**Targeted Summary of Minnesota Water Quality Assessment Report**

**2016**

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# Targeted Summary of Minnesota Water Quality Assessment Report 2016

## Abstract:

Each year the Minnesota Pollution Control Board (MPCB) releases a report on the quality of water bodies in Minnesota. The MPCB is mandated by the US Environmental Protection Agency (EPA) to comply with water quality standards codified in the Clean Water Act: 33 U.S.C. §1251 et seq. (1972). TO this end the MPCB oversees assessment of the water quality of Minnesota rivers, lakes, streams, ponds, reservoirs, wetlands and Great Lakes shorelines. This report is a targeted summary of the Minnesota Water Quality Assessment Report for 2016. It describes the methods used to assess water quality, site specific monitoring results for the US and for Minnesota, the causes of water body impairment, and a summary of total maximum daily load (TMDL) for Minnesota water bodies. The impairment rate for Minnesota’s rivers and streams is less than the U.S while the impairment rate for Minnesota’s lakes, reservoirs, and ponds if higher than the U.S.

As in previous years, the number one pollutant is mercury. A review of the cumulative numbers of Minnesota TMDLs illustrates an increase in the number of TMDLs beginning in 2006. This increase is due in part to the passage in 2006 of the Minnesota Clean Water Legacy Act (CWLA). This legislation provided a policy framework and resources to state and local governments to accelerate efforts to monitor, assess, and restore impaired waters, and to protect unimpaired waters.

The monitoring of pollutants continues to occur on a statewide basis. Assessment of those parameters is done statewide every two years, to reflect the monitoring design. The watershed approach provides a unifying focus on the water resource as the starting point for water quality (WQ) assessment, planning, and results measures.

## Introduction:

The Minnesota Pollution Control Agency (MPCA) is charged under both federal and state law with protecting the water quality of Minnesota’s lakes, rivers, streams, and wetlands. It is the responsibility of the MPCA to monitor Minnesota’s water bodies, to assess water quality, and to report the results to the public.

This report includes a subset of the results of the water quality assessment for the state of Minnesota performed by the MPCA, as required by the federal Environmental Protection Agency (EPA). This report includes water quality data for 2016.

The federal Clean Water Act (CWA) requires the MPCA to assess all waters in the state to determine if they meet federal water quality standards. Minnesota water quality standards protect lakes, rivers, streams, and wetlands by defining how much of a pollutant such as bacteria or nutrients can be in water before it is no longer drinkable, swimmable, fishable, or useable in other, designated ways called “beneficial uses”. The MPCA performs this assessment and creates a list of waters that do not meet the standards. Waters that do not meet the standards are called “impaired waters”. The list is updated each even-numbered year. Waters considered impaired must be studied to determine total maximum daily load (TMDL). The TMDL is the maximum amount of a pollutant a body of water can receive without violating water quality standards.

The Inventory of Impaired Waters includes those waters needing a TMDL plan, those for which a plan has already been developed and approved by EPA, and water bodies that do not require a TMDL.

## Method:

Pollutant sources are characterized as either point sources that receive a wasteload allocation (WLA), or nonpoint sources that receive a load allocation (LA). Point sources include all sources subject to regulation under the National Pollutant Discharge Elimination System (NPDES) program, including wastewater treatment facilities, some stormwater discharges and concentrated animal feeding operations (CAFOs). For purposes of assigning LAs, nonpoint sources include all remaining sources of the pollutant as well as natural background sources. TMDLs must also account for seasonal variations in water quality, and include a margin of safety (MOS) to account for uncertainty in predicting how well pollutant reductions will result in meeting water quality standards.

Expressed mathematically, the TMDL equation is: **TMDL = ΣWLA + ΣLA + MOS**

TMDLs are developed using a range of techniques, from simple mass balance calculations to complex water quality modeling approaches. The degree of analysis depends on factors including the waterbody type, complexity of flow conditions and pollutant causing the impairment.

All point and nonpoint sources of the pollutants are identified, and they are allocated a portion of the allowable load that usually contemplates a reduction in their pollution discharge in order to help solve the problem. Natural background sources, seasonal variations and a margin of safety are all taken into account in the allocations.

