

2010 Water Quality Management Plan Update

Upper Chippewa River Basin, Wisconsin

December 2010

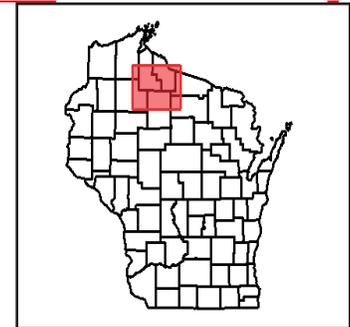
The North Fork Flambeau River watershed lies within the Upper Chippewa Basin and stretches from Iron County, through the southeastern portion of Ashland County, terminating in north-western Price County (Map 1).

The major water resource in this watershed is the Flambeau River (a.k.a. North Fork Flambeau R.) which begins at the Turtle-Flambeau Flowage dam in Iron County, and exits the downstream end of the watershed in Price County. There are four impoundments on this reach of the river. A number of small streams, many of which are trout waters, feed into the Flambeau River.

There are many small lakes, the largest being Lake Six at 148 acres. Wetlands are abundant and comprise 33% of the watershed. The abundant wetlands contribute to good water quality and also result in many waters being stained by the dissolved organic substances present in wetland drainage.



Map 1: North Fork Flambeau River



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Watershed Details

Population and Land Use

The watershed consists of approximately 158 square miles and contains 164 miles of streams, 630 acres of lakes, and 33,476 acres of wetland habitat (Table 1).

Table 1. Watershed Attributes

Item	Size
Watershed Size	158 mi sq.
Stream Miles	164
Lake Acres	630
Wetland Acres	33,476

Forest is the dominant land cover (51%), followed by wetland (39%) (Figure 1). Grassland, open space, and agriculture are other significant land uses present in the watershed, but collectively only make up less than 12% of the watershed. Urban land uses account for less than 1% of the land area.

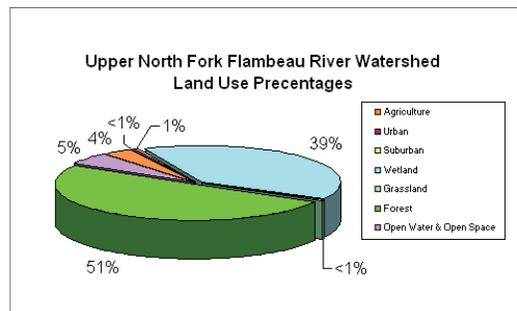
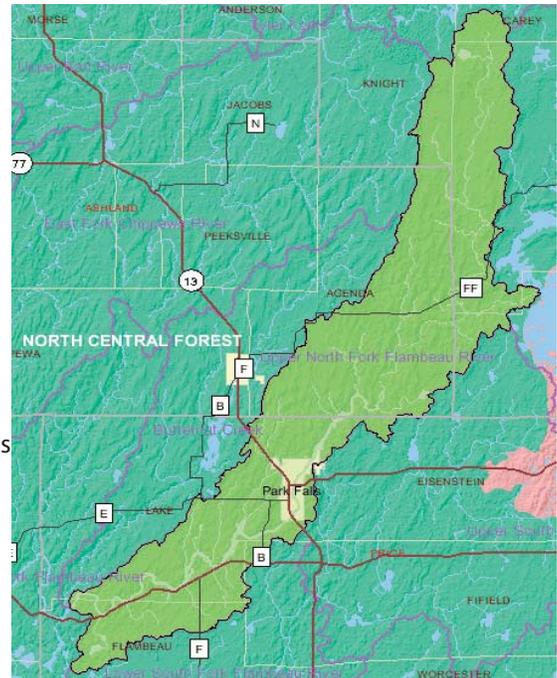


Figure 1. Land Use and Land Cover

Ecological Landscapes

The entire North Fork Flambeau River watershed lays within the North Central Forest Ecological Landscape occupying much of the northern third of Wisconsin. Its landforms are characterized by end and ground moraines with some pitted outwash and bedrock controlled areas. Two prominent areas in this Ecological Landscape are the Penokee-Gogebic Iron Range in the north extending into Michigan, and Timm's Hill, the highest point in Wisconsin (1,951 feet) in the south. These are not located within the North Fork Flambeau River Watershed; however, they are important areas for the Upper Chippewa Basin in which the watershed is located. Soils consist of sandy loam, sand, and silts throughout the region. The vegetation is mainly forest, with many wetlands and some agriculture, though the growing season is not as favorable as it is in southern Wisconsin. Lake Superior greatly influences the northern portion of the Ecological Landscape especially during the winter season, producing greater snowfall than in most areas in Wisconsin.

