Assessed**	**Percent of Statewide Lakes as Insufficient Information**
Aesthetic Quality	375	0.4	16.0	71.5	12.5	99.5	0.1
Aquatic Life	374	0.4	90.6	9.1	0.3	99.5	0.1
Fish Consumption	133	0.1	1.5	96.2	2.3	99.9	0.0
Indigenous Aquatic Life	1	100.0	100.0	0.0	0.0	0.0	0.0
Primary Contact	15	0.0	46.7	53.3	0.0	100.0	0.0
Public and Food Processing Water Supply	65	97.0	83.1	16.9	0.0	3.0	0.0
Secondary Contact(2)	7	0.0	100.0	--	--	100.0	0.0

Note: Numbers and percentages may not add up due to rounding.

1. Statewide, Illinois has 91,456 lakes and ponds designated for general uses, one lake designated for Indigenous Aquatic Life Use, and 67 lakes designated for Public and Food Processing Water Supply Use.

2. By definition, Secondary Contact Use is "Fully Supporting" in all waters in which Primary Contact Use is "Fully Supporting".

The Volunteer Lake Monitoring Program (VLMP) is primarily an educational program for Illinois citizens to learn about lake ecosystems, but it also serves as a cost-effective method for gathering fundamental information about Illinois inland lakes. The Illinois VLMP consists of three Tiers. Volunteers in each Tier participate in the basic Secchi disk monitoring program. Volunteers also record water color, aquatic plant growth, and several other factors relating to lake, weather, and watershed conditions at the time of monitoring. Tier 2 and Tier 3 volunteers also collect water samples for chemical parameters. The Tier 3 program is the most time- and labor-intensive of the Tiers. Tier 3 volunteers have been in the VLMP for several years and have proven themselves to be reliable and committed. They undergo the most intensive training of all VLMP volunteers. While Tier I and Tier 2 VLMP data are generally considered insufficient for making use-support determinations and 303(d) listings, Tier 3 data is considered sufficient for making use-support determinations and 303(d) listings as the sample collection and data undergo strict quality assurance guidelines.

For the period of 2011 through 2013, data from 22 VLMP Tier 3 lakes were available. When VLMP Tier 3 data and data collected by Illinois EPA staff under the Ambient Lake Monitoring Program were available for the same time period, both were evaluated together to make use-support decisions. When only data collected under the VLMP Tier 3 Program were available for this time period, those data were evaluated independently for making aquatic life and aesthetic quality use-support decisions.

Potential causes of use impairment in freshwater lakes are summarized in Table C-38. Potential sources of use impairment in freshwater lakes are summarized in Table C-39. Trophic status of freshwater lakes is summarized in Table C-40. Use assessment information for individual lakes is available in Appendix B-3

“Significant Publicly Owned Lakes” are defined as having 20 acres or more surface area; however, some smaller lakes, which provide substantial public access and benefits to the citizens of Illinois, have also been defined as “significant.” For summary information regarding “significant publicly owned lakes,” refer to Appendix C.

Table C-38. Statewide Summary of Potential Causes of All Use Impairments in Freshwater Lakes, 2016

Potential Cause of Impairment	Acres Impaired
Phosphorus (Total)	132,003
Total Suspended Solids (TSS)	117,388
Mercury	78,337
Aquatic Algae	40,569
Polychlorinated biphenyls	25,859
Aquatic Plants (Macrophytes)	25,353
Oxygen, Dissolved	12,495
Cause Unknown	10,029
Chlordane	4,820
Sedimentation/Siltation	4,450
Silver	4,194
Aldrin	3,345
Nitrogen, Nitrate	3,072
pH	2,946
Turbidity	1,531
Manganese	1,168
Terbufos	929
Fecal Coliform	722
Total Dissolved Solids	657
Nonnative Fish, Shellfish, or Zooplankton	634
Cadmium	524
Endrin	524
Zinc	524
Atrazine	497
Nickel	325
Color	310
Fluoride	172
Hexachlorobenzene	172
Odor	75
Simazine	75
Non-Native Aquatic Plants	62
Debris/Floatables/Trash	35
Copper	4

Table C-39. Summary of Potential Sources of All Use Impairments in Illinois Inland Lakes, 2016.

Potential Source of Impairment	Acres Impaired
Source Unknown	102,089
Crop Production (Crop Land or Dry Land)	95,125
Littoral/shore Area Modifications (Non-riverine)	94,454
Runoff from Forest/Grassland/Parkland	86,553
Other Recreational Pollution Sources	77,364
Atmospheric Deposition - Toxics	77,230
Urban Runoff/Storm Sewers	41,202
Agriculture	29,317
Internal Nutrient Recycling	29,113
Municipal Point Source Discharges	26,623
Animal Feeding Operations (NPS)	25,355
Contaminated Sediments	13,775
Golf Courses	11,112
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	10,038
Rcra Hazardous Waste Sites	9,156
Industrial Point Source Discharge	7,048
Dredging (E.g., for Navigation Channels)	5,966
Waterfowl	2,855
Yard Maintenance	2,567
Rural (Residential Areas)	1,990
Dam or Impoundment	1,513
Other Turf Management	1,153
Impacts from Hydrostructure Flow Regulation/modification	940
Pesticide Application	904
Natural Sources	855
Residential Districts	779
Highway/Road/Bridge Runoff (Non-construction Related)	727
Site Clearance (Land Development or Redevelopment)	722
Streambank Modifications/destabilization	235
Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)	225
Sediment Resuspension (Clean Sediment)	222
Landfills	172
Wildlife Other than Waterfowl	148
Lake Fertilization	143
Impervious Surface/Parking Lot Runoff	132
Unspecified Urban Stormwater	129
Pollutants from Public Bathing Areas	96
Introduction of Non-native Organisms (Accidental or Intentional)	88
Specialty Crop Production	71
Municipal (Urbanized High Density Area)	62
Livestock (Grazing or Feeding Operations)	43
Other Spill Related Impacts	40
Other Marina/Boating On-vessel Discharges	23
Permitted Silvicultural Activities	11
Upstream Impoundments (e.g., Pl-566 NRCS Structures)	4

Table C-40. Trophic Status – All Illinois Freshwater Lakes

Trophic Status	Number of Lakes	Acres
Hypereutrophic (TSI ≥70)	122	67,024
Eutrophic (TSI ≥50 & <70)	296	79,413
Mesotrophic (TSI ≥40 & <50)	63	8,783
Oligotrophic (TSI <40)	12	438
Unknown	90,963	162,819
Total:	91,456	318,477

Lake Michigan

Table C-41 provides a summary of Lake Michigan assessment results for each individual use: *aquatic life*, *fish consumption*, *primary contact*, *secondary contact*, *aesthetic quality*, and *public and food processing water supply*. Tables C-42 and C-43 provide summaries of causes and sources of use impairment for Lake Michigan-basin waters. Of the total 1,526 square miles of Lake Michigan open waters in Illinois jurisdiction, only 196 square miles were assessed. All 196 square miles were rated as Fully Supporting *aquatic life* use. Complete assessment results for individual segments are shown in Appendix B-4.

Table C-41. Individual Use-Support Summary for Lake Michigan-Basin Waters, 2016

Lake Michigan Harbors; Units: Square Miles

Designated Use[1]	Total Size	Total Assessed		Size Fully Supporting (Good)	Size Not Supporting (Fair)	Size Not Supporting (Poor)	Size Not Assessed
		Size	%				
Aesthetic Quality	3.88	0.18	4.6	0.12	0	0.06	3.70
Aquatic Life	3.88	3.88	100	3.82	0	0.06	0.00
Fish Consumption	3.88	2.62	67.5	0	0	2.62	1.26
Primary Contact	3.88	0	0	0	0	0	3.88
Secondary Contact[2]	3.88	0	0	0	0	0	3.88

Table C-41 (cont.) Individual Use-Support Summary for Lake Michigan Basin Waters, 2016

Lake Michigan Open Water; Units: Square Miles

Designated Use[1]	Total Size	Total Assessed		Size Fully Supporting (Good)	Size Not Supporting (Fair)	Size Not Supporting (Poor)	Size Not Assessed
		Size	%				
Aesthetic Quality	1,526	196	12.8	0	0	196	1,330
Aquatic Life	1,526	196	12.8	196	0	0	1,330
Fish Consumption	1,526	196	12.8	0	0	196	1,330
Primary Contact	1,526	196	12.8	196	0	0	1,330
Public and Food Processing Water Supplies	196	196	100	196	0	0	0
Secondary Contact[2]	1,526	196	12.8	196 [2]	0[2]	0[2]	1,330

Lake Michigan Shoreline; Units: Miles

Designated Use[1]	Total Size	Total Assessed		Size Fully Supporting (Good)	Size Not Supporting (Fair)	Size Not Supporting (Poor)	Size Not Assessed
		Size	%				
Aesthetic Quality	64	0	0.0	0	0	0	64
Aquatic Life	64	0	0.0	0	0	0	64
Fish Consumption	64	64	100	0	0	64	0
Primary Contact	64	64	100	5.5	0	58.5	0
Secondary Contact[2]	64	5.5	8.6	5.5	0	0	58.5

1. .Illinois has jurisdiction over 1,526 square miles of Lake Michigan open water, 3.88 square miles of Lake Michigan harbors and 64 miles of Lake Michigan shoreline, which are covered under the Lake Michigan Basin Water Quality Standards. Also, 196 square miles of Lake Michigan are designated for Public and Food Processing Water Supply Use.
2. By definition, Secondary Contact Use is "Fully Supporting" in all waters in which Primary Contact Use is "Fully Supporting".

