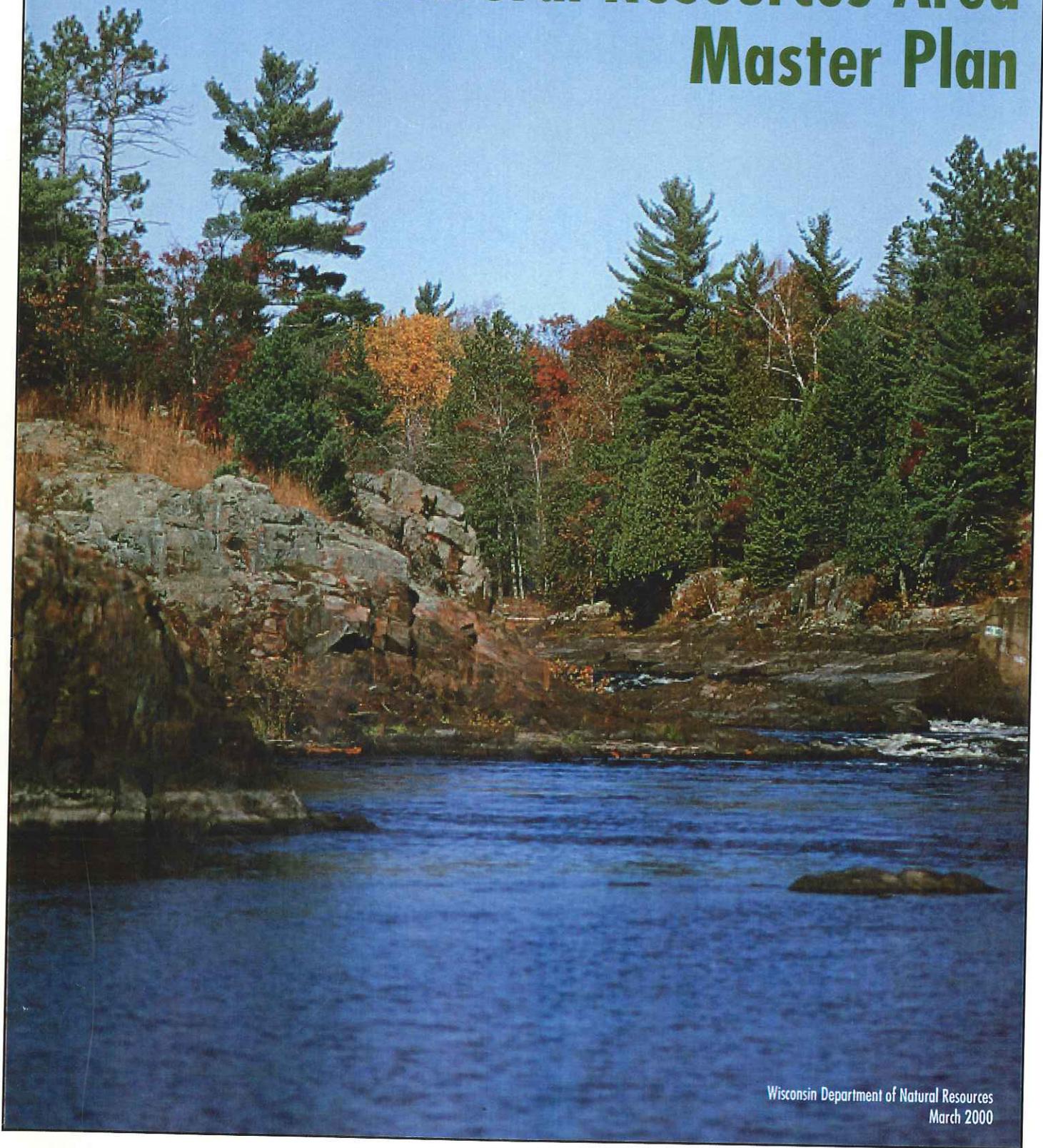


Menominee River Natural Resources Area Master Plan



Wisconsin Department of Natural Resources
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ABBREVIATIONS