The historic vegetation was primarily hemlock-hardwood forest dominated by hemlock, sugar maple, and yellow birch. There were some smaller areas of white and red pine forest scattered throughout the Ecological Landscape, and individual white pine trees were a component of the hemlock-hardwood forest. Harvesting hemlock to support the tanneries was common at the turn of the century, and the species soon became a minor component of forests due to over-harvesting and lack of regeneration. Currently, forests cover approximately 80% of this Ecological Landscape. The northern hardwood forest is dominant, made up of sugar maple, basswood, and red maple, and also including some scattered hemlock and white pine pockets within stands. The aspen-birch forest type group is also relatively abundant, followed by spruce-fir. A variety of wetland community types also are present, both forested and non-forested.



Map 2: Ecological Landscapes

Invasive Species

No comprehensive survey has been conducted to determine the extent of invasive plants and animals in the watershed. Invasive species are present in and adjacent to the watershed. Aquatic invasives are present in nearby or connecting waterways. There is also a potential for terrestrial invasive species such as buckthorn, Asian honeysuckle, loosestrife, or others to be transported from established patches along transportation and recreation corridors or nearby urban landscapes. Efforts to build volunteer support for monitoring are encouraged through River Alliance's Project RED (Riverine Early Detectors), the Upper Chippewa Invasives Cooperative, and UW-Stevens Point's Clean Boats/Clean Waters program, and Citizen Lake Monitoring Network. Table 2 outlines some of the aquatic and riverine invasive species that have been found in the area.

Table 2. Invasive species identified within the North Fork Flambeau River Watershed

<i>Waterbody</i>	<i>Species</i>	<i>County</i>
Butternut Lake	Banded Mystery Snail, Chinese Mystery Snail	Price
Flambeau River	Chinese Mystery Snail	Price, Iron, Ashland
Manitowish River	Rusty Crayfish, Chinese Mystery Snail	Iron, Vilas
Turtle Flambeau Flowage	Purple Loosestrife	Iron
Augustine Lake	Fresh Water Jellyfish	Ashland
Perch Lake	Fresh Water Jellyfish	Sawyer
Gile Flowage	Spiny Waterflea	Iron
Lake Winter (Brunet River)	Curly Leaf Pondweed	Sawyer
Mud Lake	Eurasian Water Milfoil	Sawyer
Phillips Chain of Lakes	Eurasian Water Milfoil	Price

Watershed Historical Note

The city of Park Falls is located in Price County in the Upper North Fork Flambeau River watershed. The city began in the late 1800s as a small river village called Muskellunge Falls. It was later renamed Park Falls for the scenic beauty surrounding the former falls on the south side of town. With a pulp and paper mill, the town grew rapidly and was incorporated as a city in 1912. At the height of the city's industrial success the city's population swelled to more than 4,000 residents. At the same time, commercial development fueled a sizeable downtown which largely remains today.

Watershed Condition

Watershed Priorities & Water Quality Goals

- Maintaining natural riparian buffers, wildlife travel corridors, and protecting key "wild" sections of rivers for recreation and aesthetics
- Protecting wetland values and functions
- Reducing impacts of forest fragmentation due to development and recreational activities
- Work with private land owners and government agencies to minimize the impact of ATV trail development and ATV use on the watershed's natural resources
- Protecting water bodies and riparian corridors from invasive species by educating citizens and recreational users and encouraging monitoring activities



Point and Nonpoint Sources

There are two point sources in this watershed, Flambeau River Paper Company and the Park Falls Municipal Wastewater Treatment Plant.

E. coli testing at the Smith Lake beach was conducted in May through August of 2004 to 2008 by the Price County Health Dept. The beach is about 5 miles downstream of the paper mill. The E. coli health standard was exceeded on 64% of dates in 2004. E. coli health standard exceedances declined over the years, and in 2008 no exceedances were found. A shift in the E. coli population in the mill's wastewater treatment system occurred in 2008. This resulted in only low levels of E. coli being present in their treated discharge to the river. There is some evidence to suggest that runoff from agricultural operations between State Highway 13 and County Highway B may be contributing sources of the E. coli bacteria detected in samples downstream.

Land Use and Development Impacts

Trends in housing density tell only part of the story. Projections of housing density over time painting a clear picture of how development pressure has focused on water resource rich areas in Sawyer and Vilas Counties, but there is little research data to document impacts of non-residential housing development over time. Activities like road and trail building, land development and parcelization for hunting "cabins", and related clearing of land for food plots or wildlife ponds are having cumulative negative effects on forest health and wetlands. The Upper Chippewa Basin reports a marked increase in DNR permit requests associated with recreational use of land, as well as increases in unauthorized activities. In addition, invasive species are well documented in association with trail networks and can be spread by forest management activities and recreational use.

Forest Management Activities

Well-conducted forest management activities such as harvesting timber or building forestry roads and log landings require use of best management practices to protect water quality, but do not require that roads and landings built for temporary access be restored to a forested condition. As a result, many owners, developers, or contractors use these temporary corridors to open up previously undeveloped land without considering necessary design standards.