Table C-42. Statewide Summary of Potential Causes of All Use Impairments in Lake Michigan-Basin Waters, 2016

Lake Michigan Harbors; Units: Square Miles

Potential Cause of Impairment	Total Size (square miles)
Mercury	2.62
Polychlorinated biphenyls	2.62
Arsenic	0.06
Bottom Deposits	0.06
Cadmium	0.06
Chromium (total)	0.06
Copper	0.06
Lead	0.06
Phosphorus (Total)	0.06
Zinc	0.06

Table C-42 (cont.) Statewide Summary of Potential Causes of All Use Impairments in Lake Michigan-Basin Waters, 2016

Lake Michigan Open Water; Units: Square Miles

Potential Cause of Impairment	Total Size
Mercury	196
Phosphorus (Total)	196
Polychlorinated biphenyls	196

Lake Michigan Shoreline; Units: Miles

Potential Cause of Impairment	Total Size
Escherichia coli	58.5
Mercury	64
Polychlorinated biphenyls	64

Table C-43. Statewide Summary of Potential Sources of All Use Impairments in Lake Michigan-Basin Waters, 2016

Lake Michigan Harbors; Units: Square Miles

Source	Total Size
Source Unknown	2.62
Atmospheric Deposition - Toxics	2.62
Contaminated Sediments	0.06
Industrial Point Source Discharge	0.06
Urban Runoff/Storm Sewers	0.06

Lake Michigan Open Water; Units: Square Miles

Source	Total Size
Atmospheric Deposition - Toxics	196
Source Unknown	196

Lake Michigan Shoreline; Units: Miles

Source	Total Size
Atmospheric Deposition - Toxics	64
Source Unknown	64
Urban Runoff/Storm Sewers	0.8
Combined Sewer Overflows	0.8

C-4 Wetlands Condition Assessment

Overview

Wetlands have been defined as areas between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. Wetlands, such as marshes, swamps and bogs, support plants and animals adapted for life in water or in saturated soil.

Illinois once contained more than eight million acres of wetlands. The onset of development of the land for agricultural purposes and community development required the conversion of vast wetland areas to well-drained, functional open lands. Currently, approximately 920,000 wetland acres remain. Palustrine, riverine, and lacustrine wetlands are found in Illinois along the margins of lakes and ponds, throughout river floodplains, and as isolated depressions. Wetlands provide valuable habitat for 40 percent of the state's threatened and endangered species, as well as, benefits such as flood storage, water quality improvement and groundwater recharge. Demands for improved public health and safety, and pressures of agriculture and economic development continue to threaten modification, degradation, and conversion of the remaining wetlands. Alteration methods include dredging, filling, bridge construction, draining, flooding, and construction of dikes and levees. In addition, drought, sedimentation, overgrazing by wildlife, and other natural impacts can reduce a wetland's ability to function. It is difficult, if not impossible, to re-create or replace the multitude of benefits when wetland functions are lost.

The value of wetlands has become more evident as these areas have been depleted. Wetlands can be valuable assets in pollution treatment and in providing high quality habitat. Increased public awareness of wetland functions and value has placed special emphasis on the protection and creation of wetlands. This is reflected in state legislation. In the late 1980s, using federal guidelines, standards, specifications, and class systems and working with the federal government, the state completed an inventory of Illinois' remaining wetlands. This inventory has been included in the National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service. The inventory is being used by the Natural Resources Conservation Service in identification of areas subject to the provisions of the Food Security Act and by Illinois EPA's Bureau of Water as part of its review process required for permit issuance, as well as other uses. State agencies have developed working agreements resulting in the reduction of wetland loss by the actions of state agencies. The Illinois Wetlands Protection Act (IWPA) established state policies and procedures that minimize the destruction of existing wetlands in Illinois as a result of state and state-supported activities. The IWPA, however, provides for those instances when adverse impacts to wetlands are unavoidable by requiring coordination with the Illinois Department of Natural Resources (IDNR) and mitigation of the unavoidable losses.

Wetland Monitoring and Assessment Program

To meet the requirements of the Clean Water Act (CWA), Illinois EPA developed a comprehensive document entitled, "Wetland Monitoring and Assessment Program for the State of Illinois" (IEPA/BOW/07-020). To develop the program, Illinois EPA coordinated with other state and federal agencies, academic institutions, research entities, and others to form a Technical

Working Group comprised of individuals with expertise in wetland characterization, monitoring, sampling, and assessment. This working group provided much of the technical expertise to analyze available data, design needed research efforts, formulate monitoring and assessment protocols, and author the program document. The U.S. Geological Survey played a key role by assimilating and analyzing existing data and directing the research and protocol development efforts of the Technical Working Group. Input from Illinois Natural History Survey (INHS) staff that work within the state of Illinois' Critical Trends Assessment Program (CTAP) played a key role in development of the sampling protocol (chemistry, biology, and habitat) identified in the Wetland Monitoring and Assessment Program document.

CTAP Monitoring

CTAP monitors the health of wetland resources throughout the state. Because it is impractical to sample every wetland in the state, a probabilistic monitoring design is used by CTAP to provide a reasonable determination of the health of the state's wetland resources while also being economically feasible, logistically practical, and statistically valid. This program yields comprehensive data and information that can be used to 1) establish a baseline of wetland resources and conditions from which to determine trends and changes in quantity and quality over time, 2) determine reference conditions for the various classes of Illinois wetlands, 3) develop and maintain a database which can provide for management and compensatory mitigation decisions, 4) provide information from which to evaluate wetlands restoration, creation, mitigation, and protection programs, and 5) incorporate wetland summary information into this, and future, Integrated Reports.

CTAP revisits wetland sites every five years, and CTAP biologists are in the fourth cycle of monitoring. To date CTAP botanists have monitored over 230 forested and emergent wetlands across the state (Figure C-4). During the first five-year cycle of monitoring (1997-2001), 138 palustrine emergent wetlands and 44 forested wetlands (floodplain forests) were randomly selected and monitored. To date, 120 and 48 emergent and forested wetlands, respectively, have been sampled three or four times. Sixty emergent and three forested wetlands have been sampled once or twice since 1997. To make comparisons of the average wetland condition in Illinois, 17 emergent wetlands and 11 forested wetlands that are considered 'reference sites' because of their perceived quality were selected and monitored.

Based on cursory data analysis, wetlands in Illinois were generally found to be well populated with native plant species, but reference wetlands have greater richness of native species (Figure C-5). A more reliable indicator of ecological integrity may account for the identity of those native species; Coefficient of Conservatism scores give values ranging from 0 to 10 based on the affinity of a species for undisturbed habitats. Mean values for Coefficient of Conservatism of plant species were also greater at reference relative to randomly selected wetlands for both emergent wetlands (Figure C-6) and forested wetlands (Figure C-7), indicating that these sites contain species of greater conservation concern. Similarly, the Floristic Quality Index (FQI), which accounts for both mean Coefficient of Conservatism and species richness, was also greater at reference relative to randomly selected emergent wetlands (Figure C-8). A large number of randomly selected sites (29%, data not shown) were dominated by reed canary grass (*Phalaris arundinacea*), which is a non-native, invasive plant species that usually dominates a wetland to

the near exclusion of other plant species. CTAP botanists also observed that many wetland sites were small and subject to disturbances such as artificial drainage, mowing, herbicide drift, cattle grazing, or past attempts at cultivation and farming. Another surprising observation is that a considerable number of open, emergent wetlands are declining because they are closing in due to woody succession. These wetlands would have historically been kept more open due to fire and more intact hydrologic regimes. The loss of emergent, herbaceous wetlands to woody succession may be an ecological phenomenon worthy of increased monitoring, as these changes may negatively impact wildlife species that are reliant on open-water or wet-meadow wetlands. An analysis of the influence of wetland size and adjacent land cover on woody succession is ongoing.

During the 2011 field season, CTAP biologists collected vegetation and soils data for the USEPA's National Wetland Condition Assessment (NWCA). CTAP botanists sampled 12 sites in Illinois and 11 sites in Indiana. Two of the sites in both Illinois and Indiana were resampled, for a total of 27 site visits at 23 sites. In the future, these data may be integrated in CTAP study and analysis. CTAP biologists are planning to participate in NWCA sampling again in 2016, and are planning to conduct both NWCA and CTAP sampling protocols at each site to facilitate future comparisons of data conducted by these programs.

