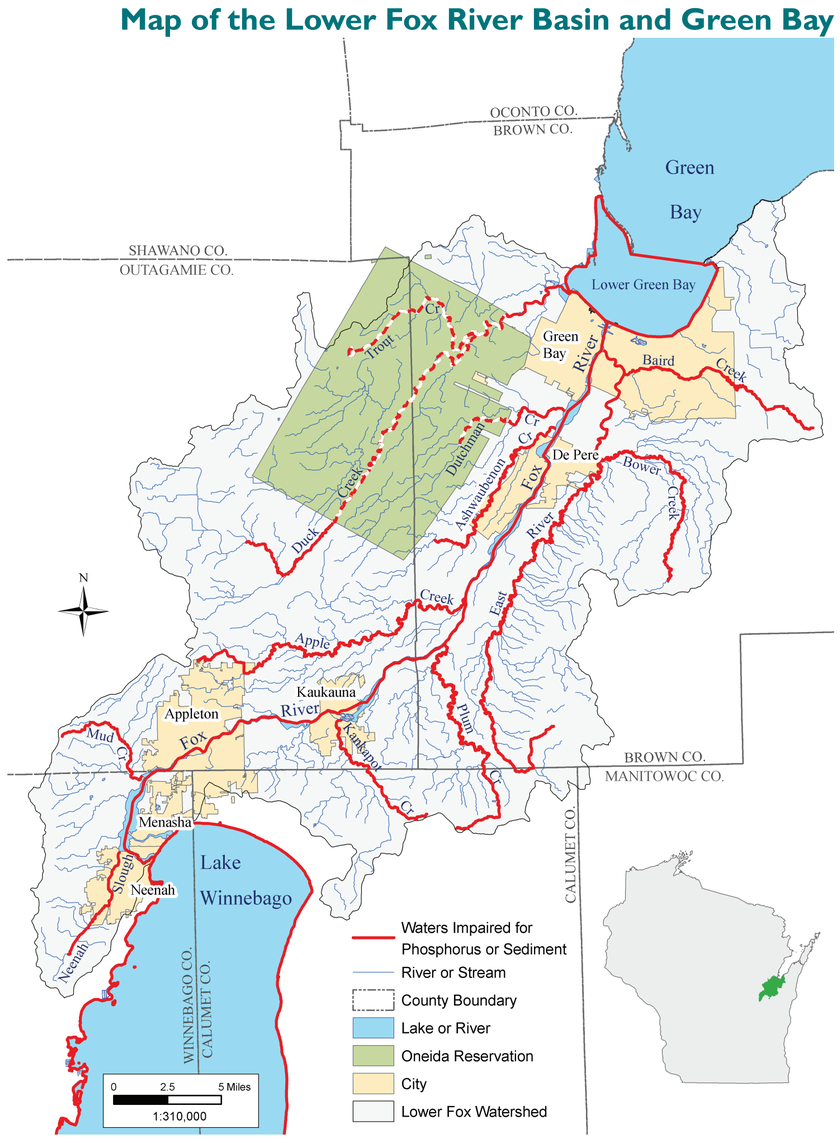
Development of a Total Maximum Daily Load and Watershed Management Plan for the Lower Fox River Basin and Green Bay Area of Concern

The 638 mi^2 Lower Fox River Basin is located in northeastern Wisconsin and encompasses the following counties: Brown, Calumet, Outagamie, and Winnebago, and most of the Oneida Nation Reservation. The Lower Fox River drains into Lower Green Bay; the Green Bay Area of Concern (AOC) includes a little over 21 mi^2 of southern Green Bay out to Point au Sable and Long Tail Point. The Lower Fox River Basin and Green Bay AOC are impaired by excess phosphorus and sediment loading. Sources of phosphorus and sediment loading to the river and bay include treated effluent from permitted municipal and industrial point source dischargers and polluted runoff from nonpoint sources, such as pastures and crop land, rural and urban land, and construction sites.

Map of the Lower Fox River Basin and Green Bay



Phosphorus is an essential nutrient for plant growth; however, excess phosphorus in the river and bay increases the occurrence of unwanted algae blooms. Excess algae growth severely depletes the supply of oxygen in waterbodies, endangering fish and other aquatic life. Excess sediments in the river and bay reduce light availability to critical aquatic plants, restricting their ability to grow. Aquatic plants serve as vital habitat and food sources for fish, birds, frogs, turtles, insects, and other kinds of wildlife. They also produce life-giving oxygen, help stabilize bottom sediments, protect shorelines from erosion, and take up nutrients that would otherwise be available for nuisance algae growth.