Many forested areas in the region are interspersed with wetlands. The photo above shows creation of small plots

of open land in 2005 based on previous logging activities. These areas of open land also impact overall forest composition as they create “edge” effect that favors some species over species of wildlife that depend upon interior habitat in larger blocks of forest. More education is needed in order to protect streams and wetland areas, maintain well balanced forest composition, and prevent the spread of invasive species.

Rivers and Streams

The high percentage of the watershed in forest and wetland land cover (>86%) results in generally good stream water quality.

The Flambeau River is the largest stream in this watershed. Upstream from Park Falls, the Flambeau River quality is excellent with low nutrient and suspended solids concentrations, good dissolved oxygen concentrations, and an excellent non-game and gamefish community. This segment of the river has been designated as an outstanding resource water (ORW). Its condition is generally good, although it has four dams and some water quality impacts from the point sources in Park Falls (paper mill and municipal wastewater treatment plant). The river then passes through a series of four impoundments, with only two short segments of free-flowing river between them.

Below the last dam in the watershed (Crowley) the river flows freely for 6 miles to the mouth of the watershed. Water quality is still good, although somewhat poorer than above Park Falls due mostly to the two permitted point source discharges from the paper mill and municipal sewage treatment plant.

Flambeau River Fishery

Aquatic habitat in the entire Flambeau River is fragmented by nine dams, including eight hydroelectric projects and one headwater storage reservoir, not all within the North Fork Flambeau River watershed. In general, habitat complexity and species diversity are greater in the free-flowing segments of the Flambeau River than in the impounded reaches.

The fish community in the Flambeau River is moderately diverse. Resource agencies and tribes have captured 39 fish species with various gear in surveys conducted since 1928. Recent samples from the Flambeau River collected by electrofishing under the baseline monitoring protocol for non-wadable streams included 19 fish species. By comparison 68 fish species have been recorded from the St. Croix River in the adjacent basin, a relatively undisturbed stream of comparable size with fewer alterations to habitat and stream flow than the Flambeau River has endured.

Stream flow is regulated seasonally by operation of two headwater storage reservoirs, the Turtle-Flambeau Flowage and the Manitowish Chain-of-Lakes. Reservoir drawdowns in summer, fall, and winter moderate both the high and the low extremes of discharge. Recent changes in the normal operation of the large hydroelectric projects on the lower Flambeau River have nearly eliminated the twice-daily fluctuations in stream flow that resulted from storing and releasing water to meet the peak demand for electricity. Those sudden and frequent changes in discharge affect the suitability of habitat for fish and other aquatic life.

For centuries, the Flambeau River was an important source of fish protein for native people. “Flambeau” is translated from French as “torch river.” The name is derived from 17th century accounts of European settlers who described Native Americans using torches to illuminate the base of the waterfalls where they speared muskellunge, sturgeon, and other fish for sustenance. The waterfalls were



Post harvest development patterns do not consider forest and wetland impacts.



Photo courtesy of WDFNR

earlier known as Muskellunge Falls, and they are presently inundated by Lower Park Falls Flowage within the City of Park Falls. Today, popular sportfish species include smallmouth bass, muskellunge, walleye, lake sturgeon, and channel catfish. Suckers and redhorse provide early angling opportunities in spring before the general fishing season opens. Each population sustains itself; however, large muskellunge fingerlings are stocked in alternate years to supplement recruitment from natural reproduction. For the last 125 years since the railroad was extended to Fifield and Park Falls, the Flambeau River continues to be a premiere destination for musky anglers and fishing guides. The results from a 10-year evaluation of muskellunge stocking in northern Wisconsin should demonstrate whether continued stocking of those reaches and impoundments is necessary.

Two fish species from the Flambeau River have elevated protective status. Greater redhorse are classified as "threatened" but there are no harvest restrictions on greater redhorse. No exotic fish species are known to occur on the Flambeau River. Lake sturgeon are listed as a "species of special concern" under Wisconsin's Endangered Species Act. Sturgeon harvest in the Flambeau River and other selected waters is closely regulated with a six-week open season beginning in early September, a 50-inch minimum length limit, and an annual bag limit of one fish.

Radio telemetry, tailrace netting in the discharge of hydroelectric turbines, and recapture of fish given differential marks indicated that nearly all fish species present in the river system move downstream through the turbines and spillways of the dams at some time during their life cycle. Some fish that move downstream through these structures are killed as a result of their entrainment. Some die immediately from injury caused by turbine blade strikes or sudden changes in pressure. Others suffer delayed mortality due to a variety of factors, including increased vulnerability of predators.

All entrained fish are permanently displaced from upstream habitat. Physical barriers to fish movements have affected the geographic distribution of freshwater mussels, which rely on a specific host fish to carry their larvae as parasites (Figure 2). The dams that block the movements of fish have fragmented the distribution of at least two mussel populations in the Flambeau River system. The lower reach of the Flambeau downstream from Thornapple Dam supports viable populations

of purple wartyback and bullhead mussels, but upstream from Thornapple Dam only remnant populations with very old individuals are found. Further upstream shells from dead mussels indicate that both species once occurred throughout the river system (Table 3).