Revised National Wetland Inventory

Via funding from the Illinois Department of Natural Resources and U.S. Fish and Wildlife Service, Ducks Unlimited updated the NWI for Illinois. The results of this study can be found at http://www.ducks.org/conservation/glaro/gis-nwi-update. The Illinois Natural History Survey conducted an analysis of the accuracy of the mapping by comparing the map to areas where wetlands had been mapped from the field. The comparison highlighted that the NWI has some errors, but that the updated NWI is an improvement over the previous version.

Illinois Wetlands Index of Biological Integrity (w-IBI)

Under contract with USEPA Region 5, using data from 47 herbaceous and 27 forested wetlands sampled as part of CTAP, the Illinois Natural History Survey developed a wetland Index of Biological Integrity (w-IBI) to evaluate emergent and forested wetlands throughout Illinois. The w-IBI takes advantage of plant and bird data to rank any one wetland relative to all other wetlands in the state. The disturbance gradient with which the w-IBI was developed was multivariate and multi-scaled. Several dozen biological metrics for plants were tested, along with established metrics associated with bird conservation scores. In summary, 56% of the variation in biological integrity of herbaceous wetlands was explained by 2 variables: mean Coefficient of Conservatism (a metric of the average conservation importance of each plant species), and the number of native plant species in the ground layer. Bird conservation scores were also incorporated into this formula to provide biological redundancy to the w-IBI. In forested wetlands 79% of the variation was explained by three variables: tree density, mean Coefficient of Conservatism of the ground layer, and species richness of non-native plants. The addition of bird scores increased the explanatory power to 86%.

The w-IBI provides a tool to allow biologists in Illinois to quickly assess the status of a wetland. How the w-IBI was created, and how to collect data needed to evaluate wetlands using the wIBI, are outlined in a report entitled, "An Index of Biological Integrity (IBI) to Monitor and Assess Illinois" Wetlands." (Spyreas and Ward, 2011. Illinois Natural History Survey. University of Illinois at Urbana-Champaign).

For both emergent and forested wetlands, the values for w-IBI suggest that randomly selected wetlands are in a more degraded state than reference sites (Figures C-9, C-10). While this result is not surprising given that reference sites were selected because of their perceived quality, the results also suggest that the quality of emergent wetlands may have declined during the most recent sampling period (2012-2014; Figure C-9), although these results should be viewed with caution given that sampling from 2015 and 2016 is needed to make results for each period strictly comparable. In contrast, the results from forested wetlands suggest that the quality of sites increased in both the third and fourth sample rounds (reflected by decreased index scores; Figure C-10).

Using the w-IBI approach, we classified sites as representing high, medium, or low quality based on whether scores fell below the 15th percentile of all sites, between the 15th and 50th percentile, or above the 50th percentile, respectively. Again, reference sites generally fall within the category of 'high quality', although these sites also include some 'medium' and 'low quality' examples (Figures C-11, C-12). Viewing the results in this way also supports the conclusion that there may have been an increase in the proportion of 'low quality' emergent sites, and a decrease in the proportion of 'low quality' forested sites (Figures C-11, C-12). Indeed, analysis of trends in the probability of assigning sites into each category over time supports that the number of 'high quality' emergent and forested wetlands has remained relatively stable, whereas 'medium quality' emergent wetlands have declined and 'low quality' emergent sites have increased in proportion (Figure C-13). In contrast, the decreasing proportion of 'low quality' forested wetland sites may have been driven by increases in 'medium quality' sites (Figure C-14).

Evaluating the w-IBI in the context of restored wetlands

Researchers from the Illinois Natural History Survey and the Department of Natural Resources and Environmental Sciences at the University of Illinois have further examined the applicability of the w-IBI model and its individual metrics. The CTAP dataset does not contain a large number of restored wetlands and it was uncertain as to whether the existing w-IBI would apply to newly created wetlands, primarily because restored wetlands may have intentional plantings and other mitigating factors that inhibit or obscure their quality. However, because the w-IBI likely will be applied to these types of wetlands in the future, the current w-IBI was tested and was effective in predicting the quality of a supplemental group of restored wetlands that were sampled for this purpose.

Somewhat surprisingly, there was little evidence that the IBIs for natural and restored wetlands responded differently to the underlying disturbance gradient. Therefore, the w-IBI was found to meaningfully apply to restored wetlands, with confidence that it represented a robust characterization of surrounding human disturbance and consequent biological condition. Additionally, researchers were unable to detect any relationship in this study between the w-IBI,

or their component metrics, and water quality parameters in the restored wetlands. Since chemical measurements fluctuate widely, repeated sampling would have been necessary to establish long-term averages and ranges of variability.

Findings are outlined in a report entitled, "Does an Illinois Wetland Index of Biological Integrity Accurately Indicate Differences in Human Disturbance among Restored Wetlands?" (Matthews, Spyreas, Ward, and Benson, 2013. Department of Natural Resources and Environmental Sciences, and Illinois Natural History Survey, University of Illinois at Urbana-Champaign).

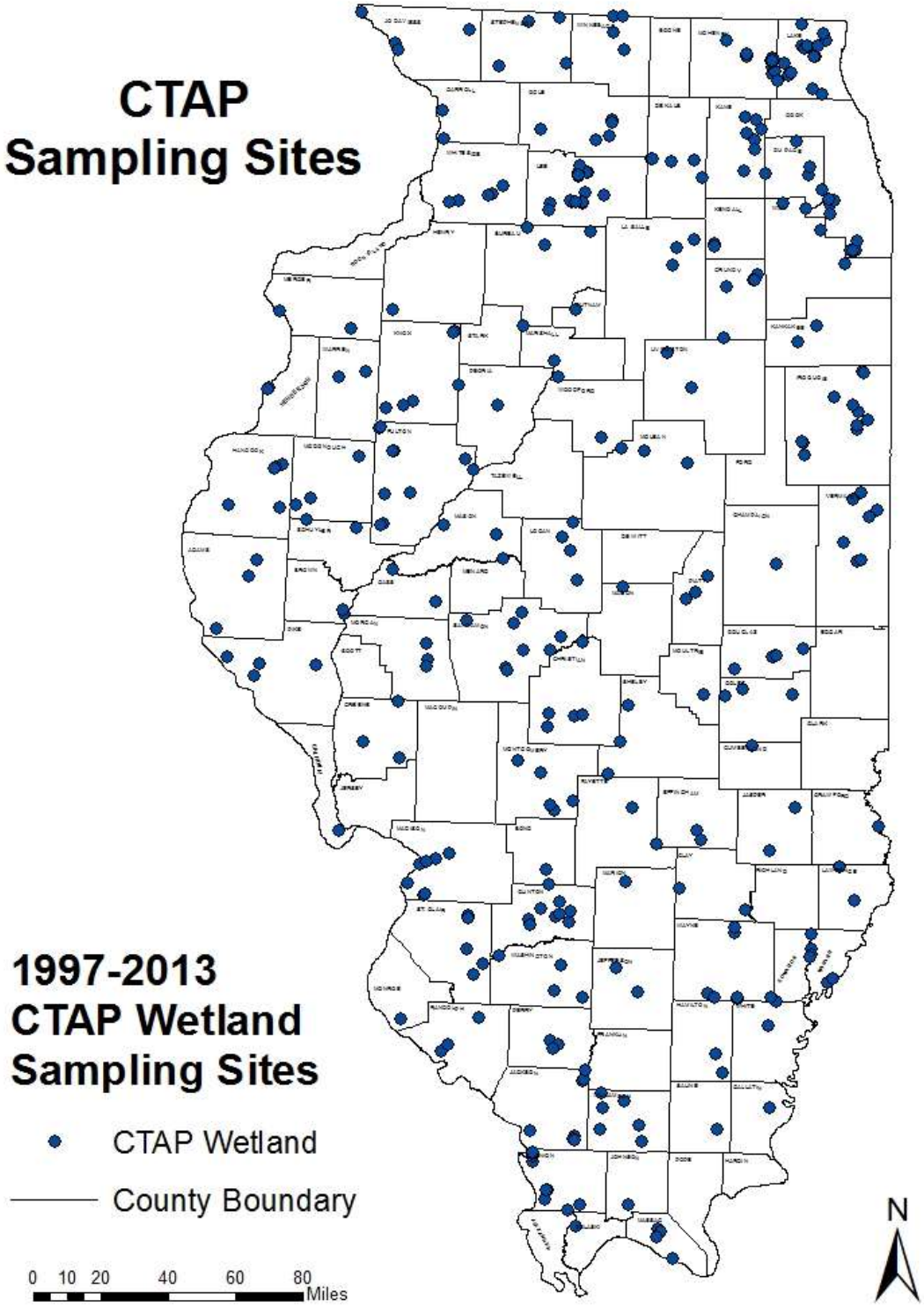


Figure C-4. Wetlands monitored through the Critical Trends Assessment Program from 1997–2013.