The Wisconsin Department of Natural Resources (WDNR) is developing a total maximum daily load (TMDL) for the Lower Fox River Basin and Green Bay AOC to address the phosphorus and sediment impairments. A watershed management plan (WMP) will also be developed simultaneously with the TMDL to address the phosphorus and sediment impairments on the segments within the boundary of the Oneida Nation Reservation. Restoring water quality in the river and bay will involve the implementation of multiple best management practices (BMPs) and other watershed management activities to address both nonpoint sources and point sources of phosphorus and sediment. Point source facilities have already begun to reduce their discharge of phosphorus as part of their permit requirements established by WDNR. While additional reductions from point source facilities may be needed to restore water quality in the river and bay, reducing phosphorus and sediment loading to the Lower Fox River Basin and Green Bay AOC will require significant reductions in polluted runoff from nonpoint sources.

A TMDL is the total amount of a pollutant that a waterbody can receive without violating water quality standards. The TMDL for a waterbody is an actual formula:

TMDL = WLA + LA + MOS

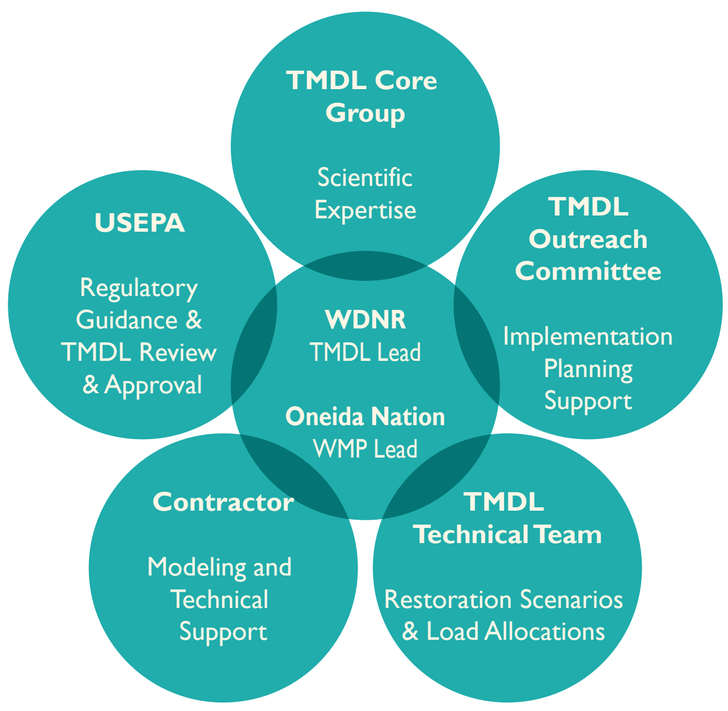
where the Total Maximum Daily Load is equal to the sum of the Waste Load Allocation (WLA) from point sources, plus the Load Allocation (LA) from nonpoint sources, plus a Margin of Safety (MOS), which accounts for uncertainty between pollutant loads and the quality of the receiving waterbody.

Impaired Segments Covered Under the TMDL for the Lower Fox River Basin and Green Bay AOC

