

## CENTRAL WISCONSIN RIVER MAINSTEM

The Central Wisconsin River Mainstem is shown on the Basin Map (Figure 1-1). The watersheds of the Central Wisconsin River Basin are described in Chapter 3.

The central portion of the Wisconsin River Mainstem, 127.0 miles long, starts at Merrill Dam (River Mile. 286.7) and flows south to Castle Rock Dam (River mile 159.7). This section of the river has fifteen impoundment's generating power to produce hydroelectricity. Table M-1 summarizes the lakes and flowages along the mainstem of the Wisconsin River.

The central portion of the Wisconsin River is classified as supporting a balanced warm water sport fishery (WWSF) including diverse game and non-game fishery. Of the 127.0 miles of the Wisconsin River only a small portion supports its potential biological use due to:

1. Excess nutrient loading from point and nonpoint sources;
2. Urban runoff;
3. High Fecal coliform bacteria levels;
4. Elevated levels of heavy metals and organic chemicals in sediments;
5. Bioaccumulation of organic contaminants in fish tissue.

The Department has collected ambient data on the Wisconsin River in the Central Wisconsin River Basin at six long term monitoring locations: Wausau Dam, Lake DuBay Dam, Stevens Point Dam, Biron Flowage Dam, Nekoosa Dam and Petenwell Dam. Samples were collected and analyzed for dissolved oxygen, pH, Total BOD<sub>5</sub>, suspended solids, total and dissolved phosphorous, ammonia as nitrogen, total Kjeldahl nitrogen, nitrite plus nitrates nitrogen, conductivity, chloride, hardness, chlorophyll, and fecal coliform bacteria. A review of this data indicates the Wisconsin River is currently meeting water quality standards for dissolved oxygen and pH, however fecal coliform bacteria counts and total phosphorus concentrations are high. High fecal coliform bacteria counts have occurred at all six stations, but the majority has occurred at Biron, Nekoosa and Wausau Dam locations. The intensity of sampling has been reduced and is currently being conducted at the Biron Flowage Dam.

Toxins are a concern in this portion of the Wisconsin River, in particular the chemical pentachlorophenol (PCP), used in the wood industry as a wood preservative. Known spill sites exist adjacent to the Wisconsin River between Merrill and Wausau. Groundwater is pumped and treated at the spill sites. At the spill site in Wausau (Wauleco), dozens of wells have been installed to pump the contaminated water to an extensive treatment system which then discharges to Wausau's municipal wastewater treatment plant for further treatment. Both Wauleco (a remediation company) and the City of Wausau have limits PCP that can be discharged. The chemical has been detected in the sediments below and above the Rothschild Dam (Weyerhaeuser) and may be discharged to the river below Merrill, and on the Rib River above Lake Wausau. More detailed sediment sampling needs to be conducted between Merrill and Wausau to show the distribution and extent of PCP contamination. PCBs have also been detected in sediments below the Wausau Dam and occur in fish from Biron Flowage to Castle Rock Flowage. Dioxin (paper mill by-product) has been detected in fish from the Petenwell and Castle Rock Flowage. We assume these chemicals also exist within the sediments but further testing is necessary to confirm this. Another concern in this segment of the Wisconsin River as well as the whole river system, is nutrient loading. Many of the main stem reservoirs especially the Petenwell and Castle Rock, suffer from severe alga blooms, and increased siltation or sedimentation because of excess available phosphorus. In many cases this impact on water quality prohibits recreational uses in these impoundments. Currently, larger WWTPs, municipal plants discharging more than 150 pounds a month and industries discharging more than 60 pounds in a given month, are required to reduce nutrients (phosphorus) from effluents but their overall phosphorus loading to the river is still a concern, especially during low flow events. In any event, further study needs to be conducted to identify the sources of the phosphorus that is affecting the river.