The approach normally used to develop a TMDL for a particular waterbody or watershed consists of five activities:

* Selection of the pollutant(s) to consider.
* Estimation of the waterbody's assimilative capacity (i.e., loading capacity).
* Estimation of the pollutant loading from all sources to the waterbody.
* Analysis of current pollutant load and determination of needed reductions to meet assimilative capacity.
* Allocation (with a margin of safety) of the allowable pollutant load among the different pollutant sources in a manner such that water quality standards are achieved.

## Site Specific Monitoring Results:

In the report each water type is listed and includes the amount of water assessed, the status, total waters assessed, total waters, and the percent waters assessed. This information is provided for the United States as a whole and then for individual states.

A water body is rated “good” if it meets all intended uses,” threatened” if it currently supports all intended uses, but may be exhibiting a deteriorating trend. A water body is rated as “impaired” if any one of its uses is not met.

See **Table 1** for the site-specific monitoring results to the United States. See **Table 2** for the site-specific monitoring results for Minnesota. waters assessment status for this reporting period.

**Table 1: Site Specific Targeted Monitoring Results United States 2016**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Rivers, Streams (miles)** | **Lakes, Reservoirs, Ponds (Acres)** | **Bays, Estuaries (Square Miles)** | **Coastal shoreline (Miles)** | **Ocean, Near Costal (Square Miles)** | **Wetlands (Acres)** | **Great Lakes Shoreline (Miles)** | **Great Lakes Open Water (Square Miles)** |
| **Good Waters** | 518,293 | 5,390,57 | 11,516 | 1,298 | 726 | 569,328 | 106 | 1 |
| **Threatened Waters** | 4,495 | 30,309 |  |  |  |  |  |  |
| **Impaired Waters** | 588,173 | 13,208,917 | 44,625 | 3,329 | 6,218 | 642,924 | 4,354 | 39,230 |
| **Total Assessed** | 1,110,961 | 18,629,795 | 56,141 | 4,627 | 6,944 | 1,242,252 | 4,460 | 39,231 |
| **Total Waters** | 3,533,205 | 41,666,409 | 87,791 | 58,618 | 54,120 | 107,700,000 | 5,202 | 196,343 |
| **Percent Waters Assessed** | 31.4 | 44.7 | 63.9 | 7.9 | 12.8 | 1.2 | 85.7 | 20.0 |

**Table 2: Site Specific Targeted Monitoring Results Minnesota 2016**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Rivers/Stream (miles)** | **Lakes, Reservoirs,and Ponds (acres)** | **Wetlands (acres)** | **Great Lakes Shoreline (miles)** |
| **Good Waters** | 4,0035.7 | 201,148.0 |  | 4.7 |
| **Previously impaired, now attaining all uses** | 511.1 | 38, 247.0 |  | 0 |
| **Impaired waters** | 15,493.7 | 3,712,902.2 | 995.0 | 1.1 |
| **TMDLs Completed** | 3,064.3 | 1,352,431.0 | 55.0 |  |
| **TMDLs Needed** | 12,335.1 | 2,357,267.2 | 940.0 | 1.1 |
| **New TMDLs Completed** | 1,639.0 | 45,342.0 | 0 | 0 |
| **Remaining TMDLs Needed** | 10,696.1 | 2,311,925.2 | 940.0 | 1.1 |
| **Total Waters Assessed** | **19,529.5** | **3,914,050.2** | **995.0** | **5.7** |
| **Total Waters** | 91,944.0 | 4,500,000.0 | Unavailable | Unavailable |
| **Percent Waters Assessed** | 21.2 | 87.0 | Unavailable | Unavailable |

|  |
| --- |
|  |
|  |
|  |

The report includes a list of pollution sources that contributed to impairment for each water body type. The list includes the number of miles, acres, or square miles threatened or impaired. Causes for impairment for Minnesota rivers and streams are presented in **Table 3.** Causes of Impairment for Minnesota lakes, reservoirs and ponds are presented in **Table 4**.

