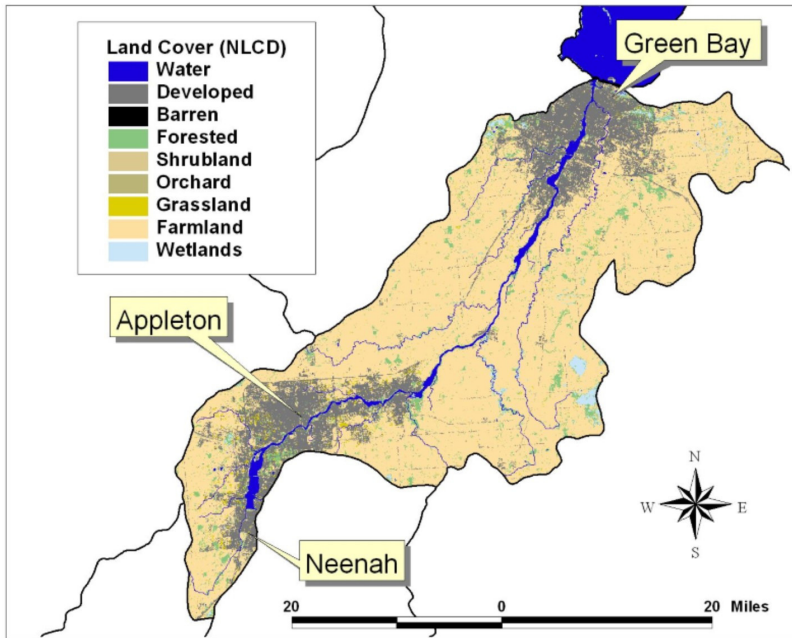


# LOWER FOX WATERSHED

Hydrologic Unit Code 04030204



The Lower Fox River watershed is one of 33 8-digit hydrologic unit codes watersheds that flow to Lake Michigan. A hydrologic unit code is a sequence of numbers or letters that identify a hydrological feature like a river, river reach, lake, or area like a drainage basin (also called watershed or catchment). The smaller the number, the larger the watershed.

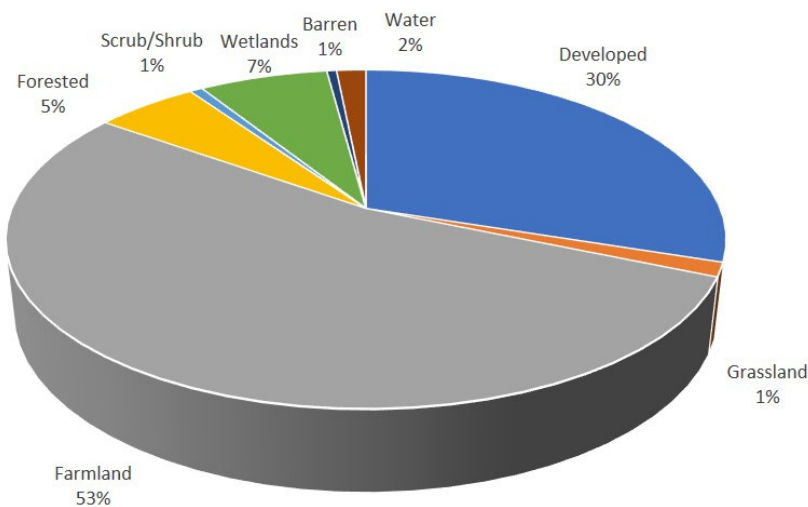
## OVERVIEW

- The Lower Fox River basin is located in northeastern Wisconsin and encompasses the following counties: Brown, Calumet, Outagamie and Winnebago.
- The 638 square mile drainage basin is bordered by the Twin Door Kewaunee basin to the north and east, the Manitowoc River basin to the south and east, the Upper Fox River basin to the south, the Wolf River basin to the west and the Upper Green Bay basin to the north.
- The Lower Fox River originates at the outlet of Lake Winnebago and flows northeast for 39 miles where it empties into the bay of Green Bay.
- The watershed has the most paper mills in the world.
- The Lower Fox Basin contains the highest concentration of Dairy Cows in the State of Wisconsin. There is currently not enough cropland available for land application of animal and other land applied waste.
- The main stem of the Fox River in the Lower Fox River Basin is fragmented by a series of 17 locks and 12 dams built in the mid 1800's to aid navigation or produce power.
- Some watershed groups working basin issues include:
  - League of Women Voters of Wisconsin <http://www.lwwi.org>
  - Oneida Tribe of Indians, [www.oneidanation.org](http://www.oneidanation.org)
  - Fox Wolf Watershed Alliance, [www.fwwa.org](http://www.fwwa.org)
  - Rivers Alliance of Wisconsin, [www.wisconsinrivers.org](http://www.wisconsinrivers.org)
  - Baird Creek Preservation Foundation, [www.Bairdcreek.org](http://www.Bairdcreek.org)
  - Northeast Wisconsin Land Trust, [www.newlt.org](http://www.newlt.org)
  - Green Bay Area Great Lakes Sports Fisherman [www.gbagslf.com/](http://www.gbagslf.com/)



The Lower Fox River watershed flows to Green Bay and has a long history of logging and paper manufacturing. It is an important center of recreation and critical habitat and species.