Waterbody	County	Pollutants	Impairments
Apple Creek Segment 1	Brown	Phosphorus, Sediment	Degraded Habitat, Dissolved Oxygen, Temperature
Apple Creek Segment 2	Outagamie	Phosphorus, Sediment	Dissolved Oxygen, Sediment
Ashwaubenon Creek	Brown	Phosphorus, Sediment	Degraded Habitat, Dissolved Oxygen
Baird Creek Segment 1	Brown	Phosphorus, Sediment	Degraded Habitat, Dissolved Oxygen, Temperature
Baird Creek Segment 2	Brown	Phosphorus, Sediment	Degraded Habitat, Dissolved Oxygen
Bower Creek Segment 1	Brown	Phosphorus, Sediment	Degraded Habitat
Bower Creek Segment 2	Brown	Phosphorus, Sediment	Degraded Habitat
Duck Creek Segment 1	Brown	Phosphorus, Sediment	Dissolved Oxygen, Sediment
Duck Creek Segment 2	Outagamie	Phosphorus, Sediment	Dissolved Oxygen, Sediment
Dutchman Creek	Brown	Phosphorus	Dissolved Oxygen
East River	Brown	Phosphorus, Sediment	Degraded Habitat, Dissolved Oxygen, Sediment
East River	Brown	Phosphorus, Sediment	Degraded Habitat, Dissolved Oxygen, Sediment
Fox R. Lower Segment 1 (1)	Outagamie	Phosphorus	Degraded Habitat, Dissolved Oxygen
Fox R. Lower Segment 2 (1)	Brown	Phosphorus	Degraded Habitat, Dissolved Oxygen
Fox R. Lower Segment 3 (1)	Brown	Phosphorus, Sediment	Degraded Habitat, Dissolved Oxygen
Green Bay AOC (inner bay) (1)	Brown	Phosphorus, Sediment	Degraded Habitat, Dissolved Oxygen
Kankapot Creek Segment 1	Outagamie	Phosphorus, Sediment	Degraded Habitat
Kankapot Creek Segment 2	Outagamie	Phosphorus, Sediment	Degraded Habitat
Mud Creek Segment 1	Outagamie	Phosphorus, Sediment	Degraded Habitat
Mud Creek Segment 2	Outagamie	Sediment	Degraded Habitat
Neenah Slough	Winnebago	Phosphorus	Dissolved Oxygen
Plum Creek Segment 1	Outagamie	Phosphorus, Sediment	Degraded Habitat & Temperature
Plum Creek Segment 2	Outagamie	Sediment	Degraded Habitat & Temperature
Plum Creek Segment 3	Outagamie	Sediment	Degraded Habitat & Temperature

Note: Orange indicates proposed additions based on impending 2008 Impaired Waters List

Organizational Structure for the Development of the TMDL and WMP



The TMDL development process will be led by WDNR, with guidance from the U.S. Environmental Protection Agency (EPA) and technical support from a contractor. Several committees will support the development and implementation of the TMDL and WMP – the TMDL *Core Group*, the TMDL *Technical Team*, and the TMDL *Outreach Committee*. The *Core Group* and *Outreach Committee* include representatives from WDNR, EPA, University of Wisconsin Green Bay (UWGB), University of Wisconsin (UW) Extension, UW Sea Grant, Oneida Nation Reservation, Brown County Land Conservation Department, and Green Bay Metropolitan Sewerage District. The *Core Group* will contribute scientific expertise on the technical aspects of the TMDL, including the numeric targets for the TMDL and WMP. The *Outreach Committee* will provide input on the development of the implementation plan for the TMDL and WMP, as well as play a key role in public and stakeholder outreach. In the near future, WDNR will solicit volunteers to serve on the *Technical Team*. The *Technical Team* will develop the restoration scenarios, as well as provide input on the load allocation process.

Process for Developing the TMDL & WMP

Task 1. Define Goals of the TMDL and WMP
- A. Refine Geographic Coverage
- B. Define the Numeric Targets

Task 2. Perform Watershed Modeling Analysis
- A. Calibration and Validation of SWAT
- B. Loading Analysis Using SWAT

Task 3. Implementation Planning for the TMDL and WMP
- A. Define Restoration Goals
- B. Identify Restoration Scenarios
- C. Perform Cost Analysis of Restoration Scenarios
- D. Perform Load Reduction Optimization Analysis
- E. Identify Potentially Restorable Wetlands
- F. Determine Load Allocations
- G. Develop Load Duration Curves

Task 4. Prepare TMDL and WMP Reports
- A. Prepare Draft TMDL and WMP Reports
  1) Identification of Waterbody, Pollutants of Concern, Pollutant Sources, and Priority Ranking
  2) Description of Applicable Water Quality Standards and Numeric Water Quality Targets
  3) Loading Capacity
  4) Load Allocations
  5) Wasteload Allocations
  6) Margin of Safety
  7) Seasonal Variation
  8) Reasonable Assurances
  9) Monitoring Plan
  10) Implementation Plan
  11) Public Participation
- B. Submit Final TMDL and WMP

TMDL Resources

For more information regarding the Lower Fox River and Green Bay TMDL, contact Nicole Richmond at (608) 266-0152, or Nicole.Richmond@wisconsin.gov, or visit the following Web site: dnr.wi.gov/org/water/wm/wqs/303d/FoxRiverTMDL/

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Timeline for the Development of the TMDL and WMP