**Table 3: Causes for Impairment for Minnesota Rivers and Streams**

| **Cause of Impairment** | **Cause of Impairment Group** | **Miles Threatened or Impaired** |
| --- | --- | --- |
| **Mercury in Fish Tissue** | Mercury | 6,069.1 |
| **Turbidity** | Turbidity | 5,795.5 |
| **Fish Bioassessments** | Cause Unknown - Impaired Biota | 4,852.0 |
| **Aquatic Macroinvertebrate Bioassessments** | Cause Unknown - Impaired Biota | 4,389.1 |
| **Escherichia Coli (E. Coli)** | Pathogens | 4,180.7 |
| **Fecal Coliform** | Pathogens | 3,216.3 |
| **Dissolved Oxygen** | Organic Enrichment/Oxygen Depletion | 1,922.1 |
| **PCB(s) in Fish Tissue** | Polychlorinated Biphenyls (PCBs) | 1,352.3 |
| **Mercury in Water Column** | Mercury | 689.6 |
| **Nutrient/Eutrophication Biological Indicators** | Nutrients | 611.5 |
| **Chloride** | Salinity/Total Dissolved Solids/Chlorides/Sulfates | 235.1 |
| **Total Suspended Solids (TSS)** | Turbidity | 204.2 |
| **Arsenic** | Metals (other than Mercury) | 146.6 |
| **Nitrates** | Nutrients | 126.6 |
| **Ammonia, Un-ionized** | Ammonia | 80.1 |
| **pH** | pH/Acidity/Caustic Conditions | 56.2 |
| **Polychlorinated Biphenyls (PCBs)** | Polychlorinated Biphenyls (PCBs) | 43.1 |
| **Chlorpyrifos** | Pesticides | 39.6 |
| **Lack of a Coldwater Assemblage** | Other Cause | 38.1 |
| **DDT** | Pesticides | 19.0 |
| **Dieldrin** | Pesticides | 19.0 |
| **Perfluorooctane Sulfonate (PFOS)** | Toxic Organics | 14.4 |
| **Perfluorooctane Sulfonate (PFOS) in Fish Tissue** | Toxic Organics | 14.5 |
| **Acetochlor** | Toxic Organics | 13.4 |
| **Toxaphene** | Pesticides | 12.5 |
| **Dioxin (Including 2,3,7,8-TCDD)** | Dioxins | 12.5 |
| **Temperature, Water** | Temperature | 9.6 |

**Table 4: Causes for Impairment for Minnesota Lakes, Reservoirs and Ponds**

|  |  |  |
| --- | --- | --- |
| **Cause of Impairment** | **Cause of Impairment Group** | **Acres Threatened or Impaired** |
| **Mercury in Fish Tissue** | Mercury |  3,559,458.2 |
| **PCBs in Fish Tissue** | PCBs | 1,627,561.5 |
| **Nutrient/Eutrophication Biological Indicators**  | Nutrients | 598,325.0 |
| **Mercury in Water Column** | Mercury | 7,555.0 |
| **Fish Bioassessments** | Cause Unknown | 5,741.0 |
| **Perfluorooctane Sulfonate (PFSOS) in Fish Tissue** | Toxic Organics | 1,576.0 |
| **Chloride** | Salinity/Total Dissolved Solids/Sulfites | 1,400.0 |

## TDMLs for Minnesota Water Bodies:

The report lists, by TMDL pollutant, the number of TMDLs approved, as well as the number of causes of impairments associated with all TMDLs for that pollutant. See **Table 5** for the cumulative number of TMDLs for Minnesota by pollutant. The list includes TMDLs since October 1, 1995.

**Table 5: Minnesota Cumulative TMDLs by Pollutant**

| **Pollutant** | **Number of TMDLs** | **Number of Causes of Impairment Addressed** |
| --- | --- | --- |
| **Mercury** | 1,257 | 1,279 |
| **Phosphorous, Total** | 388 | 474 |
| **E Coli** | 233 | 233 |
| **Total Suspended Solids** | 167 | 206 |
| **Fecal Coliform** | 121 | 124 |
| **Chloride** | 40 | 41 |
| **Nitrate** | 17 | 17 |
| **Phosphorous** | 17 | 13 |
| **Oxygen Demand** | 13 | 13 |
| **Carbonaceous BOD** | 12 | 13 |
| **Fecal** | 10 | 10 |
| **Sediment** | 7 | 7 |
| **Temperature** | 5 | 8 |
| **Nitrogenous BOD** | 4 | 4 |
| **Biochemical Oxygen Demand** | 3 | 3 |
| **Ammonia, Total** | 2 | 2 |
| **Dissolved Oxygen** | 1 | 1 |
| **Sediment Oxygen Demand** | 1 | 1 |
| **Total Suspended Sediment** | 1 | 2 |

The report lists, by EPA fiscal year, the number of TMDLs approved, as well as the number of causes of impairments associated with all TMDLs for each year. See **Table 6** for the cumulative number of TMDLs for Minnesota from 2003-2016. The EPA’s fiscal year runs from October 1 through September 30.