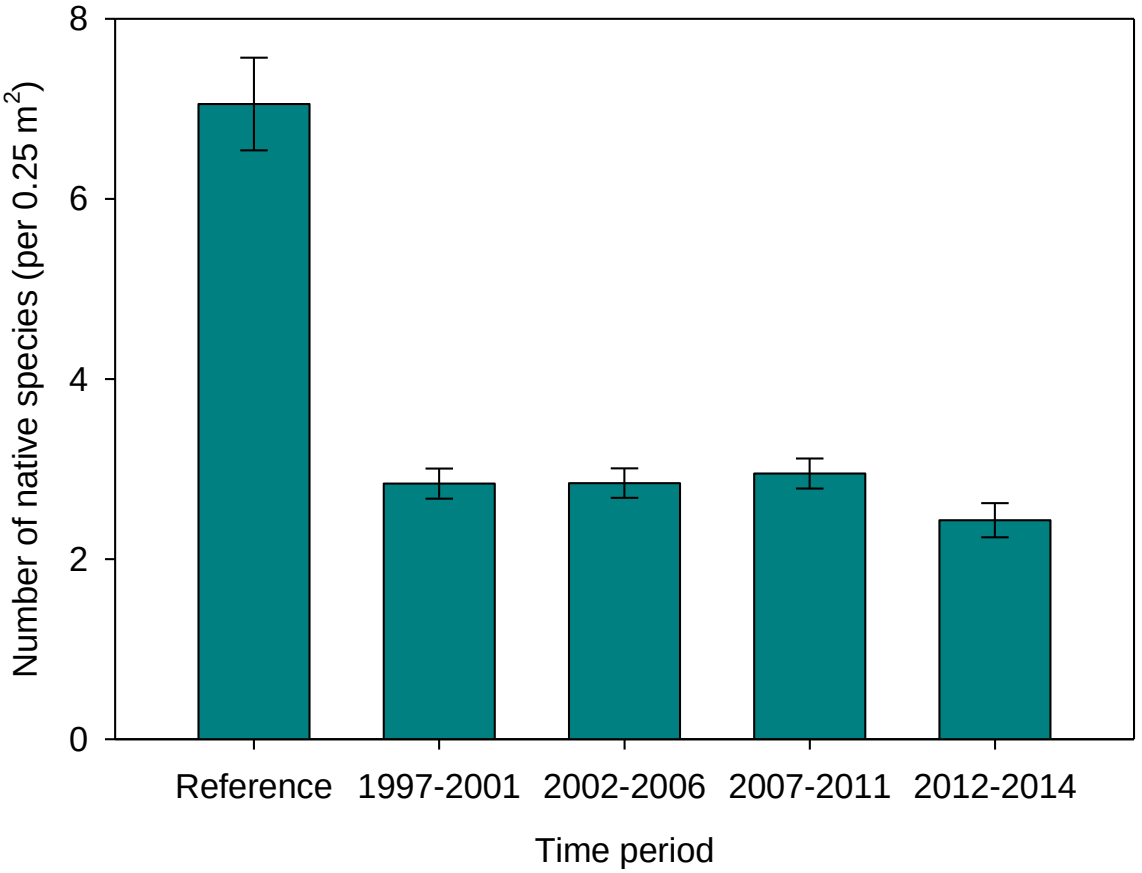


Figure C-5. The number of native species per quadrat in emergent wetlands sampled throughout Illinois as part of the Critical Trends Assessment Program, 1997-2014. Values for reference wetlands differ from randomly selected wetlands during all time periods. Values for the fourth sample round are significantly less than during the prior three sample rounds.

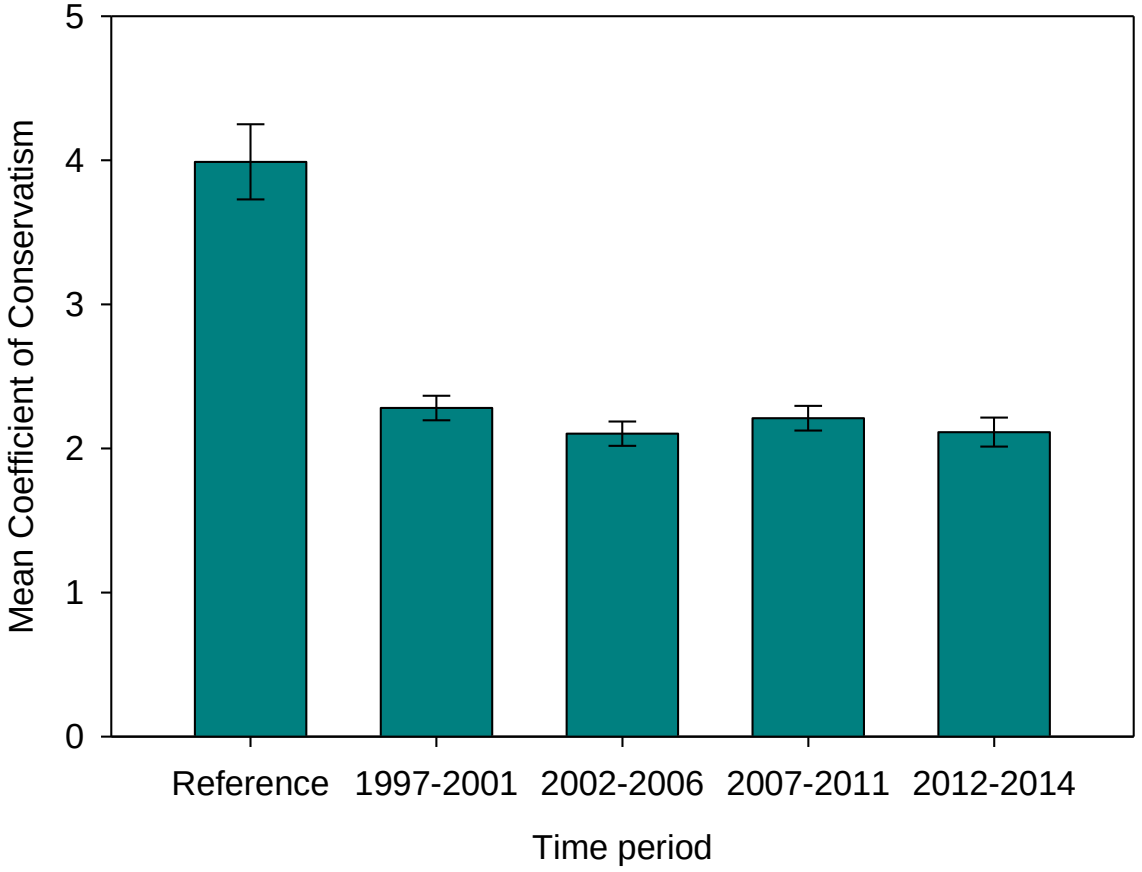


Figure C-6. The mean value for Coefficient of Conservatism, a measure of the affinity of a particular species to undisturbed habitats, for plants sampled in reference and randomly selected emergent wetlands in Illinois, 1997–2014.

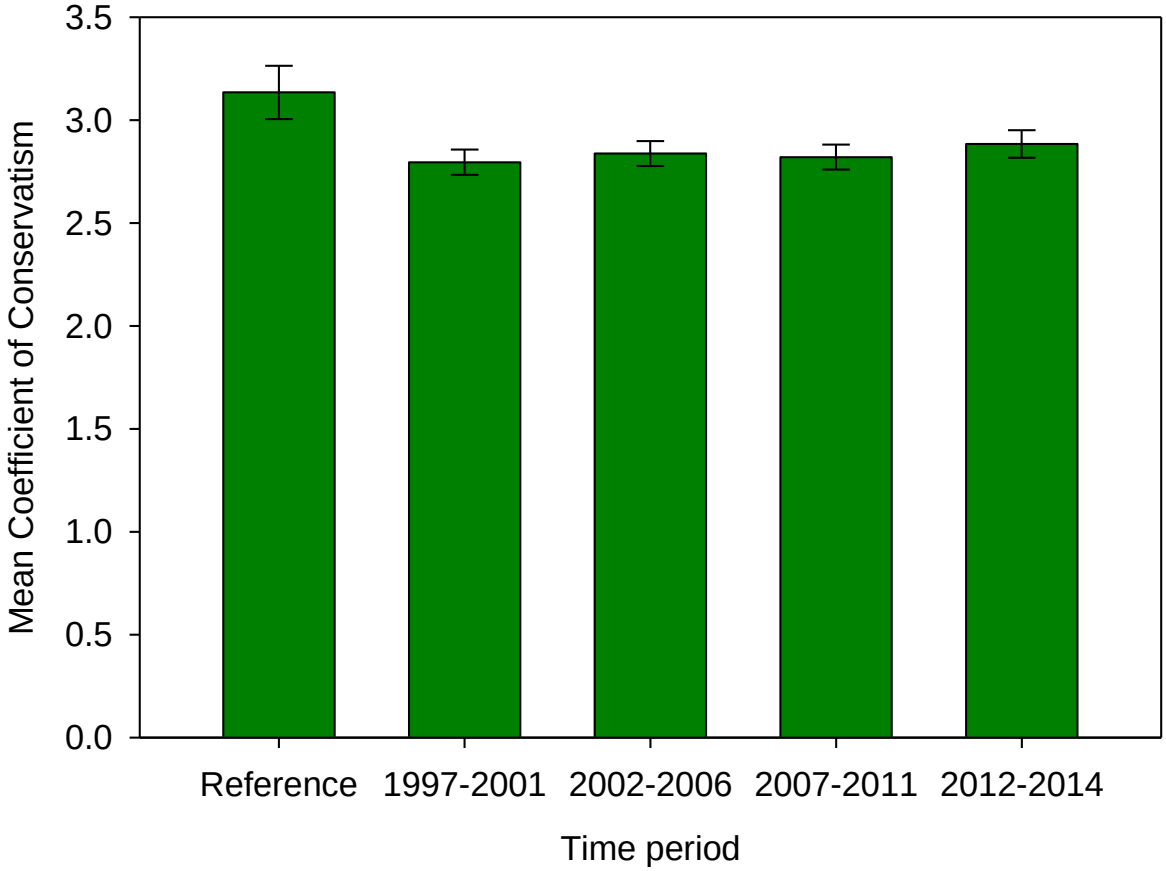


Figure C-7. The mean value for Coefficient of Conservatism, a measure of the affinity of a particular species to undisturbed habitats, for plants sampled in reference and randomly selected forested wetlands in Illinois, 1997–2014.