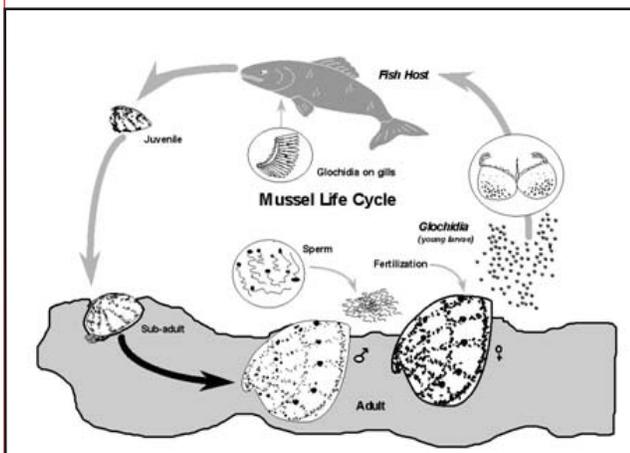


Figure 2. Life cycle of a freshwater mussel.

Several fish refuges are established below some of the dams on the Flambeau River, presumably to deter poachers in areas where fish often congregate. Fishing is prohibited year round several hundred yards downstream from the Turtle-Flambeau and the Upper Park Falls dams. In the lower Flambeau River all fishing is prohibited within 200 feet of the hydroelectric dams in Rusk County, except during the open fishing season for muskellunge. Eventually, we hope to evaluate the need for these and other fish refuges within the Upper Chippewa River Basin to simplify the current regulations.

Spotlight on Lake Sturgeon!

Lake sturgeon are like living fossils, remaining much unchanged from those of the Upper Cretaceous period of the Mesozoic Era some 100 million years ago. Their mouth protrudes outside the body to suck up food as they cruise lake and riverbeds, using barbels that hang in front of the mouth as feelers to sense snails, insects, and other likely food.

Historically, they flourished in Wisconsin's rivers including the Mississippi, Wisconsin, and Menomonee Rivers, Lake Superior, Lake Michigan and Green Bay. Today, lake sturgeon are uncommon in most large rivers in Wisconsin and are considered a "species of concern" due to overharvest and habitat impairments like pollution and dams.

In 2005, a new project began to protect Lake Sturgeon in the Upper Chippewa watershed basin. The project aims to better estimate population abundance of these large fish and to track the percentage harvested by anglers using Passive Integrated Transponder (PIT) tagged fish in the population. The percentage of tagged fish harvested can be compared to the total number of tagged fish in the population, helping to ensure appropriate harvest goals.

DNR is also working to restore the remnant populations upstream in the Turtle Flambeau Flowage and the Manitowish River by artificially spawning sturgeon where they congregate in the North Fork Flambeau River.

Table 3. Mussels in the Flambeau River.

Table 3: Mussels in the Flambeau River			
Common name	Scientific name	Status	Comments
mucket	<i>A. ligamentina carinata</i>		
elktoe	<i>A. marginata</i>	special concern	
threeridge	<i>A. plicata plicata</i>		
giant floater	<i>P. grandis form grandis</i>		
paper pondshell	<i>A. imbecillis</i>		
cylindrical papershell	<i>A. ferussacianus</i>		
purple wartyback	<i>C. tuberculata</i>	endangered	extirpated from watershed
spike	<i>E. dilatata</i>		
wabash pigtoe	<i>F. flava</i>		
fatmucket	<i>L. siliquoidea</i>		
plain pocketbook	<i>L. cardium</i>		
creek heelsplitter	<i>L. compressa</i>		
fluted-shell	<i>L. costata</i>		
black sandshell	<i>L. recta</i>		
hickorynut	<i>O. olivaria</i>		
round pigtoe	<i>P. coccineum</i>	special concern	"= <i>P. sintoxia</i> "
squawfoot	<i>S. undulatus undulatus</i>		
Gaspé floater	<i>P. cataracta marginata</i>		

Tributary Streams

There are 23 streams flowing into the Flambeau River. Swamp Creek is the largest of these. Its drainage area has minimal development and abundant wetlands. Water quality and macroinvertebrate samples near its mouth show good to excellent conditions.

The remaining streams are fairly small. Fifteen streams support trout populations. Most of these are coolwater streams and are Class 2 and 3 trout streams. The small streams with recent macroinvertebrate monitoring data show good to excellent conditions.

Flambeau River Impoundments

Water quality conditions and habitat on the Flambeau River are influenced by the four impoundments. Upper Park Falls Flowage is shallow and riverine. It is only slightly impacted by urban runoff in Park Falls. Phosphorus and chlorophyll a concentrations indicate mesotrophic conditions. It has an excellent non-game and gamefish community. The Park Falls point sources (paper mill and municipal wastewater treatment plant) discharge to the upper end of Lower Park Falls Flowage. On average, the discharges increase the river's surface temperature by 2.5°F, increase water color (staining) by 23%, and increase total phosphorus concentrations by 86%. However, extensive testing indicated the species of bacteria present in the discharge were not a health concern. Amounts of these bacteria in the discharge varied from year to year and declined to low levels in 2008.