Fish from the Central Wisconsin River area have been analyzed for micro contaminants. Sample locations include:

1. Wisconsin River below Merrill Dam
2. Wisconsin River at Brokaw
3. Wisconsin River at Wausau Dam Lake

4. Wisconsin River at Lake Wausau
5. Wisconsin River at Rothschild
6. Wisconsin River at Mosinee Flowage
7. Wisconsin River at Lake DuBay.
8. Wisconsin River below Stevens Point Flowage
9. Biron Flowage
10. Wisconsin River below Biron Dam
11. Port Edwards Flowage
12. Nekoosa Flowage
13. Wisconsin River below Nekoosa Dam
14. Petenwell Flowage
15. Castle Rock Flowage

Some of these locations contain fish that are on the state fish health advisory. Monitoring should continue to track trends. Whole fish sampling is being conducted for PCBs, Mercury, PCP, dioxins and furan. In addition, the DNR is conducting follow-up sampling for dioxin and furans below Rothschild. Walleye are on the state fish health advisory for mercury from the Nekoosa Dam to the Castle Rock Dam, including the Castle Rock and Petenwell Flowage. Carp and white bass from the Petenwell Flowage and carp from Castle Rock Flowage are on the advisory for dioxin. Periodic sampling is done to analyze for trends. For more information on where there are health advisories on fish consumption check with your local DNR Service centers for updated Wisconsin Fish Consumption Advisory Booklet.

This section of the Wisconsin River has permits for treated effluent discharges directly from ten municipal and fourteen industrial WWTP facilities.

Municipal treatment plants include:

- Village of Brokaw
- Rib Mountain Metropolitan Sewerage District
- City of Wausau
- City of Mosinee
- City of Stevens Point
- Village of Whiting
- Village of Plover
- City of Nekoosa
- City of Port Edwards
- City of Wisconsin Rapids

Industrial Discharges include:

- Wausau-Mosinee Papers, Brokaw
- Wisconsin Public Service - Units 1 & 2
- Wisconsin Public Service - Unit 3
- Weyerhaeuser Paper Company
- Daishowa Chemicals (Lignotech) - (joint treatment with Weyerhaeuser)
- Foremost Foods - Rothschild
- Wausau-Mosinee Paper, Mosinee
- Mullins Cheese
- Stora Enso North America - Water Renewal Center
- Stora Enso North America - Water Quality Center
- Neenah Paper Company
- Foremost Foods - Plover
- Mc.Cain Foods
- Stora Enso North America - includes Biron, Kraft, and Wisconsin Rapids Divisions
- Domtar Inc., - joint treatment (includes Port Edwards and Nekoosa Mills)

Due to the limited ability of the Wisconsin River to assimilate wastes from Hwy WW in Brokaw down to the inlet of Lake DuBay this portion of the river is wasteload allocated by code in NR 212. This is done to ensure water quality standards for DO are maintained at times of low flow and high temperatures in the river. The entire stretch of the Wisconsin River in the CWRB is wasteload allocated for biochemical oxygen demand (BOD). This means the Department has determined the maximum allowable BOD load to the river from 1 May until 31 October of each year, based on stream flow and temperature. Discharges (point sources) must calculate their BOD limit each day during the warmer months using the previous day's stream temperature and flow, which is what determines what BOD load the River can assimilate.

Under the Wisconsin Administrative Codes NR 105 and NR 106, water quality standards were set for toxic chemicals in surface waters and appropriate discharge limits have been or will be included in the Wisconsin Pollutant Discharge Elimination System (WPDES) permits issued to point source dischargers. This is required to protect aquatic life, human health, and wild and domestic animals. Some municipal and industrial facilities are required to test effluent to determine if toxins are a concern. If so, appropriate water quality standards for site-specific surface water will be set and effluent limits established.

Petenwell and Castle Rock Flowages are listed on the EPA 303 (d) list as impaired waterbodies. A comprehensive management plan developed in 1996 for the flowages, provides a summary of the impaired beneficial uses and recommends measures to mitigate the problems. Based on information in the Management Plan, impaired beneficial uses to Petenwell and Castle Rock flowages include:

- Impaired recreation
- Impaired aesthetics
- Undesirable blue-green algae blooms, some toxic algae
- Impaired environmental
- Phosphorus loading from both point and nonpoint sources, causing eutrophication
- Dioxin, Mercury and PCB contaminated fish and sediments
- Degradation of desirable phytoplankton, zooplankton, bottom-dwelling organisms (benthos), and fish and wildlife communities because of poor water quality and lack of established rooted aquatic plants.
- Dissolved oxygen and fish (carp) kills on the Petenwell Flowage

A water quality study using the BATHTUB Model was a monitoring recommendation identified in the management plan. The model predicts how water quality in impoundments will improve if nutrient inputs are reduced. The University of Wisconsin-Stevens Point completed the model for the Petenwell Flowage in 2000. Due to the large size of Petenwell, the lake had to be broken down into several segments. The model predicted water quality in the lower segments of the Flowage would respond greater to phosphorus reductions. The upper segments did show improvement but the response was not as great. This study focused on how the Flowage would respond to phosphorus reductions but did not identify the sources of phosphorus loading.

