

Statistical Guidelines development for: TP, TN, and TSS (Sedimentation/Siltation)

Illinois Water Quality Report (prior to 2004)

Clean Water Act, Section 305(b) Report
Clean Water Act, Section 303(d) List

Illinois Integrated Water Quality Report (2006-present)

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

ILLINOIS DESIGNATED USES

Beneficial uses officially designated by the Illinois Pollution Control Board (IPCB) include:

- aquatic life,
- primary contact (swimming),
- public and food water processing supply,
- fish consumption,
- Chicago Area Waterway System (CAWS) and Lower Des Plaines River Water Quality and Indigenous Aquatic Life Use



Illinois Surface Water Monitoring programs include:

- Ambient Water Quality Monitoring Network (AWQMN),
- Intensive Basin Surveys (IBS),
- Facility-Related Stream Surveys (FRSS),
- Ambient Lake Monitoring Program (ALMP), and
- Lake Michigan Monitoring Program (LMMP),

Similarly, chemical and biological water resource data are collected on groundwater resources throughout the state to detect impairments.

Groundwater quality monitoring programs include:

- the Ambient Network of Community Water Supply Wells (CWS Network),
- Pesticide Monitoring Subnetwork of the CWS Network,
- Rotating Monitoring Network, and
- Dedicated Pesticide Monitoring Well Network.



Baseline Loadings of Nitrogen, Phosphorus, and Sediments From Illinois Watersheds (October 1980 - September 1996)

<https://epa.illinois.gov/topics/water-quality/watershed-management/resource-assessments.html>

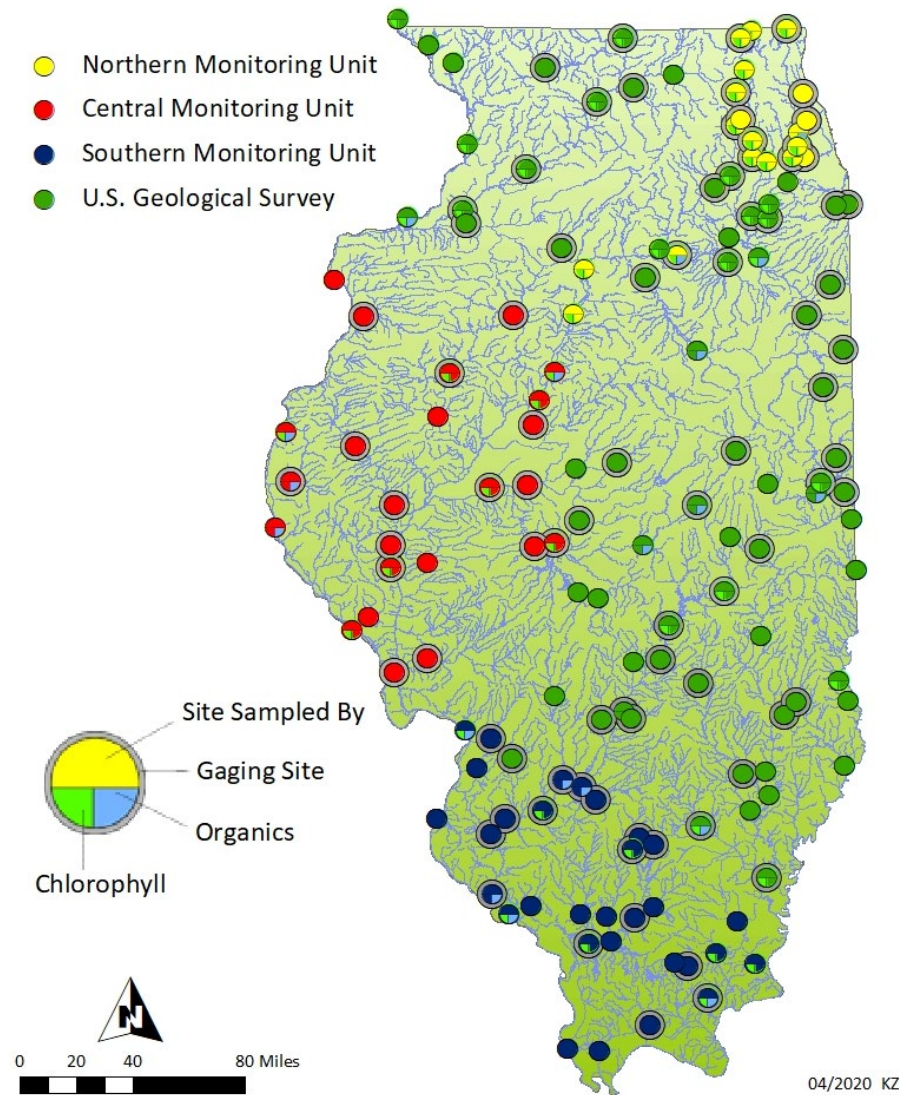
- To evaluate baseline loadings of nutrients and sediment to the Mississippi River from the state of Illinois and to identify the sources of those loads.
- Baseline loads were determined from the mean load calculated from the samples collected over the period of record (16 years).
- The Illinois EPA's Ambient Water Quality Monitoring Network was selected as the data set to conduct this analysis because it provided a statewide network with consistent sampling and analysis methods over an extended period of time. The network consisted of 209 stations on streams ranging in size from agricultural drainage ditches to the **Mississippi River**.
- During the course of preparing this information, it was deemed appropriate to include similar information on the portion of Illinois which drains into the **Ohio River basin**.