Phosphorus concentrations in Lower Park Falls Flowage indicate eutrophic conditions, although a short hydraulic residence time prevents significant algae growth. Phosphorus and chlorophyll a concentrations in Pixley and Crowley Flowages also indicate eutrophic conditions. Longer hydraulic residence times allow significant algae blooms to occur at times.

Elevated heavy metal concentrations have also been found in the sediment of the flowages influenced by Park Falls point sources. These toxic contaminants can cause problems for fish or other organisms, but it is especially important to understand their impacts on benthic (bottom dwelling) organisms such as insect larvae, aquatic worms, or others that

form the base of the food chain. Concentrations of mercury and zinc are the greatest concern, with some elevation of copper and lead concentrations also present. Mercury is known to have been historically used as a slimicide by paper mills, but is no longer used. Sediment samples were last collected in 1989 and 1992.

Table 4. Metals Concentrations in Flambeau River Sediment at Park Falls

FLOWAGE	Mercury (mg/kg)	Zinc (mg/kg)	Copper (mg/kg)	Lead (mg/kg)
Lower Park Falls (surface grab, 1989)	0.64	355	28	24
Lower Park Falls (1.4-2.0 m, 1992)	4.2			
Pixley (surface grab, 1989)	1.5	470	58	42
Pixley (0-0.25 m, 1992)	1.9			
Pixley (0.75-0.95 m, 1992)	7.9			
Crowley (surface grab, 1989)	1.6	375	52	28
Consensus based sediment quality guidelines:				
PEC*	1.06	459	149	128
TEC**	0.18	121	31.6	35.8

*PEC = probable effect concentration, above which harmful effects are likely to be observed

**TEC = threshold effect concentration, below which harmful effects are unlikely to be observed

Sampling results indicate surficial sediment mercury concentrations are at toxic levels for most benthic organisms in Pixley and Crowley Flowages. At the downstream end of Lower Park Falls Flowage, sediment concentrations for mercury are also at toxic levels for a substantial percentage of benthic organisms. Zinc concentrations mirror those same trends with Pixley Flowage sediments at toxic levels for most benthic organisms (>50%) as well as a lower, yet substantial, percentage in Lower Park Falls and Crowley Flowages. Sediment metal concentrations are summarized in Table 4 above.

Surficial sediment mercury concentrations are at toxic levels for most benthic (bottom dwelling) organisms (insect larvae, aquatic worms, etc.) in Pixley and Crowley Flowages, and are at toxic levels for many benthic organisms in Lower Park Falls Flowage. Surficial sediment zinc concentrations are at toxic levels for most benthic organisms in Pixley Flowage, and are at toxic levels for many benthic organisms in Lower Park Falls and Crowley Flowages. Lower Park Falls, Pixley, and Crowley Flowages have good gamefish communities. Mercury contamination of fish tissue is documented in Pixley and Crowley Flowages.

Lake Name	Acres
Betsy Creek Springs	.3 Acres
Betsy Lake	4.7 Acres
Blueberry Lake	2.6 Acres
Gardner Lake	24.0 Acres
Hoffman Lake	89.0 Acres
Lake Six	148.0 Acres
Le Tourneau Lake	124.0 Acres
Leonards Lakes (East)	.6 Acres
Leonards Lakes (West)	.5 Acres
McKaskel Lake	.6 Acres
Minnow Lake	11.0 Acres
Peters Lake	19.0 Acres

Table 5. Named lakes and acreage

There are three other flowages in the watershed. Smith "Lake" is the large bay on the north side of the Pixley Flowage. While it is part of the flowage created by the Pixley dam, it has traditionally been considered a separate water body. Le Claire Lake is a 27 acre impoundment of Le Tourneau Creek in Price County. It supports a warm water sport fish community. Forest Wander Lake 17 is a 39 acre impoundment of Swamp Creek in Iron County.

Lake Health

There are 12 named lakes and 24 unnamed lakes in the watershed (Table 5). Three of the named lakes are larger than 80 acres (Lake Six, 148 acres; Le Tourneau, 124 acres; Hoffman, 89 acres). The remaining 9 named lakes are smaller than 25 acres. All of the unnamed lakes are smaller than 7 acres.

Only LeTourneau Lake has had a recent fish survey (2004). A warm water sport fish community was present. Older data documents warm water sport fish communities present in most of the named lakes.

Many of the shallower lakes are subject to winterkills (partial or complete die-offs of fish due to lack of oxygen under the ice). This is primarily a naturally occurring condition. A previous watershed assessment indicated 36% of the lakes (less than 10 acres) experienced winterkills. A higher percentage of the smaller lakes are also likely to be affected.