The US Army Corps of Engineers recently completed a draft reconnaissance report on the entire Wisconsin River Basin. The purpose of the study is to evaluate the potential for Federal interest in implementing solutions to flooding, ecosystem degradation and other related water resource problems and opportunities in the basin. The reconnaissance report identifies resource issues that encompass the entire river, which includes three regional basin boundaries. The report identifies five alternatives for additional analysis to demonstrate that Federal participation in a feasibility study is warranted. Currently, two potential alternatives have been identified for the Central Wisconsin Basin. 1) Create barrier islands in Petenwell Flowage to reduce shoreline erosion and improve habitat for wildlife and fish. Water quality would likely benefit as a result of sediment control and habitat improvement. 2) Complete a comprehensive water quality study to identify nutrient loading sources and their contribution to the river. Water quality models would be used to determine loading reduction scenarios and BMPs to improve water quality in the Wisconsin River

Under Wisconsin Administrative Codes NR 105 and 106, water quality standards have been developed for toxic chemicals in surface waters and appropriate discharge limits will be, or have been, included in WPDES permits to protect aquatic life, human health, wild and domestic animals. To determine if toxins are a concern, municipal and industrial treatment facilities have and will be continue to be required to test their effluent (See the Point Source Report). Appropriate water quality standards for surface water are and will continue to be used to set effluent limits.

**CENTRAL WISCONSIN RIVER MAINSTEM RECOMMENDATIONS**

1. Fish and Aquatic Habitat Staff should continue to monitor fish tissue for contaminants of concern between Merrill and Castle Rock Dams.
2. DNR should evaluate the following stream segments for inclusion in NR 102 as Exceptional Resource Waters
  - Wisconsin River (Business Hwy 51 in Merrill downstream to the Marathon Co. line.)
  - Wisconsin River (Lincoln Co. line downstream to Cty Hwy WW at Brokaw).
3. Watershed Staff should conduct sampling of sediments for contaminants of concern between Merrill and Castle Rock Dams.
4. Basin Staff should work closely with WVIC and other consumptive water users to determine the allowable water diversion (loss) on the Wisconsin River mainstem.
5. Maintain and extend the reintroduction of Sturgeon and other native species to the Wisconsin River.
6. Fish and Aquatic Habitat staff should continue to work to eliminate flashboards, which can fail and result in sudden water level changes.
7. Monitor carp on the Wisconsin River and look for alternatives and methods for the removal and control of carp.
8. Work towards a long-term goal of establishing a Total Maximum Daily Load (TMDL) on the entire Wisconsin River Mainstem.
9. Central office should determine if there is a need to develop a wasteload allocation for the Wisconsin River from HWY 10 downstream to the Biron Dam (Segment C-D).
10. Basin Staff and Central Office WT Staff should work together to develop a phosphorus mass balance study for the Wisconsin River. This information would be used to help establish a TMDL for 303 (d) listed waterbodies including Petenwell and Castle Rock Flowages.
11. Basin Staff should construct barrier islands or breakwaters at suitable locations to break up wind fetch, create fish and wildlife habitat, provide shelter for establishment of aquatic vegetation, and prevent shoreline erosion.

Table M-1 is a comprehensive list of all the Hydroplants and Reservoir Systems on the Wisconsin River in the Central Wisconsin River Basin

**TABLE M-1 Hydroplants and Reservoir Systems, Central Wisconsin River Basin**

Plant	Owner	Reservoir Area (acres)	Height of Dam (feet)	Generation Capacity (kw)	Annual Generation (mwh)	People served*
Wausau	Wisconsin Public Service	284	27.5	5400	32375	10792
Rothschild	Weyerhaeuser Paper Co.	1604	20.5	3640	22736	7579
Mosinee	Wausau Mosinee Paper Co.	1380	21.7	3050	23865	7955
DuBay	Stora Enso	7800	25.3	7200	43278	14426
Stevens Point	Stora Enso	3915	16.6	3840	28184	9935
Wisconsin River Division	Stora Enso	240	22.0	6340	40343	13448
Biron	Stora Enso	2078	23.6	6600	39467	13156
Wisconsin Rapids	Stora Enso	455	30.2	10050	54493	18164
Centralia	Georgia Pacific	250	15.0	3500	23492	7831
Port Edwards	Georgia Pacific	150	16.5	2400	17863	5954
Nekoosa	Georgia Pacific	400	21.4	3800	26450	8817
Petenwell	Wisconsin River Power Co.	25180	41.5	20000	101540	33847
Castle Rock	Wisconsin River Power Co.	14900	34.0	15000	93216	31072