ATV	All Terrain Vehicle
BMP's	Best Management Practices
CPP	Citizen Participation Plan
DBH	Diameter at Breast Height
DMU	Deer Management Unit
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
GLARC	Great Lakes Archaeological Research Center
LTE	Limited Term Employee
MCF	Marinette County Forest
MDNR	Michigan Department of Natural Resources
MRNRA	Menominee River Natural Resource Area
NHEU	National Hierarchy of Ecological Units
NR 44	Wis. Adm. Code-Master Planning for Department Properties
NR 45	Wis. Adm. Code-State Parks and Forests Miscellaneous
RAP	Remedial Action Plan
Foundation	Richard King Mellon Foundation
SHSW	State Historical Society of Wisconsin
UWEX	University of Wisconsin Extension
WDNR	Wisconsin Department of Natural Resources
WE	Wisconsin Electric Power Company
WPSC	Wisconsin Public Service Corporation
WSSA	Wilderness Shores Settlement Agreement

I. INTRODUCTION AND SUMMARY

Executive Summary

The Menominee River Natural Resources Area (MRNRA) includes the Wisconsin portion of the 4,450 acres of land purchased by the Richard King Mellon Foundation (Foundation) and the Conservation Fund in 1997 from Wisconsin Public Service Corporation (WPSC). This includes 2,530 acres in Michigan and 1,922 acres in Wisconsin. The Menominee River, which forms the boundary between the states of Michigan and Wisconsin, passes through the center of the property resulting in about 5 miles of publicly owned river frontage in each state. This presents Michigan and Wisconsin with an opportunity for coordinated planning and management of boundary water resources. Planning staffs for both states have worked together in developing similar management strategies within the river corridor.

The property is mostly forested with aspen as the dominant cover type. It is interspersed with areas of pine, oak, and swamp conifers. The river corridor is mostly wild and undeveloped. Much of the property has been logged in the past, however a narrow band along the river corridor has not been logged recently and has been maintained in a mix of older growth trees.

Wildlife is abundant on the property with species such as white-tailed deer, ruffed grouse, bald eagle, and a variety of migratory songbirds known to be present. The river supports a diverse warm water fishery including smallmouth bass, walleye, lake sturgeon, and other species.

Unique features contained within the property are Quiver Falls near the north boundary and Pemene Falls at the southern end. Both of these areas consist of scenic rocky gorges with significant drops in the river. In addition, 2 miles of the Pemebonwon River are located within the property.

This master plan describes the management and development of the part of the property within Wisconsin.

Management Vision

The management vision for this project set at the time of acquisition by the Foundation, was for natural resource management and public recreation. This vision was then restated in the three-year lease agreement between the Foundation and the WDNR, and it was reinforced by the public and participants in the master planning process. The vision, goals, objectives and management recommendations of this plan continue this theme by outlining a management strategy that will maintain and enhance the natural qualities of the property while providing compatible recreational opportunities. This property is designated as a Natural Resources Area, which will allow a variety of management practices to achieve the goals of this plan.

Current Uses

The property, previously owned by a public utility, has been open for public recreation uses and is especially popular for hunting, fishing, canoeing, camping and a variety of uses. Deer and small game hunting, camping and fishing are strong traditional activities in the region and on the MRNRA. These activities have led to some problems such as the cutting of trees to clear shooting lanes, erection of permanent deer blinds, and the use of all terrain vehicles (ATV). There also has been illegal disposal of unwanted household appliances, tires and rubbish on the property. Camping, which has always been prohibited, also has been documented on the site.

Unfortunately, some of these abuses have been commonplace because of the difficulty of enforcement on the large utility holdings. Enforcement of regulations will be important in maintaining and enhancing this property.