Limited water quality monitoring at LeTourneau Lake indicates it is stained and eutrophic. Monitoring at Lake Six indicates mesotrophic conditions. Water quality monitoring data is not available for the other lakes.

Wetland Health

Wetland Status

The North Fork Flambeau River watershed lies within the Upper Chippewa Basin and stretches from Iron County, through the southeastern portion of Ashland County, terminating in northwestern Price County. Wetlands comprise 31% of the current land uses in the watershed. It is estimated that about 93% of the original wetlands in the watershed currently exist. Of these wetlands, forested wetlands (77%) and shrub wetlands (18%) dominate the landscape.

Wetland Condition

Reed canary grass, an opportunistic aquatic invasive wetland plant, often invades different wetland types and has been identified as a statewide concern. WDNR uses leaf-off satellite imagery to estimate areas of infestation based on visible patterns. This information shows that reed canary grass dominates 71% of the existing forested wetlands (~89 acres) and 22% of the remaining shrub wetlands. These areas show up west of Park Falls associated with agricultural fields, and north of Park Falls along the river where larger patches are seen on field edges and forest margins. Reed Canary Grass domination inhibits successful establishment of native wetland species. An increasing concern among WDNR staff is loss of wetland due to trends in recreational land use, road and trail construction and pond construction (see Land Use and Development Impacts).

Wetland Restorability

Restorable wetlands were estimated for the watershed based on acres of hydric soil minus acres mapped as wetlands on the Wisconsin Wetland Inventory. Of the 2,296 acres of estimated lost wetlands in the watershed, approximately 2,000 acres (87%) are considered potentially restorable based on modeled data. These areas do not include 53 acres lost due to development of the city of Park Falls, roads, and buildings, and 245 acres of wetlands less than .5 acres in size (Chris Smith, DNR, 2009). Much of the agricultural land in the watershed contains soils with hydric inclusions that, in pre-settlement times, undoubtedly contained wetlands.

It is important to note that a number of realistic factors limit wetland restoration in the basin including identification of cost-effective eligible sites and economic considerations within the agricultural community. Resource managers believe that educating local and non-resident landowners about wetland values and proper siting of development (including roads) will provide greater benefit to wetlands than seeking out potential restoration sites.



Black spruce and tamarack bogs are common throughout the watershed.

Wetlands are common in the watershed and are often interspersed in forested areas. This illegal wetland fill should have been avoided with proper planning and use of best management practices.



Wetlands often are associated with navigable streams. Recreational uses like food plot creation, roadways, or ATV play areas should not be located in wetlands. In the photo at right, marsh grass is evident around an area filled in for creation of a recreation area. Pond building activities may also be restricted near streams and wetlands. Creation or restoration of ponds should be designed by a qualified engineer in consultation with Department of Natural Resources specialists and U.S. Army Corps of Engineers.



Waters of Note:

Outstanding or Exceptional Waters (ORW/ERW)

Table 6 shows the named ORW/ERW waters in the North Fork Flambeau River watershed. There are five named (seen in the table) and three unnamed waterbodies. Unnamed waterbodies include a tributary of Pixley Flowage (ERW) and two tributaries of Smith Creek (ERW).

Table 6: ORW/ERW waters or portions of waters in the North Fork Flambeau River watershed (See Maps in Appendix)

Official Waterbody Name	Local Waterbody Name	WBIC	ORW/ERW
Bosner Creek	Bosner Creek (Rapid Creek)	2291000	ERW
Flambeau River	Flambeau River	2225000	ORW and ERW for two different segments
Sixmile Creek	Sixmile Creek	2287500	ERW

Trout Streams

Table 7 shows trout waters in the watershed. There are nine named and six unnamed waters. Unnamed waters include two Class II tributaries of Deer Creek, two Class I tributaries of Smith Creek, and one Class I tributary of Pixley Flowage.

Table 7: Trout Streams in the Watershed

Official Waterbody Name	Local Waterbody Name	WBIC	Start Mile	End Mile	Trout Class
Bosner Creek	Bosner Creek (Rapid Creek)	2291000	0	3.63	CLASS II
Bosner Creek	Bosner Creek (Rapid Creek)	2291000	3.63	4.61	CLASS I
Deer Creek	Deer Creek	2291900	0	7.56	CLASS II
Flood Creek	Flood Creek	2287700	0	3.47	CLASS II
Hurd Creek	Dan Hurd Creek	2293300	0	6.64	CLASS II
Ninemile Creek	Ninemile Creek (Flambeau Creek)	2287000	0	1	CLASS II
Ninemile Creek	Ninemile Creek (Flambeau Creek)	2287000	1	3.01	CLASS III
Pinkerton Creek	Pinkerton Creek	2288000	0	5.17	CLASS II
Sixmile Creek	Sixmile Creek	2287500	0	2.31	CLASS I
Smith Creek	Smith Creek	2289100	2.07	8.26	CLASS II
Swamp Creek	Swamp Creek	2292500	2.2	15.91	CLASS III
Swamp Creek	Swamp Creek	2292500	15.91	21.8	CLASS II

Contaminated sediment is the primary source of impairment in this watershed. Specific fish advice from contaminated sediment, as well as atmospheric deposition of mercury, have resulted in waters or waters segments not meeting state and federal water quality standards.