Land Cover: Lower Fox Watershed



Over half of the watershed is farmland, but it has seen significant growth in development over the last several years. Land use data source: NOAA



<https://www.lwvlmr.org/> <https://my.lww.org/wisconsin>

# KEY CHALLENGES

- Agricultural practices can be associated with fertilizer/pesticides runoff, excessive sedimentation of streams resulting in low levels of dissolved oxygen that contributes to algal growth and can cause dead zones.
- Development in urban areas and farmland expansions drained historic wetlands, destroyed habitat, straightened streams, which reduced stormwater holding opportunities for water infiltration that impacts groundwater levels.
- Waste from farm animals and pets increases eColi and other pathogens in streams, lakes and beaches.
- Pumping from deep confined aquifers lowered groundwater levels, resulting in higher radium and other contaminant concentrations.
- Beach closures resulting from higher eColi levels have been an ongoing problem, but have seen reductions in numbers as sources are addressed.
- Increased severe storms cause stream bank erosion sending sediment downstream impacting water quality and aquatic life.
- Increases in invasive/non-native plant species pushes out native species which support native wildlife and pollinators.
- Road salt in street runoff increases chloride pollution on nearby habitat and receiving streams and lakes impacting aquatic life.
- Loss of natural areas and habitats impact wildlife populations that rely on natural land and water migration corridors and recreational open space.
- Several waterways are on the 303d impaired waters list, meaning they have higher levels of contaminants requiring special remediation. Phosphorus, sediment, degraded habitat, dissolved oxygen, PCBs in fish tissue, temperature, and metals. More information is found at <http://dnr.wi.gov/topic/watersheds/basins/lowerfox/>.
- The watershed has an Area of Concern (AOC) caused by previous industrial activity. See more in the AOC section.

# NEEDED ACTIONS

This list implies separate items, but they interact in the watershed. Many items represent a legacy of industrial and agricultural activities prior to the 1972 Clean Water Act framework to meet the goal of fishable, swimmable, and drinkable water.

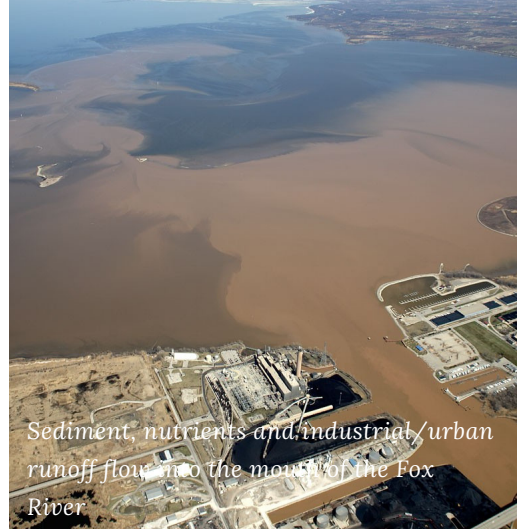
- Support use of technology and weather awareness for better targeting application levels of nutrients and pesticides to prevent loss of applied products into runoff for farms, golf courses and other large areas,
- Improve habitat and water quality by constructing stream buffers, restoring wetlands and other practices on streams for both farms and developed areas.
- Review Wisconsin Department of Natural Resources streams status reports to target areas where action is needed.
- Identify areas where sediments are entering and how they are moving as a result of streambank erosion to prevent and repair erosion.
- Factor changing climate and intensive storms into storm water management using stream buffers, wetland restoration and naturalized detention areas practices to prevent flooding, polluted runoff and to aid ground water recharge and possible recreational open space opportunities.
- Collaborate to gather or support research on the movement of sediments and beach sand due to changing storm intensity.
- Maintain and leverage the momentum of the Clean Water Act's framework of State Water Quality Standards and Section #319 Watershed Planning.
- Maintain and leverage the momentum of the recent watershed projects of the federal Great Lakes Restoration Initiative.