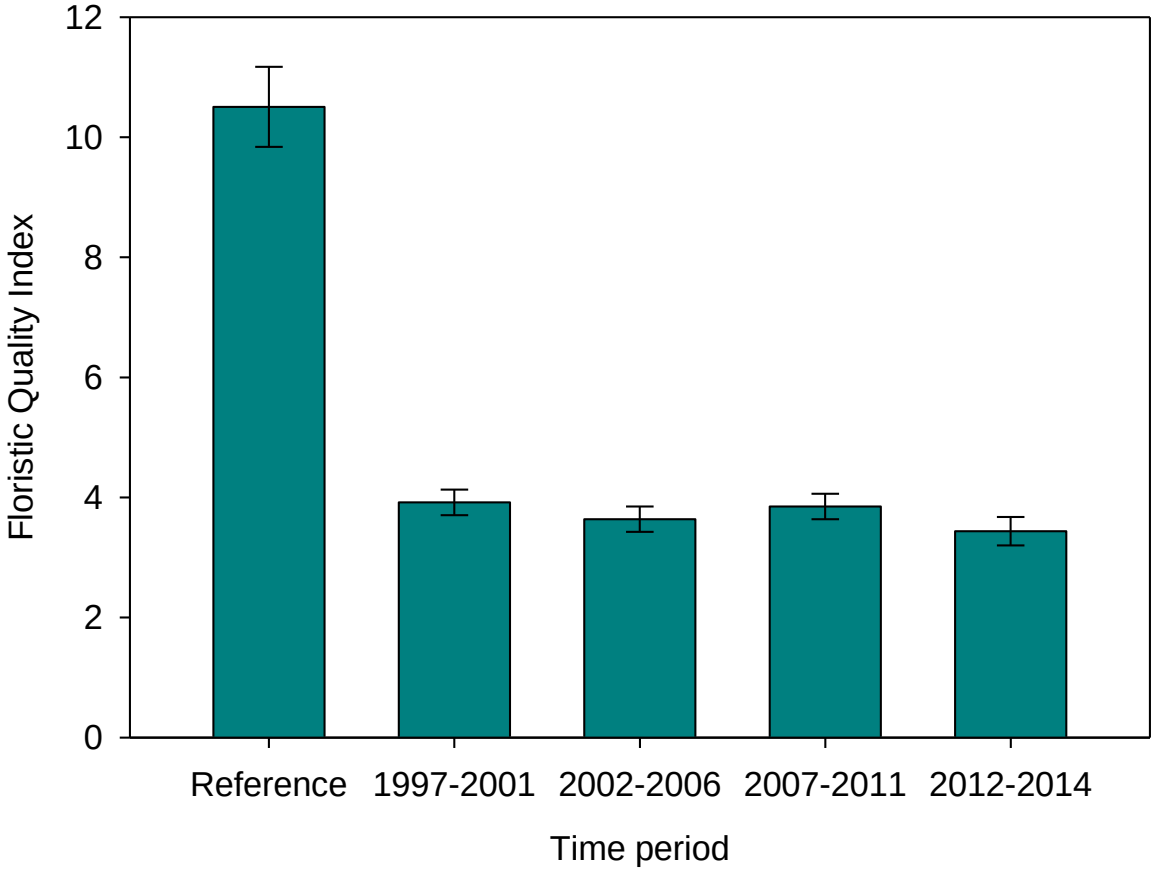


Figure C-8. Values for the Floristic Quality Index, a measure that combines the mean Coefficient of Conservatism and species richness of native plants, at reference and randomly selected wetlands in Illinois, 1997-2014.

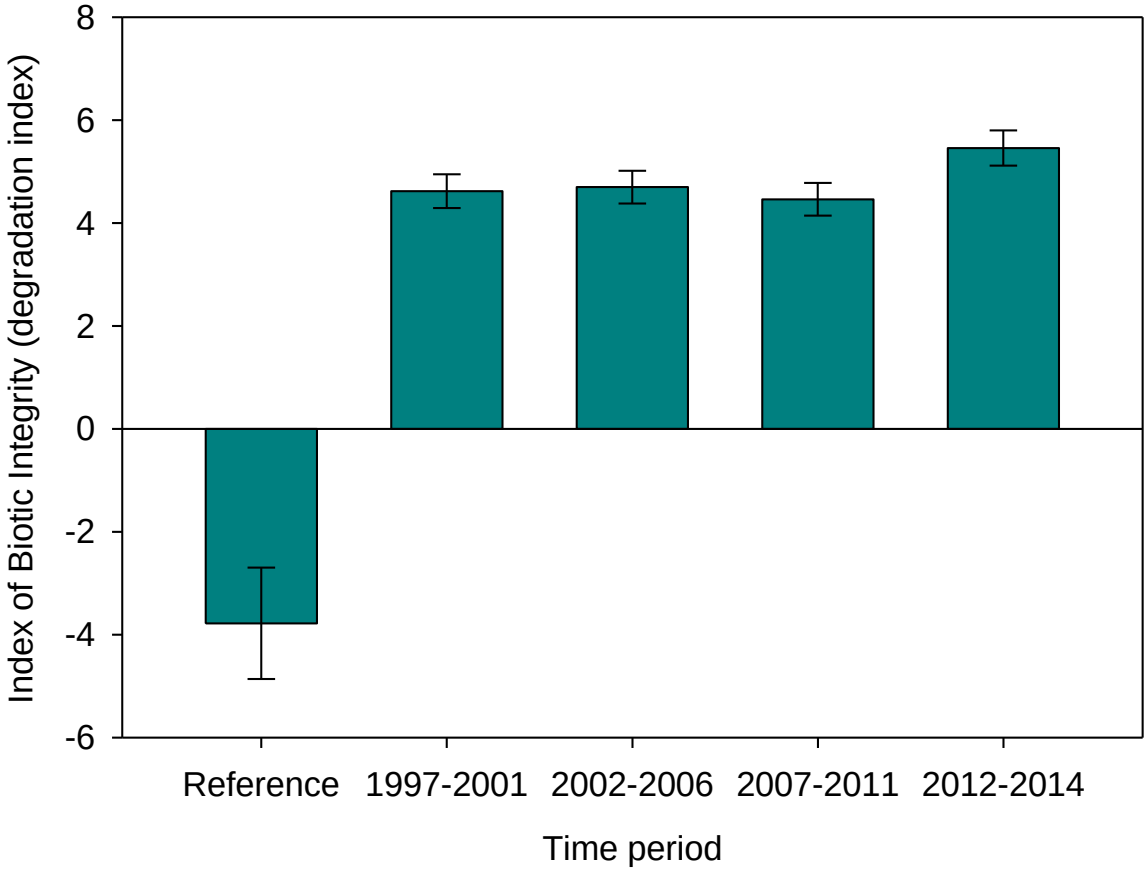


Figure C-9. Index of Biotic Integrity values calculated for reference and randomly selected emergent wetlands in Illinois, 1997–2014. Negative values indicate higher quality sites and, thus, positive values should be interpreted as an index of the degradation of a particular site.