Table 8. The six impaired waters in the North Fork Flambeau River watershed.

Stream Name	Start Mile	End Mile or Acres	Impaired Category	Pollutants	Impairments	Sources
Flambeau River	0	84.32	Atm. Deposition	Mercury	Contaminated Fish Tissue	Contaminated Sediments, Atmospheric Deposition - Toxics
Crowley Flowage		353.64	Contam.Sediment	Mercury	Contaminated Fish Tissue, Chronic Aquatic Toxicity, Contaminated Sediment	Contaminated Sediments
Pixley Flowage and Smith Lake		257.76	Contam. Sediment	Mercury	Contaminated Fish Tissue, Contaminated Sediment	Contaminated Sediments, Atmospheric Deposition - Toxics
Lower Park Falls Flowage		61.97	Contam. Sediment	Unspecified Metals, Mercury	Chronic Aquatic Toxicity, Contaminated Sediment	Contaminated Sediments
Lake Six		148	Atm. Deposition	Mercury	Contaminated Fish Tissue	Atmospheric Deposition - Toxics
Turtle Flambeau Flowage		12942.5	Atm. Deposition	Mercury	Contaminated Fish Tissue	Atmospheric Deposition - Toxics

Watershed Actions

Projects and Grants

Projects

Flambeau River State Forest Master Plan

Flambeau Rivers State Forest encompasses just over 90,000 acres and the forest is one of the largest public lands in the region. The forest provides a remote experience with low road densities locally and regionally. The forest is perhaps best characterized by the 75 miles of the north and south forks of the Flambeau River that meander through the property. It is a popular destination for canoeists and kayakers who come to enjoy the rapids, camping, and remote nature of the Flambeau River. The purpose of the master plan outlines how the property will be managed, used, and developed, and the benefits it will provide. The Upper North Fork Scenic Area is located approximately 30 miles northeast of Park Falls in Ashland & Iron Counties. The area totals 1114 acres and consists of land on both sides of the river. The area consists of 14 river miles. [P. 94 FRSF master plan (source: WDNR Flambeau River State Forest Draft Master Plan, April 2010)].

Northern Rivers Initiative

In 1995 the Natural Resources Board approved the Northern Initiatives Project (NI). These initiatives were the culmination of more than two years of discussions with the public, Department staff and advice from many groups and organizations throughout Wisconsin. These initiatives form an integrated approach to managing resources and protecting environmental quality in northern Wisconsin. Some of the major issues identified in these public meetings were: the quickening pace of change in the north, impacts of shoreline development, concerns about mining, forest management practices, the DNR's role in the north, and land use.

The Northern Rivers Initiative (NRI) is a component of the Northern Initiative and was initiated in response to the public concern over the changing nature of the northern Wisconsin's landscape, especially its lakes and rivers. This initiative, focusing on the 20-counties north of Highway 29, including parts of 7 river basins, is designed to assess the values associated with northern rivers and streams, and then direct intensive efforts towards elevated protection on the best stream corridors. The NRI compiled a prioritized list of stream corridors based on their high ecological significance, outstanding natural beauty, or specialized recreational values. This priority list was developed using a rating system that utilized 26 different rating criteria. This system assessed the stream corridor within one-quarter mile of each shore. Rating committees were composed of 225 members from non-profit conservation organizations, government, industry,

and educators. The NRI process developed 4 categories of protection alternatives: Education, Voluntary Conservation, Technical Assistance and Acquisition.

Flambeau River - Northern Rivers Initiative

Four named streams and the Flambeau River in the North Fork Watershed were surveyed and ranked in the NRI. These included Swamp Creek, Bosner Creek, Smith Creek, Sixmile Creek and the Flambeau River (Table 9). The North Fork Flambeau River ranked very high of all streams in the basin and within the 20 county area (in the top 10% of all streams/segments ranked) while Swamp Creek ranked in the top 25% of all streams/segments ranked. Bosner, Smith and Sixmile Creek ranked considerably lower.