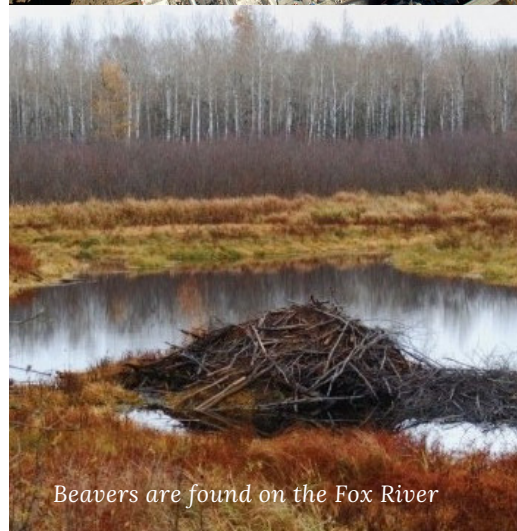
Runoff from farms and developed areas can lead to algal growth in streams and Lake Michigan



Stream buffers prevent fertilizers and other pollutants from entering waterways



Sediment, nutrients and industrial/urban runoff flow into the mouth of the Fox River.



Beavers are found on the Fox River

# SIGNIFICANT NATURAL FEATURES

- The Lower Fox River Basin is home to a variety of unique and delicate ecosystems. These include open land, woodlands, wetlands, riverine, and lacustrine ecosystems.
- The Niagara Escarpment is an especially unique ecosystem located within the basin and runs from the southwest corner of the watershed to the Northeast towards Door County.
- Open lands and woodlands ecosystems are important because they provide habitat for wildlife, provide recreational opportunities for area residents, and provide areas for groundwater recharge.
- West Shore of Green Bay contains 50% of all remaining wetlands in Lake Michigan Drainage Basin.
- The wetlands ecosystems support a variety of unique plant and animal species. They also protect water quality by buffering surface water runoff to rivers and streams.
- The riverine and lacustrine ecosystems are important because they provide habitat for wildlife, commercial fisheries, and recreational opportunities.
- Numerous endangered, threatened and otherwise rare species exist in the basin, including the endangered Barn Owl and the Small White Lady's Slipper.
- Wildlife include songbirds, White-tailed Deer, Rabbits, Red Fox, Coyote, Pheasant, Hungarian Partridge, Squirrel, Skunk, Raccoon, Upland Game Birds, Waterfowl, Bats, small mammals and invertebrates, reptiles, and amphibians.
- The Cat Island Restoration Project is a multi-partner habitat restoration project that involves reconstructing three islands in the lower bay, providing 272 acres of habitat for shorebirds, waterfowl, amphibians, turtles, invertebrates, and furbearing mammals. A 2.5-mile long wave barrier along the remnant Cat Island shoals will protect and help to restore approximately 1,225 acres of shallow water and wetland habitat behind the islands leading to recovery of much of the important lower bay habitat while benefiting sport and commercial fisheries.

## DRINKING WATER

- The source of drinking water is either surface water (Lake Michigan) or groundwater (wells)
- Much of the drinking water in the basin is derived from groundwater, but the City of Green Bay receives its drinking water from Lake Michigan.
- Several communities constructed a pipeline from Lake Michigan at Manitowoc to suburban Green Bay in 2007 after their previous supply from confined groundwater had high radium levels
- These utilities report no contaminant levels exceeding U.S. E.P.A. quality standards for regulated contaminants.
- Lead is increasingly being seen as a problem in some of the older systems. The majority of water treatment utilities add phosphate to decrease the potential of lead leaching from eroding lead pipes in service lines to homes and facilities.
- Contaminants exceeding quality standards are reported most frequently from groundwater utilities and consist of bacteria, lead, copper, and nitrates. Deep confined aquifers have increasing levels of radium as this slowly recharging groundwater source is drawn down further.
- Wastewater utilities treat wastewater to water quality standards and discharge treated effluent in streams and the Lake.



Red Fox



The watershed is an important flyover site for migratory birds



Cat Island Restoration Project  
US Army Corp of Engineers Detroit District



Lake Michigan supplies most residents with their drinking water, although groundwater is an important source for many smaller communities