Baseline Loadings of Nitrogen, Phosphorus, and Sediments From IL Watersheds Cont.

DATA SOURCES

- Historically, stream water quality data in Illinois has been collected by the Illinois State Water Survey (ISWS), the Illinois Department of Public Health, the Illinois EPA and the United States Geological Survey (USGS).
- The Illinois EPA ambient water quality monitoring network (AWQMN) was chosen as the basis for this study because it provided a statewide network, included the parameters necessary for the analysis, along with a consistent sampling method and analysis over an extended period of time.
- The AWQMN is utilized by the Illinois EPA to provide baseline water quality information, to characterize and define trends in the physical, chemical and biological conditions of the state's waters, identify new or existing water quality problems and to act as a triggering mechanism for special studies or other appropriate actions.



Total Nitrogen, Sedimentation/Siltation, and Other Non-Standards-Based Pollutants as Causes of Use Impairment in the Integrated 305(b)/303(d) Water-Quality Report

- The parameters necessary for determining nutrient and sediment loadings are:
 - total ammonia-N (NH₄ + NH₃); total nitrate+nitrite-N; total Kjeldahl nitrogen;
 - total and dissolved phosphorus;
 - total suspended solids, and stream flow.
- To determine loads and yields, total ammonia-N and total nitrate+nitrite-N were added together as inorganic nitrogen. Nitrates and total Kjeldahl nitrogen were added together to determine total nitrogen.
- Summary statistics of concentrations and loads (in pounds per day) were calculated using a STORET “MEAN” program. Data summaries of individual stations which include the number of samples, minimum, maximum, mean, standard deviation, variance, sum and percentiles (10th, 25th, 50th, 75th, 85th, 90th, 95th) are provided for both concentrations and loads.
- For parameters that have no numeric water quality standards (e.g., nutrients, suspended solids, siltation), a statistical value (i.e., 85th percentile) is used as the threshold for identifying potential causes of impairment.