Uses and Development

The MRNRA will continue to be open to public use. Vehicle access will be allowed in designated areas and former logging roads will be open to foot travel only. Hunting and fishing will remain important recreational pursuits on this property, and a limited amount of primitive camping will be provided. Hiking trails to some of the more scenic areas such as Pemene Falls and Quiver Falls will be provided, as will several small parking areas for visitors to the property. A scenic overlook will be developed at Quiver Falls.

Management of the forest resources also will parallel some of the former policies. Past timber harvests left the trees within the immediate river corridor standing untouched. Additionally, loggers did not disturb other sites including rocky glades and cedar swamps. These areas contain stands of timber that form the core of the proposed old-growth management zones called for by the public.

Public input also called for more diversity in the forest resources. Increased age class and species diversity will be provided in the management of the extensive aspen stands that make up much of the forest on the site. Some of these stands will be converted to different timber types and uneven-age management. Age class diversity will increase through the use of early and late harvest schedules for the remaining stands of aspen.

A limited amount of private land is proposed for acquisition and addition to the project. Several parcels, each 40 acres or less and totaling slightly less than 200 acres would be added. These properties are proposed for acquisition to provide resource protection in environmentally sensitive areas and to provide boundary consolidation.

Summary of Public Involvement Activities

A citizen participation plan (CPP) was developed as a first step in creating a master plan for the property. A WDNR planning team developed the CPP for use in the planning process, and a draft of the plan was made available for comments and suggestions at the first public meetings held to discuss the project. Public involvement included the following activities:

- **Public Listening Sessions**

A series of seven public listening sessions held in Michigan and Wisconsin during the planning process were used to gather input and comments from the public.

- **Focus Group Meetings**

Meetings were held with a select group of participants invited to discuss specific ideas and concepts necessary for decision making during the planning process.

In addition, news releases prepared to provide specific information about the plan, were sent to news agencies for use at their discretion. Information about meetings and planning issues were sent to news agencies for publication as well as published in the *Wisconsin Outdoor Report*. This insured that legal requirements for open meetings were met.

A mailing list of individuals and organizations was developed during the planning process. Mailings were made to all members of this list of interested parties whenever a significant issue needed explanation or other important announcement needed to be made.

All correspondence received during the planning process was answered within five days. Comments regarding the master plan received this way are given the same status as comments received as a result of a public meeting.

Input received and comments offered over the telephone are treated the same as all other information gathered during planning meetings.

Summary of Significant Public Issues

Boundary expansion was raised by many as an important issue in preserving the river corridor for the long term. Forest management issues were also important, especially species diversity and the potential for conversion of some aspen to longer-lived species. Limiting access to motorized vehicles also was favored by many.

II. THE MANAGEMENT PLAN

Vision

The Menominee River Natural Resources Area protects the natural and scenic qualities of the project area while providing public access for recreation.

Goals

- Protect and manage the project area as a place of scenic natural beauty.
- Provide opportunities for low-impact recreation consistent with resource protection.
- Manage forest resources to establish and maintain species and age class diversity,

based on site capability.

- Protect the water quality of the Menominee River, associated tributaries and wetlands.
- Protect any historic and archaeological sites on the property.
- Preserve any endangered or threatened resources on the property.

Objectives

- Manage the vegetation of the project area to provide a natural diversity of age class and species.
- Promote about 700 acres of “old growth forest” within a corridor 200 feet from the ordinary high water line of the Menominee River, or to the visual horizon, whichever is greater, and on other suitable sites within the project.
- Maintain a minimum of 900 acres of aspen in various stages of maturity.
- Implement a normal fire response to protect life and property within the project boundary, using best management practices and “light-on-the-land” techniques. Land rehabilitation will be done where needed to prevent non-point source pollution to the Menominee River, associated tributaries, and wetlands on the property.
- Provide two designated canoe access campsites within the river corridor. Allow camping on the islands within the property boundaries.
- Provide designated vehicular access to the property.
- Provide about two miles of hiking trail in the river corridor, developed to primitive standards.
- Provide public access to waterfall areas.