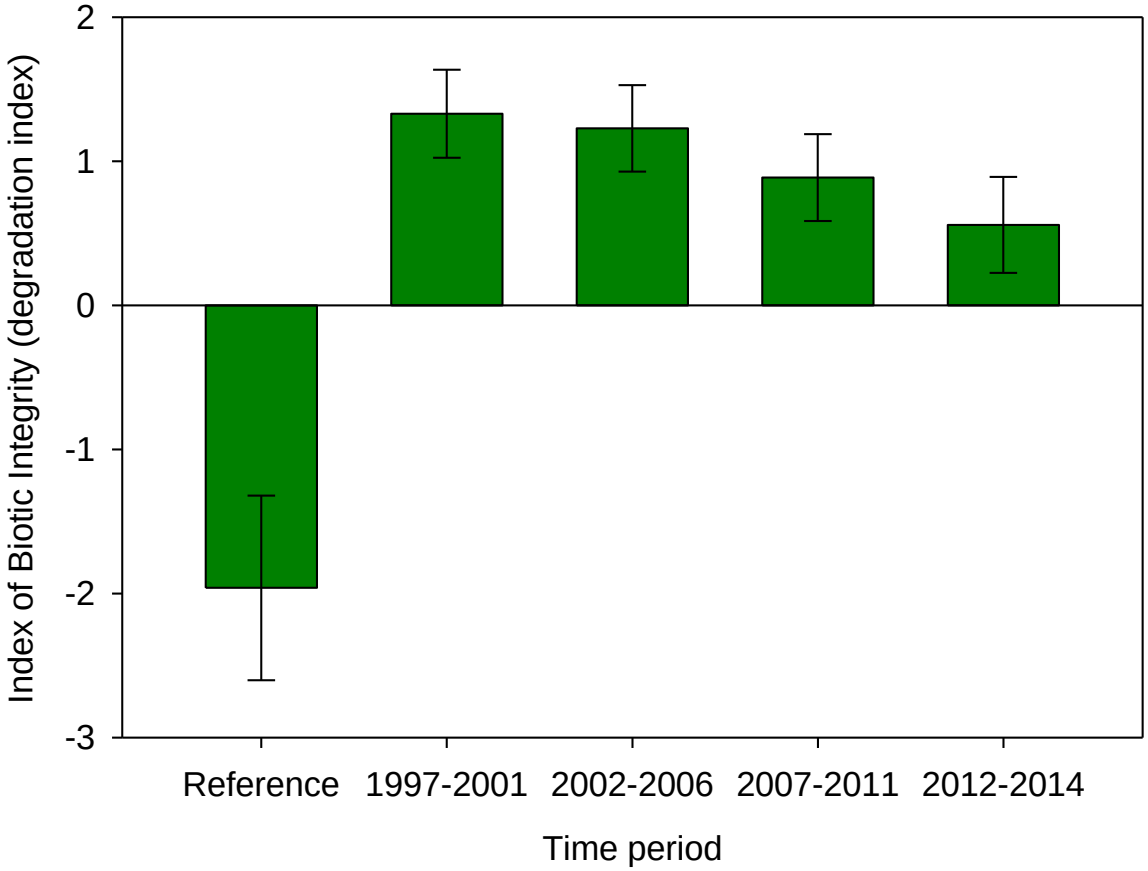


Figure C-10. Index of Biotic Integrity values calculated for reference and randomly selected forested wetlands in Illinois, 1997–2014. Negative values indicate higher quality sites and, thus, positive values should be interpreted as an index of the degradation of a particular site.

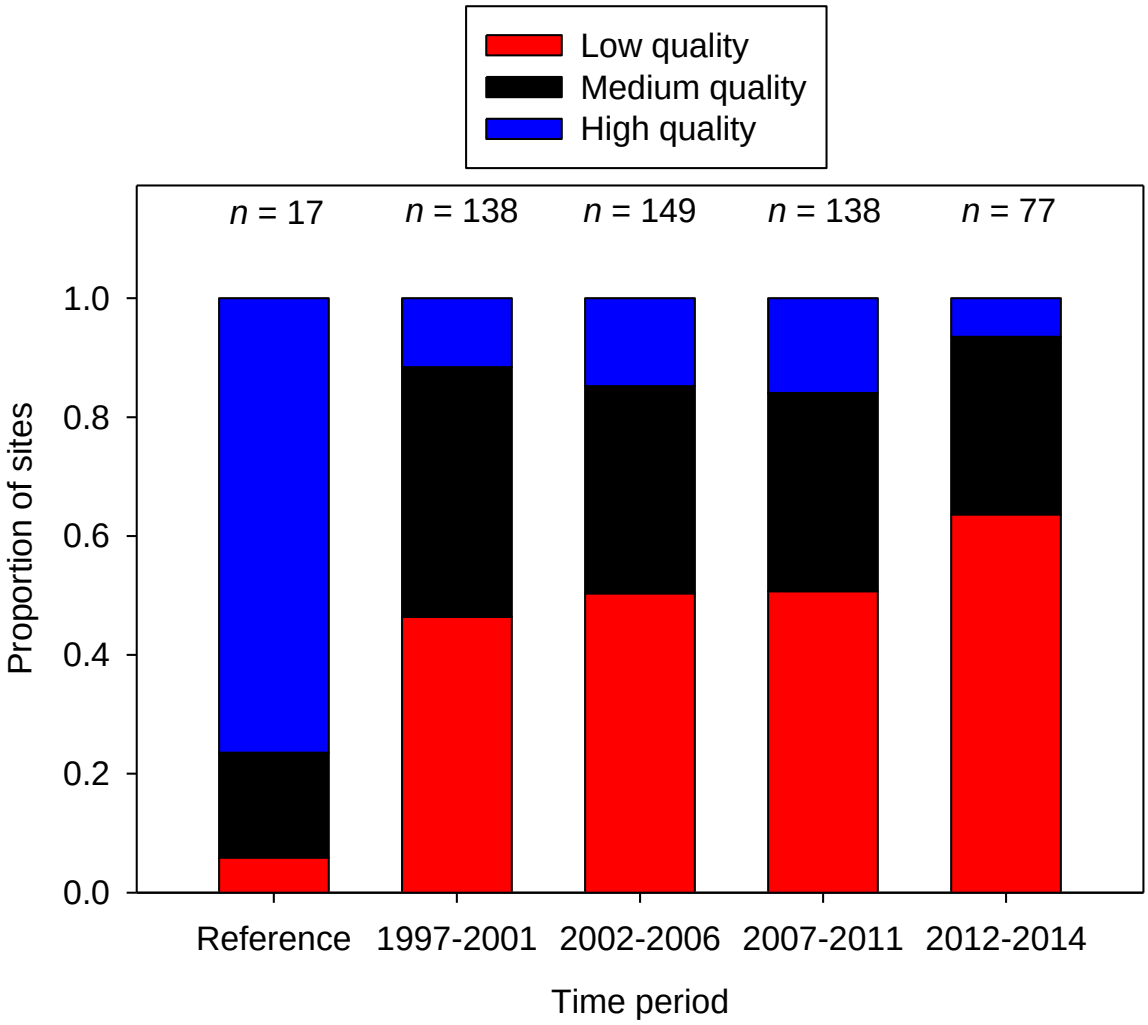


Figure C-11. Relative ranking of reference and randomly selected emergent wetland sites sampled in Illinois from 1997-2014 based on w-IBI values.