Guidelines for Identifying Potential Causes of Impairment of Aquatic

Code	Potential Cause	Program Name/Data Availability*	Medium	Guidelines	Guideline Reference
0910	Total Phosphorus	AWQMN or IBS/FRSS	Water	Total phosphorus exceeds 0.61 mg/l in at least one sample;	Statistical Guideline (3)
		IBS/FRSS	Sediment	or Phosphorus in sediment exceeds 2,800 mg/kg (highly elevated).	Statistical Guideline (2)
0925 0930	Total Nitrogen as N Nitrogen, Nitrate	AWQMN or IBS/FRSS	Water	Nitrate-N exceeds 7.8 mg/l in at least one sample (STORET code 630);	Statistical Guideline (3)
		IBS/FRSS	Sediment	or Kjeldahl nitrogen in sediment exceeds 4,680 mg/kg (highly elevated). (STORET code 627)	Statistical Guideline (2)
1100	Sedimentation/ Siltation	IBS/FRSS	Sediment	Unnatural bottom deposits: Silt/mud or sludge - Documented site-specific knowledge;	Narrative Standard (4)
		AWQMN or IBS/FRSS	Water	or $\geq 34\%$ silt/mud bottom substrate (see table 3-5). Total Suspended Solids exceed 116 mg/l in at least one sample.	Statistical Guideline (3) Statistical Guideline (3)

2. Short (1997).

3. 85th percentile of statewide AWQMN data, for water years 1978-1996.

4. 35 Ill. Adm. Code 302.203 (2002).

<https://epa.illinois.gov/content/dam/soi/en/web/epa/documents/water/water-quality/305b/305b-2004.pdf> (Table 3-7, page (pdf) 38-40/547)

Total Nitrogen, Sedimentation/Siltation, and Other Non-Standards-Based Pollutants as Causes of Use Impairment in the Integrated 305(b)/303(d) Water-Quality Report

- In 2004, IEPA switched from using total ammonia nitrogen (cause code 920) to total nitrogen (using nitrate in water or measures of Kjeldahl nitrogen in sediment) saying that total nitrogen was "a better indicator of potential negative effects of excessive nutrient in streams". In 2004, IEPA considered total nitrogen an indicator of potential negative effects of excessive nutrients.
- In the 2006 listing cycle the criteria was the 85th percentile of the statewide data, and 34% silt/mud coverage.
- In the 2008 list the criteria is 98th percentile of the statewide data with 75% coverage (i.e. only 2% of waters have >75% silt/mud coverage).



Total Nitrogen, Sedimentation/Siltation, and Other Non-Standards-Based Pollutants as Causes of Use Impairment in the Integrated 305(b)/303(d) Water-Quality Report (cont.)

Sedimentation/siltation

- In the 2006 listing cycle the criteria was the 85th percentile of the statewide data, and 34% silt/mud coverage. In the 2008 list the criteria is 98th percentile of the statewide data with 75% coverage (i.e., only 2% of waters have >75% silt/mud coverage). U.S. EPA considers >75% coverage high. Information reviewed by U.S. EPA shows data levels of sedimentation at 40-50% are problematic. Impairment is likely occurring before the sedimentation coverage is at 75%.
- In reporting-cycle 2008, Illinois EPA dissociated all instances of **total nitrogen** as a cause of impairment of Aquatic Life Use from the impaired-waters list submitted to the U.S. Environmental Protection Agency (USEPA). Similarly, Illinois EPA dissociated some instances of **sedimentation/siltation** as a cause of impairment of Aquatic Life Use.

USEPA - Decision Document for the Approval /Disapproval Illinois 2008 303(d) list, Category 5, of the Integrated Report Decision date October 22, 2008

Sedimentation/siltation

- In the 2006 listing cycle the criteria was the 85th percentile of the statewide data, and 34% silt/mud coverage. In the 2008 list the criteria is 98th percentile of the statewide data with 75% coverage (i.e., only 2% of waters have >75% silt/mud coverage). U.S. EPA considers >75% coverage high. Information reviewed by U.S. EPA shows data levels of sedimentation at 40-50% are problematic. Impairment is likely occurring before the sedimentation coverage is at 75%.
- Illinois EPA's decision was based on the previous methodology at 34% coverage will result in errors of listing waters impaired for sedimentation; however, Illinois EPA acknowledges it has no information showing a relationship between 34% and >75% silt/mud and the impairment of aquatic life use.