Property Designation and Land Management Classifications

The property is designated the “Menominee River Natural Resources Area”. The natural resources area designation allows a broad range of vegetation and recreation management on a property. This allows for management that will provide resource protection while permitting compatible recreation. The primary reasons for acquisition of this property by the Foundation were for public recreation and natural resource management. The vision statement, goals and objectives described earlier in this document arise from these two general purposes. The primary management focus is to perform some very basic management activities that will preserve and enhance the natural and scenic beauty of the property, and create greater species and age class diversity while allowing public access

for less intensive recreation.

Land management classifications shall be assigned according to Chapter NR 44.06, Wisconsin Administrative Code. The MRNRA in Wisconsin will have two classes, corresponding to the two general vegetative management strategies proposed. The lands in the zones of old growth (reserves and managed old growth) will be classed as a Scenic Resources Management Area. This will be consistent with the objective of establishing and restoring areas of old growth forest in the zone immediately bordering the Menominee River, Pemebonwon River, and Mullaney Creek, while permitting public access for recreational pursuits that are compatible with resource preservation.

The management objective for a Scenic Resources Management Area is to "...protect, maintain, and enhance for long-term public enjoyment lands or waters having unique aesthetic qualities or outstanding scenic beauty and lands where managing for aesthetics is a primary concern due to significant or special public use of the area."

The land management classification of Habitat Management Area will be applied to those lands within the zone of mixed age aspen. This classification allows management activities, including logging, to achieve the desired effect of a mixed-age aspen forest. This is in contrast to large areas of even-aged aspen that now exist as a result of previous logging operations. Delineation of both the Habitat Management Area and the Scenic Resources Management Area is shown on map 2 in the Appendix.

Recreational Use Setting – Type Two

Recreational use setting is assigned under Chapter NR 44.07, Wisconsin Administrative Code. A classification of Type Two Recreational Use Setting has been designated for areas classified as Scenic Resources Management Areas. The management objective of this setting is to provide a remote, or somewhat remote area, with little development and a predominantly natural-appearing environment, offering opportunities for solitude and primitive non-motorized recreation. This means the area will be isolated substantially from development and will be maintained to enhance the perception of remoteness from everyday human activity. Occasional sights and sounds of motors or other activity may be present, but are usually distant, except perhaps during the hunting season.

Vegetative Management

General Management Procedures

Management options for stands of vegetation will be based on the inherent site capability as well as the present conditions of the stand coupled with specific goals and objectives from this plan. Some stands will have little or no management while other stands will be actively managed for a number of years to achieve the stated goals and objectives.

WDNR foresters and the property manager will consult with other biologists and specialists and utilize the most recent resource materials available to help them make their management decisions. At present these resource materials include *the Forest Habitat Type Classification System*, soil surveys, Wisconsin's *Forestry Best Management*

Practices (BMP) for Water Quality Field Manual (March 1995), and the U.S. Forest Service's *National Hierarchy of Ecological Units* (NHEU).

Recent concerns and the development of new information direct us to look beyond our property boundary at large scale regional landscapes. This is more of an ecosystem management approach to sustainable forest management. In this regard, the WDNR, as a participant in the *Wisconsin Forest Accord*; has adopted the *Forest Habitat Classification System* and the NHEU as a means of assessing and communicating ecological considerations across government agency boundaries. As the NHEU is developed to include land in Marinette County, management options will be expanded as abiotic and biological influences are identified in the view of managing ecosystems. The Marinette County Forest (MCF) is a large neighboring landowner to the MRNRA and a member of the Wisconsin County Forest Association. The Wisconsin County Forest Association has also signed the *Wisconsin Forest Accord*.