Table 9. Flambeau River Northern Rivers Initiative Rankings

River	Segment	County	Upper Chippewa Rank (301 streams/segments ranked)	NRI Rank (20 Counties) (1494 streams/segments)
Bosner Creek	Upstream from junction with Feeder S17	Ashland	233	1203
Bosner Creek	Downstream from junction with Feeder S17	Ashland	240	1222
North Fork Flambeau River	Turtle Flambeau Flowage to Upper Park Falls Flowage	Iron	7	27
North Fork Flambeau River	Turtle-Flambeau Flowage to Upper Park Falls Flowage	Ashland	13	45
North Fork Flambeau River	Crowley Dam to Big Falls Flowage	Sawyer	2	15
North Fork Flambeau River	Crowley Dam to Big Falls Flowage	Price	3	16
Sixmile Creek	All	Price	172	910
Smith Creek	All	Price	188	1020
Swamp Creek	All	Iron	63	302

Upper Chippewa Basin Small Dam Ranking Project

There are eight dams in this watershed and include four dams on tributaries to the North Fork Flambeau River and 4 hydroelectric dams (Upper Park Falls, Lower Park Falls, Pixley, and Crowley) on the North Fork Flambeau River proper. The tributaries with dams are Swamp Creek, Bosner Creek, a tributary to Smith Creek and Betsy Creek. The dam on Betsy Creek has been abandoned.

The four hydroelectric dams on the North Fork of the Flambeau River are owned by North American Hydro and under existing FERC licenses are operated as run of the river facilities, meaning that inflow equals outflow. They also have a narrow range to operate under with a plus or minus 0.25 feet operating range.

In 2006, the WDNR contracted with the River Alliance to conduct an assessment of the dams in the Upper Chippewa Basin to rank them based on their potential benefit if removed. This project was not conducted with the intent of removing all dams within the basin but to develop a priority list of candidate dams that may benefit the resource if the dam owner was interested in removal. The ecological and logistical factors considered in the ranking of the dams for removal included:

- Dam density in the watershed
- Fisheries habitat affected
- Endangered species affected
- Potential connectivity restored
- Potential headwater impacts
- Water quality mitigation
- Specially designated rivers

Table 10, on the next page, lists the ranking of the dams in the Upper North Fork Flambeau River Watershed.

Table 10. Dams Ranked for Possible Removal in the Upper Chippewa River Basin

Dam Name	Waterbody Name	Upper North Fork Ranking	Upper Chippewa Ranking
Forest Wander Lake	Swamp Creek	3	48
Steiger Dam	Bosner Creek	1	27
Tuscolbia Trailhead County Park	Tributary to Smith Creek	Not Ranked	Not Ranked
Betsy Dam	Betsy Creek	Abandoned	Abandoned
Upper Park Falls	North Fork Flambeau River	5	120
Lower Park Falls	North Fork Flambeau River	5	120
Pixley Dam	North Fork Flambeau River	4	101
Crowley Dam	North Fork Flambeau River	2	42

This study assessed 271 dams in the Upper Chippewa Basin out of dams. The four dams owned by North American Hydro (Upper, Lower, Pixley and Crowley) produce electricity and are regulated by FERC and are highly prized for their recreational value and are not being considered as high candidates for removal. Two of the three remaining dams ranked high based on their impact to headwater resources. The third dam was unranked but should also be considered since it may be impacting a cold water resource.

Grants

A Lake Protection Grant for Pixley Flowage was issued on 09/01/2000 and is now complete. The project involved funding Price County-Smith Lake land acquisition where Price County acquired 93.5 acres of land with 6,800 feet of undeveloped frontage on Smith Lake, a flowage of the Flambeau River.

Recommendations for Future Action: Monitoring, Management & Cooperative Work

Monitoring:

- Updated sediment metals contamination assessment should be conducted for Lower Park Falls, Pixley, and Crowley Flowages (planned for early 2010).
- Periodic assessment of fecal bacteria indicators downstream of the Park Falls paper mill should be continued. Current efforts are coordinated between the Price County Health Department, Flambeau River Paper Mill, and WD.

Management:

- Update and implement Northern Rivers Initiative Objectives

Cooperative Work:

- Encourage increased citizen monitoring efforts for wetlands and water resources including monitoring for terrestrial and aquatic species, water chemistry, macroinvertebrates, buffers, or other long term indicators of a healthy watershed
- Encourage groups including the Upper Flambeau Advisory group and South Fork Flambeau River Watershed Association to continue working together to provide input and assist with monitoring

Educational Outreach

- UW-Extension, Price County Health Department, WDNR, & the Park Falls mill will continue to provide periodic updates to the public. UW-Extension’s Basin Educator will work with partners to upgrade on-line resources available to monitor E.coli and other water quality and quantity issues.

Additional Resources

Flambeau River State Forest Master Plan
http://dnr.wi.gov/master_planning/flambeau/

Northern Rivers Initiative
<http://www.dnr.state.wi.us/org/water/rivers/documents/nrifaq99.htm>

Dam study <http://www.wisconsinrivers.org>

Watershed Summaries Online
<http://dnr.wi.gov/water/basin/>

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The beautiful Flambeau River



Fishing below the Crowley Flowage



Forest Resources in the Watershed



DNR PUB.WT-931

UW
Extension
Basin Education Initiative

Wisconsin DNR's mission involves preserving, protecting, and restoring natural resources. Watershed Planning provides a strategic review of water condition to enhance awareness, partnership outreach, and the quality of natural resource management.

N. Fk. Flambeau River Watershed