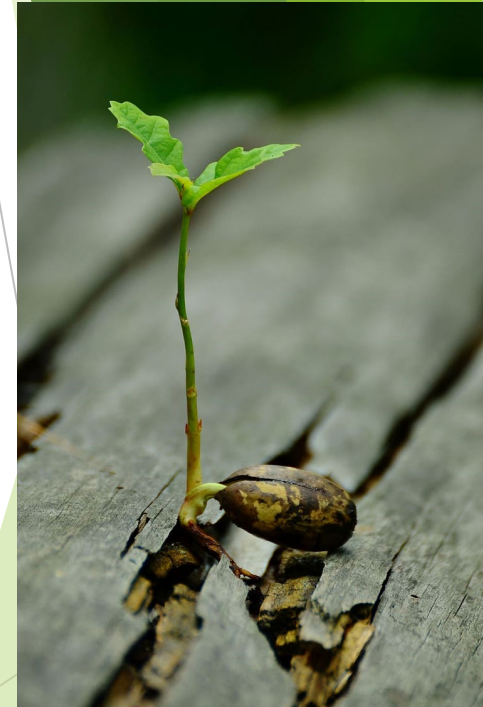
USEPA - Decision Document for the Approval /Disapproval Illinois 2008 303(d) list, Category 5, of the Integrated Report Decision date October 22, 2008

- On October 22, 2008, EPA partially approved and partially disapproved Illinois' 2008 Section 303(d) list and identified certain impairment causes for inclusion on Illinois' Section 303(d) list.
- **USEPA disagrees with the removal of the TN and Sedimentation/Siltation cause of impairment.**
- On December 29, 2008, USEPA published a notice in the Federal Register seeking public comment on these identifications.
- **USEPA took no further action on Illinois' 2008 list.**
- There was a mutual agreement between USEPA and Illinois EPA to continue submittal of the IR reports.
- Subsequently, Illinois EPA submitted its 2010, 2012, 2014 and 2016 lists on December 23, 2011, December 20, 2012, March 24, 2014, and July 11, 2016, respectively.



Final Action on Illinois' 2010, 2012, 2014 & 2016 Section 303(d) List Submittals

- USEPA approved Illinois' 2010, 2012, 2014 and 2016 Section 303(d) lists with respect to the waters and associated impairments identified on the submitted lists, with the exception of TN and sedimentation/siltation causes of aquatic life use impairment for certain waters.
- For future IR cycles, Illinois EPA will not apply these guidelines for any new identifications of observed effects or causes of impairment. However, if Illinois adopts a new numeric water-quality standard for total nitrogen or sedimentation/siltation (with USEPA approval) and Illinois EPA develops a corresponding standards-based guideline for either substance as a cause of Aquatic Life Use impairment, then the above discussed approach for removing an observed effect no longer applies.



Reporting Cycle 2018

For the cycle-2018 integrated water-quality report, Illinois EPA adds *total nitrogen* as an observed effect for each of 67 stream segments (i.e., Assessment Units) for which USEPA deferred decision as of February 2019. Also, Illinois EPA adds *sedimentation/siltation* as an observed effect for each of two stream segments.

Reporting Cycles 2020/2022 and Later

Observed Effects

For the cycle-2020/2022 and later integrated water-quality reports, if Aquatic Life Use becomes attained in a stream segment with which at least one of the two above mentioned observed effects is associated, then Illinois EPA will dissociate the observed effect because the use is no longer impaired.



THANK YOU! QUESTIONS?

- **Illinois EPA Integrated Water Quality Report and Section 303(d) List Webpage:** <https://epa.illinois.gov/topics/water-quality/watershed-management/tmdls/303d-list.html>
- **Illinois Nutrient Loss Reduction Strategy (NLRS)**
<https://epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy.html>

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