\*Based on average annual residential electrical use of 3 mwh per person. (Wisconsin Valley Improvement Corporation)

**Central Wisconsin River Mainstem and Flowages (Table M-2)**

Lake/Flowage Name	Fishery Use	Access	Area (acres)	Max / Mean Depth (Feet)	Lake Type	Watershed Drainage	Phos. Class	TSI Range	Fish Advis.	LMO	Impair Source/Impact	Aquatic Plant Data	Exotics	Self-Help Monitoring	Recommends.
Port Edwards Flowage T22NR05ES36 1395800	Small Mouth Walleye Ch. Cat	No	117.0	16/NR	DG				MEC PCB's						
Centralia Flowage T22NR05ES24 1396000	Small Mouth Walleye Ch. Cat	BR	231.0	19/NR	DG				MEC PCB's						
Wisconsin Rapids Flowage T22NR06ES08 1396200	Small Mouth Walleye Ch. Cat	No	447.0	22/NR	DG				MEC PCB's						
Biron Flowage T23NR06ES34 1396900	Small Mouth Walleye N. Pike	BR	2126.0	23/NR	DG				MEC PCB's						
Nekoosa Flowage T21NR05ES10 1387900	Small Mouth Walleye Ch. Cat	T	298.0	17/NR	DG				MEC PCB's						
Lake DuBay T25NR07ES10 1412200	Small Mouth Walleye N. Pike Ch. cat	BR	6,700.0	30/NR	DG				MEC PCB's						
Stevens Point Flowage #2 T23NR08ES08 1409100	Small Mouth Walleye Ch. Cat	No	220.0	25/NR	DG	4969.0			MEC PCB's						
Stevens Point Flowage #3 T24NR08ES32 1409400	Small Mouth Walleye Ch. Cat	BR	2093.0	25/NR	DG	4964.0			MEC PCB's						
Wausau Dam Lake T29NR07ES35 1469700	Small Mouth Walleye N. Pike	BR	284.0	28/NR	DG	3,092.0			MEC PCB's						
Mosinee Flowage T27NR07ES29 1434900	Small Mouth Walleye N. Pike	BR	994.0	18/NR	DG				MEC PCB's		Sudden water level fluctuations related to hydrodam "flash board" failure.				
Castle Rock Flowage T16NR04ES13 1345700	Small Mouth Walleye N. Pike	BR	13,955.0	36/NR	DG	6,864.0			MEC DIOXIN PCB's		NPS,PSI/NUTS,SED,Hab, SC, *Hg, *PCBs,*dioxin,*FCA, *DO *303(d) Listed Waterbody				
Petenwell Flowage T18NR04ES04 1377100	Small Mouth Walleye N. Pike	BR	23,040	44/NR	DG	5,879.0			MEC DIOXIN PCB's		NPS,PSI/NUTS,SED,Hab, SC, *Hg, *PCBs,*dioxin,*FCA, *DO *303(d) Listed Waterbody				
Lake Wausau T28NR07ES12 1437500	Small Mouth Walleye N. Pike	BF	1918.0	30/7	DG				MEC PCB's						

**MONITORING RECOMMENDATIONS:** (1) Self-Help Lake Monitoring Volunteer, (2) Long-Term Trend Monitoring Lake, (3) Fish Tissue Monitoring for Contaminants, (4) Water Quality Monitoring, (5) Watershed Land Use Assessment, (6) Conduct Aquatic Plant Survey, (7) Establish Aquatic Plant Sensitive Areas  
 (X)-Completed, (R)-Recommended, or (C)-currently being done

**MANAGEMENT RECOMMENDATIONS:** (1) Water Resource Management staff should consider this lake a high priority to receive lakes planning grant. (2) Water Resources Management staff should consider this lake a high priority to receive a lakes protection grant. (3) Water Resources Management should consider this lake a high priority for selection as a priority lakes project within the Wisconsin Nonpoint Source Pollution and Abatement Program. (4) Water Regulation and Zoning and Water Resources Management staff should assist local land use decision makers and riparian residents in developing and implementing land use management programs which protect water quality. (5) Water Resources Management staff should assist local lake management interest groups in organizing and/or working to improve and protect water quality. (6) Reference narrative for specific management recommendations.