**Table 6: Minnesota Cumulative Number of TMDLs**

|  |  |  |
| --- | --- | --- |
| **EPA Fiscal Year** | **Number of TMDLs** | **Number of Causes of Impairment Addressed** |
| **2003** | 20 | 20 |
| **2004** | 2 | 2 |
| **2005** | 7 | 7 |
| **2006** | 24 | 24 |
| **2007** | 541 | 556 |
| **2008** | 516 | 525 |
| **2009** | 56 | 58 |
| **2010** | 132 | 132 |
| **2011** | 31 | 31 |
| **2012** | 51 | 52 |
| **2013** | 163 | 173 |
| **2014** | 131 | 155 |
| **2015** | 128 | 173 |
| **2016** | 120 | 123 |
| **TOTAL** | **1,922** | **2,031** |

## Analysis:

The water body assessment for Minnesota’s rivers and streams shows a 52% impairment rate with 21.2% of waters assessed, compared to a 79% impairment rate for the US with 31.4 % assessed.

The water body assessment rate for lakes, reservoirs, and ponds shows a 92% impairment rate for Minnesota with 87% assessed compared to a 70.9% impairment rate for the US with 44.7 % assessed.

As in previous years, the number one pollutant is mercury. In March 2007 Minnesota implemented a statewide mercury reduction plan that was subsequently approved by the U.S. EPA. Since then, the MPCA has worked with stakeholders representing a broad range of interests to identify strategies and timelines that would be included in an implementation plan. The stakeholders' recommendations, completed in June 2008, are contained on the Plan to reduce mercury releases by 2025 webpage.

A review of the cumulative numbers of Minnesota TMDLs presented in Table 6, illustrates an increase in the number of TMDLs beginning in 2006. This increase is due in part to the passage in 2006 of the Minnesota Clean Water Legacy Act (CWLA). This legislation provided a policy framework and resources to state and local governments to accelerate efforts to monitor, assess, and restore impaired waters, and to protect unimpaired waters.

The monitoring of pollutants continues to occur on a statewide basis. Assessment of those parameters is done statewide every two years, to reflect the monitoring design. The watershed approach provides a unifying focus on the water resource as the starting point for water quality (WQ) assessment, planning, and results measures.

Minnesota is fortunate to have many water bodies that are in good condition because their terrestrial watersheds still have minimal development, although all surface waters are affected by atmospheric pollutants such as mercury. It is important to protect the good condition of many water bodies, while also addressing degraded water resources

The Minnesota’s Water Quality Monitoring Strategy, 2011-2021 (Monitoring Strategy), describes elements of the state’s surface water and groundwater monitoring programs. The Monitoring Strategy satisfies the EPA monitoring program strategy requirement and serves as the guide to MPCA monitoring programs. Minnesota’s WQ monitoring strategy is available at: <https://www.pca.state.mn.us/sites/default/files/pgen1-10.pdf>

Minnesota’s TMDL Priority Framework: https://www.pca.state.mn.us/sites/default/files/wq-iw1-54.pdf · EPA’s Long-Term Vision: https://www.epa.gov/sites/production/files/2015- 07/documents/vision\_303d\_program\_dec\_2013.pdf · Water Governance Evaluation: <https://www.pca.state.mn.us/sites/default/files/lrwq-gen1sy13.pdf>

## References:

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<https://www.pca.state.mn.us/sites/default/files/pgen1-10.pdf>

<https://www.pca.state.mn.us/sites/default/files/lrwq-gen1sy13.pdf>

<https://www.pca.state.mn.us/water/total-maximum-daily-load-tmdl-projects>

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