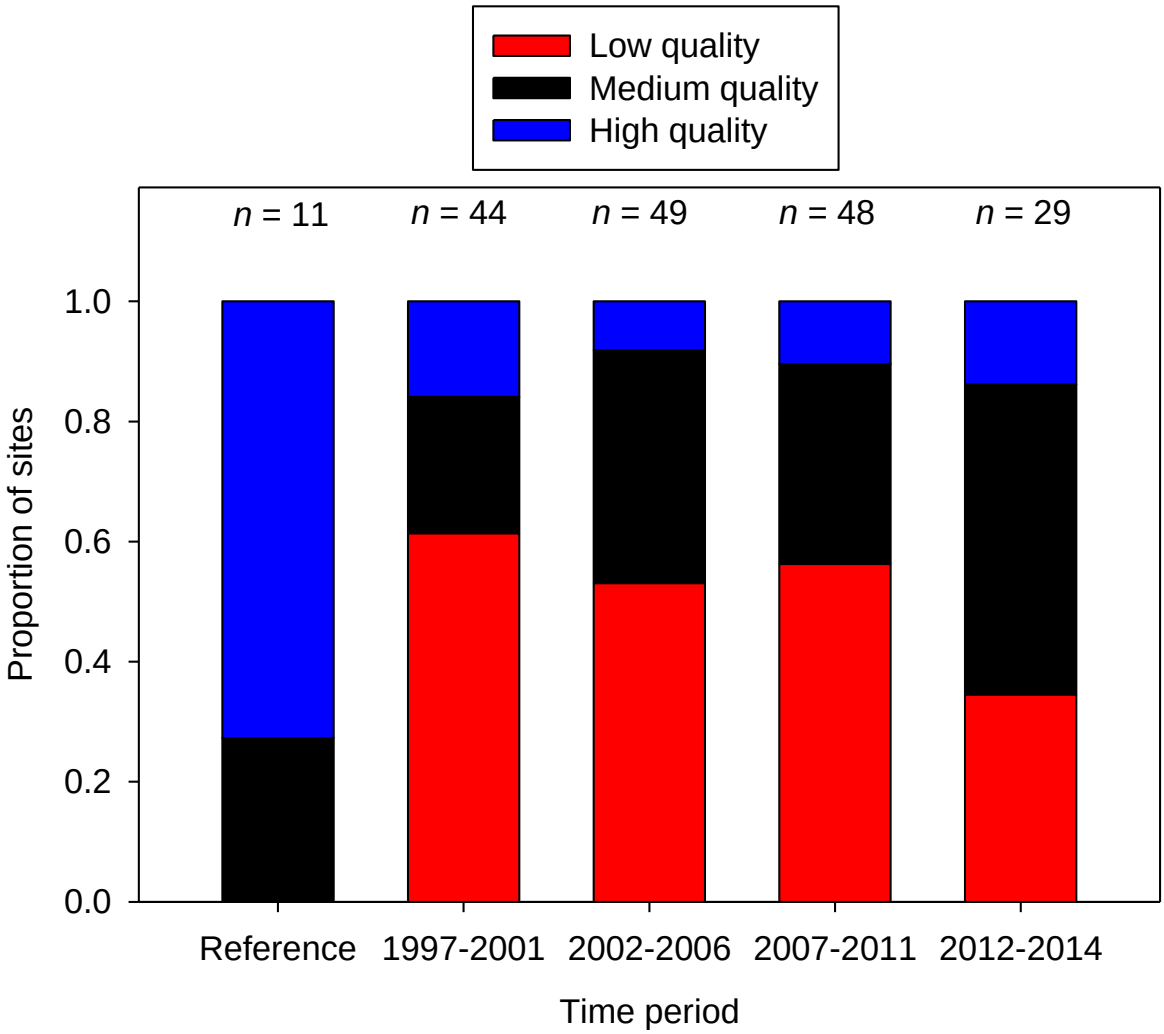


Figure C-12. Relative ranking of reference and randomly selected forested wetland sites sampled in Illinois from 1997-2014 based on w-IBI values.

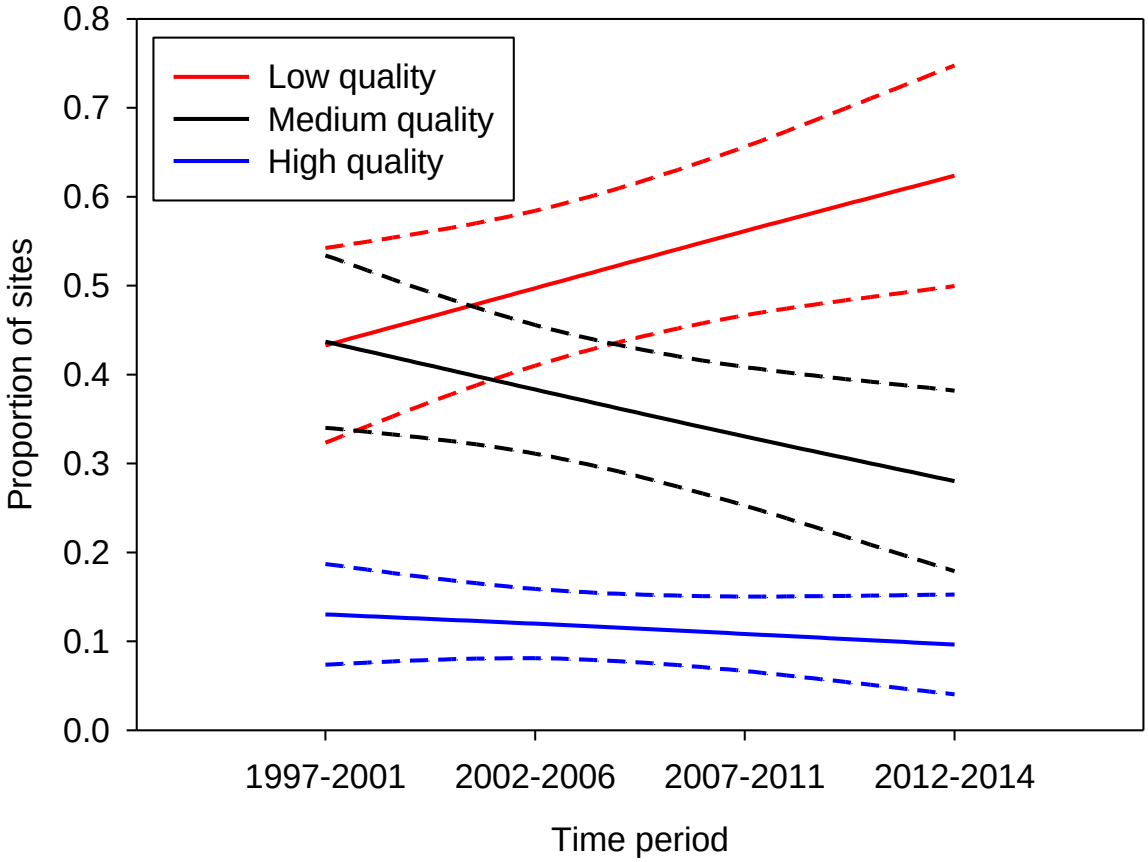


Figure C-13. Temporal trends in the probability of ranking randomly selected emergent wetland sites as low, medium, or high quality based on w-IBI values from sites sampled in Illinois from 1997-2014.

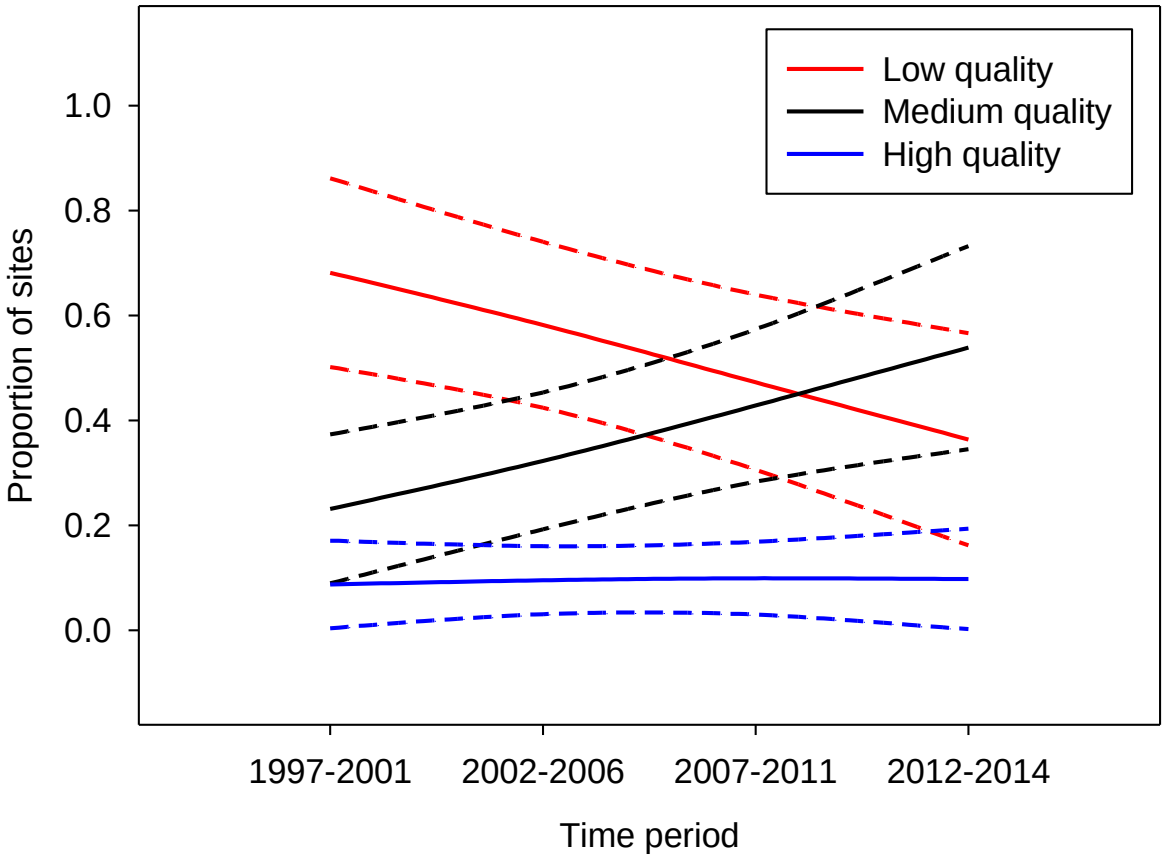


Figure C-14. Temporal trends in the probability of ranking randomly selected forested wetland sites as low, medium, or high quality based on w-IBI values from sites sampled in Illinois from 1997-2014.

C-5 Public Health Issues

USEPA guidance asks states to provide information regarding public health issues including information on *fish consumption*, *primary contact*, and *public and food processing water supply* uses. The summaries of use support for these three uses are shown in Table C-44. Potential causes of impairment for these uses are shown in Table C-45.