To achieve certain goals and objectives in the master plan, some stands of trees on the property will be actively managed using timber sales. WDNR foresters, biologists and other specialists involved in the timber sale set up and administration will follow standard WDNR timber sale procedures. Sales will be advertised and awarded using the competitive bid process. The WDNR has the right to reject any and all bids. Timber sales on the property will utilize a full range of sound forestry practices including non-commercial timber stand improvement practices such as crop tree release, thinning and pruning. These practices may be done by hand, mechanically or with approved forestry herbicides. Also included is site preparation for planting or seeding forest plants, including mechanical or chemical means or by use of prescribed fire. Finally, even-aged intermediate thinnings and all types of even-aged and all-aged regeneration harvest practices will be utilized to achieve plan goals and objectives.

Prescribed fire may be used for habitat maintenance or conversion on specific sites to be determined by the WDNR foresters, biologists, and other specialists. Prescribed fire whether used for site preparation for planting or for habitat maintenance or conversion will be done following standard WDNR procedures.

Catastrophic events, including fire, disease, insect infestations, or timber blowdowns will be managed on a case by case basis. Particular management options will be chosen after considering multiple factors including life/safety, improvements impacted and threatened, resources impacted and threatened, goals and objectives of the property and costs and benefits of managing or not managing the event. The normal response to wildfire on the property will be to protect life, property and the resource by putting out the fire with immediate initial attack. Watershed protection after extinguishing the fire will be accomplished using BMPs. Land rehabilitation will be done where needed to prevent non-point source pollution to the Menominee River, its' tributaries and wetlands on the property.

Management Prescriptions for Vegetative Management Zones

The three zones are: 1. Zone of old growth reserves, 2. Zone of managed old growth pine,

3. Zone of mixed age aspen. The property manager, in collaboration with WDNR foresters, wildlife biologists and other specialists, will develop specific methods and timetables for managing individual stands within the MRNRA using the following guidelines. See map 4 in the appendix for the locations of timber types within the vegetative management zones.

NOTE: References in the following sections to saw-timber-sized or pole-sized trees are not meant to indicate these trees will be harvested because of their apparent size. They are simply descriptive terms that foresters use for the diameter at breast height (DBH) of trees and follow the table below.

Key to Size Classes

<u>Classification</u>	<u>DBH in inches</u>
Seedlings	0-1
Saplings	1-5
Seedlings & saplings	0-5
Pole-timber (conifers/hardwoods)	5-9 / 5-11
Small sawtimber (conifers/hardwoods)	9-15 / 11-15
Large sawtimber	15+

Zone of Old Growth Reserves

The zone of old growth reserves on the MRNRA includes a 200 foot wide corridor parallel to the ordinary high water mark of the Menominee River or to the visual horizon from the river, whichever is greatest. In some places it has been increased to include the full width of the current timber stand. This zone is 490 acres. The zone also includes lowland hardwood and conifer stands, with lowland brush areas, and several large open and timbered rock outcrop areas. Most of the rock areas adjoin lowland areas.

The goal of this vegetative management zone is to preserve and perpetuate the existing communities. Along the river corridor the goal is to also protect, maintain and enhance the aesthetic qualities and outstanding scenic beauty found there. There is no active management planned for this zone except for one acre of pine plantation that will be thinned to achieve old growth objectives. Unplanned management from responses to catastrophic events such as fire or insect outbreaks may be needed and will be consistent with the goals and objectives of the property. It is anticipated this management commitment will lead to the development and maintenance of desired old growth attributes along the river corridor and within the swamps and rock outcrop areas.

The river corridor is mostly an area of second growth timber that was not harvested 20-25 years ago when much of the adjoining land was harvested. As such, it has a visually attractive appearance from the river and from within the stand itself. It has larger and older trees than the adjoining cutover land where timber was harvested more recently.

The trees are mostly pole-timber sized with saw timber trees mixed in or in separate stands. Some of the more common trees are early successional species and usually short lived. Trees such as aspen, white birch, balsam fir and scrub oak are common. However there are areas containing later successional species like white and red pine, maple, basswood and white oak that are generally longer lived trees.