# LOWER GREEN BAY AND FOX RIVER AREA OF CONCERN (AOC)

- The Lower Green Bay and Fox River Area of Concern (AOC) consists of the lower 7 miles of the Fox River below DePere Dam and a 34 square mile area of southern Green Bay out to Point au Sable and Long Tail Point.
- It was designated an Area of Concern under the 1987 Great Lakes Water Quality Agreement and is primarily contaminated with PCBs from industrialization.
- Since 1988, over 3/4 of the 120 remedial actions recommended by the Lower Green Bay Remedial Action Plan have been completed or initiated.
- Land water use upstream (logging, agriculture and industry) was a significant contributor to the numerous negative impacts to water quality in the water system.
- High turbidity, sedimentation, fluctuating dissolved oxygen, frequent algal blooms, degraded fish/wildlife/plant populations and adverse toxicant impacts have all been found in Lower Green Bay/Fox River.
- These led to designation of the following beneficial use impairment
  - Restrictions on fish and wildlife consumption
  - Tainting of fish and wildlife flavor
  - Degradation of fish and wildlife populations
  - Fish tumors or other deformities
  - Degradation of aesthetics
  - Degradation of benthos
  - Restriction on dredging activities
  - Loss of fish and wildlife habitat
  - Bird or animal deformities or reproductive problems
  - Eutrophication or undesirable algae
  - Restrictions on drinking water consumption, or taste and odor
  - Beach closings
  - Degradation of phytoplankton and zooplankton populations
- More information is found at: <https://www.epa.gov/green-bay-fox-river-aoc>

## TO READ MORE ABOUT IT

### General Overviews

#### Wisconsin DNR Overview:

<http://dnr.wi.gov/topic/watersheds/basins/lowerfox/>

#### Watershed Central wiki:

[https://wiki.epa.gov/watershed2/index.php/Lower\\_Fox\\_Watershed](https://wiki.epa.gov/watershed2/index.php/Lower_Fox_Watershed)

### Watershed Plans

#### Fox River- Appleton

<http://dnr.wi.gov/water/watershedDetail.aspx?key=924659>

#### Apple and Ashwaubenon Creeks

<http://dnr.wi.gov/water/watershedDetail.aspx?key=924811>

#### Plum and Kankapot Creeks

<http://dnr.wi.gov/water/watershedDetail.aspx?key=924658>

#### Duck Creek

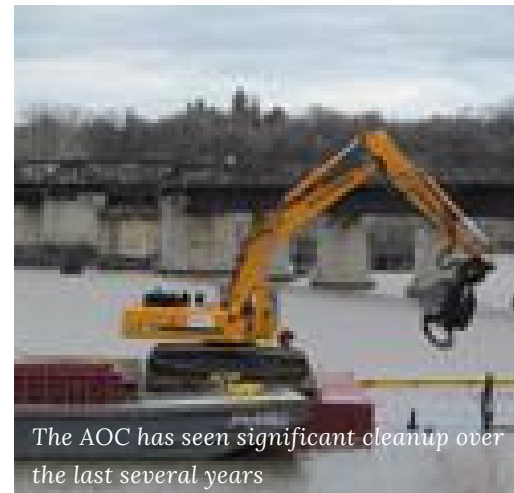
<http://dnr.wi.gov/water/watershedDetail.aspx?key=924812>

#### East River

<http://dnr.wi.gov/water/watershedDetail.aspx?key=924887>

### Great Lakes Restoration Initiative

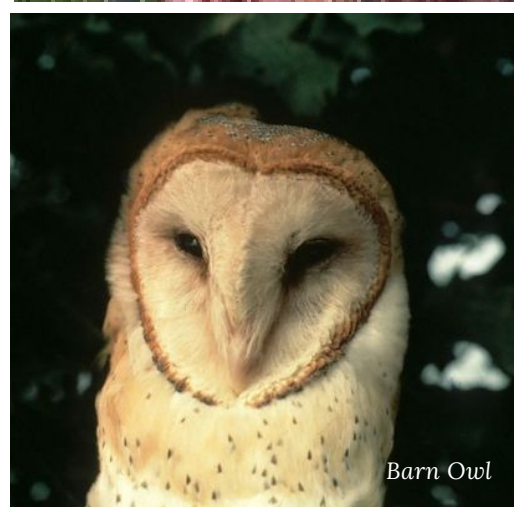
<http://www.glri.us> and [glrimap.glc.org](http://glrimap.glc.org)



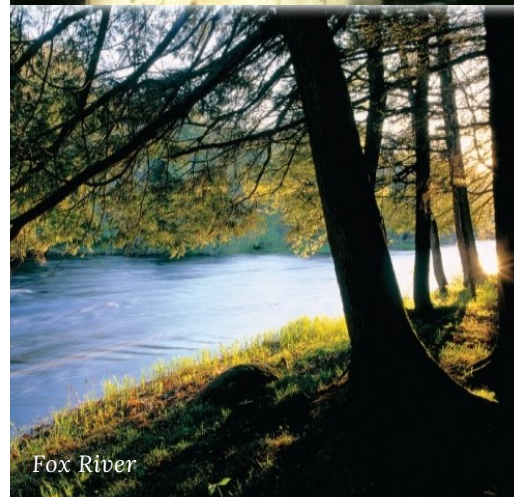
*The AOC has seen significant cleanup over the last several years*



*The AOC has led to streambank restorations*



*Barn Owl*



*Fox River*