Table C-44. Individual Use-Support Summary for Public Health Related Uses, 2016

Streams: Designated Use	Total Miles	Miles Assessed	Miles Fully Supporting (Good)	Miles Not Supporting (Fair)	Miles Not Supporting (Poor)	Miles Not Assessed
Fish Consumption	119,244	4,167	0	3,890	278	115,077
Primary Contact	118,571	4,486	753	1,472	2,261	114,085
Public and Food Processing Water Supply	923	923	602	321	0	0
Freshwater Lakes: Designated Use	**Total Acres**	**Acres Assessed**	**Acres Fully Supporting (Good)**	**Acres Not Supporting (Fair)**	**Acres Not Supporting (Poor)**	**Acres Not Assessed**
Fish Consumption	318,477	93,103	6,840	85,669	594	225,374
Primary Contact	316,877	1,814	1,092	722	0	315,063
Public and Food Processing Water Supply	74,709	74,536	69,317	5,220	0	173
Lake Michigan Harbors: Designated Use	**Total Square Miles**	**Square Miles Assessed**	**Miles Fully Supporting (Good)**	**Miles Not Supporting (Fair)**	**Miles Not Supporting (Poor)**	**Square Miles Not Assessed**
Fish Consumption	3.88	2.62	0	0	2.62	1.26
Primary Contact	3.88	0	0	0	0	3.88
Lake Michigan Open Water: Designated Use	**Total Square Miles**	**Square Miles Assessed**	**Miles Fully Supporting (Good)**	**Miles Not Supporting (Fair)**	**Miles Not Supporting (Poor)**	**Square Miles Not Assessed**
Fish Consumption	1,526	196	0.0	0	196	1,330
Primary Contact	1,526	196	196	0	0	1,330
Public and Food Processing Water Supplies	196	196	196	0	0	0
Lake Michigan Shoreline: Designated Use	**Total Miles**	**Miles Assessed**	**Miles Fully Supporting (Good)**	**Miles Not Supporting (Fair)**	**Miles Not Supporting (Poor)**	**Miles Not Assessed**
Fish Consumption	64	64	0	0	64	0
Primary Contact	64	64	5.5	0	58.5	0

Note: Numbers may not add up due to slight rounding errors.

Table C-45. Potential Causes of Impairment for *Public and Food Processing Water Supply*, *Primary Contact*, and *Fish Consumption* Uses in Illinois Waters, 2014

STREAMS	Miles Impaired
Fish Consumption	
Mercury	3,272
Polychlorinated biphenyls	2,969
Dioxin (including 2,3,7,8-TCDD)	131
Chlordane	80
Primary Contact	
Fecal Coliform	3,739
Public and Food Processing Water Supply	
Atrazine	143
Iron	108
Nitrogen, Nitrate	59
Total Dissolved Solids	22
Simazine	15
Manganese	11

FRESHWATER LAKES	Acres Impaired
Fish Consumption	
Mercury	78,337
Polychlorinated biphenyls	25,831
Chlordane	4,820
Primary Contact	
Fecal Coliform	722
Public and Food Processing Water Supply	
Nitrogen, Nitrate	3,072
Manganese	1,168
Total Dissolved Solids	657
Atrazine	497
Simazine	74

LAKE MICHIGAN HARBORS	Square Miles Impaired
Fish Consumption	
Mercury	2.62
Polychlorinated biphenyls	2.62

LAKE MICHIGAN OPEN WATERS	Square Miles Impaired
Fish Consumption	
Mercury	196
Polychlorinated biphenyls	196

LAKE MICHIGAN SHORELINE	Miles Impaired
Primary Contact	
Escherichia coli	58.5
Fish Consumption	
Mercury	64
Polychlorinated biphenyls	64

PART D: PUBLIC PARTICIPATION

The Agency solicited information from the public to be used in the use assessment process as described in Section C-2.

We also solicited public input on the assessment results. A draft of the 2016 Integrated Report was placed on the Illinois EPA website (**http://www.epa.illinois.gov/topics/water-quality/watershed-management/tmdls/303d-list/index.**) for public review on February 11, 2016 and notices were sent out to all known interested parties of its availability. Hard copies of the report were available for those who requested them. Public comments were accepted from February 11, 2016 until midnight, March 11, 2016. The Agency responded to all pertinent comments and incorporated changes into the existing document. Responses to comments are documented in a Responsiveness Summary (Appendix G).

For TMDL development, the Illinois EPA has a comprehensive approach offering opportunities for stakeholders to participate, review and comment throughout the TMDL development process. For watersheds in which the development of TMDLs is currently underway, the Illinois EPA holds three public meetings. All public meetings are held at a location within the effected watershed to enable greater local participation. Illinois EPA and its contractor typically provide an update of the progress made. The final public meeting held within the watershed, is on the draft TMDL report. The public/stakeholders have an opportunity to comment 30 days prior to the meeting date, during the meeting and generally 30 days after the meeting. In addition, where applicable, the report is distributed to the Illinois Department of Agriculture, the USDA—Natural Resources Conservation Service and other state and federal partners prior to release to the public for technical review and input.

REFERENCES

Anderson, H.A., J.F. Amrhein, P. Shubat, and J. Hesse. 1993. Protocol for a uniform Great Lakes sport fish consumption advisory. Great Lakes Fish Advisory Task Force Protocol Drafting Committee.

AquaNova International, Ltd. and Hey & Associates, Inc. 2003. Lower Des Plaines River Use Attainability Analysis Final Report. Prepared for Illinois EPA (December 2003).

Camp, Dresser. and McKee. 2007. Chicago Area Waterway System Use Attainability Analysis Final Report. Prepared for Illinois EPA (August 2007).

Carlson, R.E. 1977. A trophic state index for lakes. Limnology and Oceanography. 23:361-369.

Illinois EPA. 1994. Quality assurance project plan. Bureau of Water, Division of Water Pollution Control. Springfield, Illinois.

Illinois EPA. 2007. Wetland Monitoring and Assessment. Program for the State of Illinois. IEPA/BOW/07-020. Bureau of Water, Division of Water Pollution Control. Springfield, Illinois.

Illinois EPA. 2014. Water Monitoring Strategy, 2015-2020. IEPA/BOW/14-001. Bureau of Water, Division of Water Pollution Control. Springfield, Illinois.

Illinois EPA. 2014. Guidance for Submission of Surface Water Data For Consideration in Preparing the 2016 Integrated Report on Illinois Water Quality, including the List of Clean Water Act Section 303(d) Impaired Waters. Bureau of Water, Division of Water Pollution Control. Springfield, Illinois.

Karr, J. R., K. D. Fausch, P. L. Angermeier, P. R. Yant, and I. J. Schlosser. 1986. Assessing biological integrity in running water: a method and its rationale. Illinois Natural History Survey Special Publication 5. Champaign, Illinois.

Matthews, Spyreas, Ward, and Benson. 2013. Does an Illinois Wetland Index of Biological Integrity Accurately Indicate Differences in Human Disturbance among Restored Wetlands. Department of Natural Resources and Environmental Sciences, and Illinois Natural History Survey. University of Illinois at Urbana-Champaign.

Rankin, E. T. 1989. The Qualitative Habitat Evaluation Index (QHEI): Rationale, methods, and application. State of Ohio Environmental Protection Agency, Columbus, OH.

Safe Drinking Water Act. 42 U.S.C. 300f-300j-18. 1996.

Smogor, R. 2000 (draft, annotated 2006). Draft manual for calculating Index of Biotic Integrity scores for streams in Illinois. Illinois Environmental Protection Agency, Bureau of

Water, Division of Water Pollution Control. Springfield, Illinois.

Smogor, R. 2005 (draft). Interpreting Illinois fish-IBI scores. Illinois Environmental Protection Agency, Bureau of Water, Division of Water Pollution Control. Springfield, Illinois.

Spyreas and Ward. 2011. An Index of Biological Integrity (IBI) to Monitor and Assess Illinois' Wetlands. Illinois Natural History Survey. University of Illinois at Urbana-Champaign.

State of Illinois, office of the Secretary of State, Illinois Administrative Code Title 35: Environmental Protection. (For an unofficial version of the Illinois Administrative Code, refer to http://www.legis.state.il.us/commission/jcar/admincode/035/035parts.html); official versions are available from the office of the Secretary of State of Illinois).

State of Illinois, office of the Secretary of State, Illinois Administrative Code Title 77: Public Health. (For an unofficial version of the Illinois Administrative Code, refer to http://www.legis.state.il.us/commission/jcar/admincode/077/077parts.html); official versions are available from the office of the Secretary of State of Illinois).

Tetra Tech Inc., 2004. Illinois Benthic Macroinvertebrate Collection Method Comparison and Stream Condition Index Revision, 2004.

United States Environmental Protection Agency. 1997. Guidelines for preparation of the comprehensive state water quality assessments (305(b) reports) and electronic updates: Supplement. EPA-841-B-97-002b. office of Water. Washington, D.C.

United States Environmental Protection Agency. 2002. National recommended water quality criteria: 2002. EPA-822-R-02-047. office of Water. office of Science and Technology. Washington, D.C.

United States Environmental Protection Agency. 2005. Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act. Watershed Branch Assessment and Watershed Protection Division, office of Wetlands, Oceans, and Watersheds, office of Water. July 29, 2005.