Much of the lowland has had little human influence compared to nearby upland areas. These consist of several stands of white cedar, black spruce, mixed swamp conifers, swamp hardwoods, and lowland brush. The trees are mostly pole timber sized with saw timber sized trees mixed in. The swamp hardwoods consist of large sapling sized or small pole sized black ash.

The upland rocky outcrops are common to this area of Marinette County, yet unique enough in the MRNRA to warrant protecting their scenic and biological qualities. Some of the rocky areas are non-timbered large rock outcrops that rise above the surrounding land. They are covered in places with blueberry or other shrubs, lichens and moss. Where trees are growing, they are stunted and poorly formed. The most common species are pin oak, aspen and pine.

Within the river corridor enough of the longer lived trees are mixed with the shorter lived trees to allow the corridor in the next 15 years to naturally convert over to the longer lived species by letting the shorter lived trees die out. It is anticipated that in the next 15 years much of the aspen component of the river corridor will be replaced by longer lived species. Many of these are present already as seedlings, saplings and pole sized trees. Fifteen years from now little will be different in the lowland swamps and rocky outcrops except the trees will be somewhat larger and tree mortality in some of the rocky areas may be more noticeable. Natural changes in water levels in the lowlands may possibly lead to some individual tree or stand mortality.

One hundred years from now the management goal for this zone will remain unchanged. Succession, natural disturbances and other ecological processes will change the composition, structure and function of all stands in the zone. Most of the zone will develop late successional stand characteristics, with natural disturbances potentially maintaining some young and early successional stands within the zone. The river corridor should be a mixed hardwood – pine forest. The trees will range in size from seedlings to large diameter sawtimber sized trees. Dead snags and fallen trees will be scattered throughout. White cedar stands will continue and may even develop underneath and eventually dominate areas of the swamp hardwoods where seed sources are available. The appearance of the rock outcrops will change as trees take root and grow in rock fissures and thin top soil layers. Existing trees will die prematurely because of the poor site conditions on the rock. What now is timbered may be open rock and what now is open rock may be timbered. Lowland brush areas may become more stocked with trees from the surrounding forest seed source.

Zone of Managed Old Growth

The zone of managed old growth includes areas of red pine plantation and natural white

pine that have potential for old growth appearance, values and characteristics. These pine areas are located outside the river corridor, except for less than one acre of red pine plantation located at the very south end of the property. This zone includes 200 acres. The primary management goal is the long-term development and maintenance of some old growth ecological attributes in the pine timber types, while allowing some limited active management practices and harvest. This will provide for and enhance large diameter white and red pine on the MRNRA. Managed old growth can provide some unique combinations of ecological and social benefits.

The plantation pine located in the zone of old growth reserves and in this zone will be thinned on a re-occurring basis to approximate the structure and size class of adjacent naturally occurring pine stands. This also will speed up the transformation from pole and small sawtimber sized trees to large sawtimber sized trees. In the next 15 years the pine plantation will move from a large pole size class stand to a small sawtimber size class stand. The trees will be larger and spaced farther apart. The stand will start to lose its plantation row appearance. More understory shrubs and plants will develop in the stand as well.

Naturally occurring white pine will be selectively thinned to speed up the transformation from pole and small sawtimber sized trees to large sawtimber sized trees. In the next 15 years the trees will be larger and spaced farther apart. The understory brush and other tree species already mixed in the stand will develop further to provide excellent habitat for a wide range of birds and animals. In time, as the size of the pine trees increases, these areas of natural and plantation pine will take on the appearance, characteristics and values of old growth pine stands. It will take repeated selective thinning over many years to achieve this, but these pine areas will have outstanding scenic beauty.

There are several small areas where the present age and size of the pines already approximate the old growth appearance, biological characteristics and values many people seek and enjoy in the forest. These trees are over 100 years old, and 18 – 25 inches in DBH. Active management of these trees will be minimal if done at all. In 15 years these areas will be much the same as they are now. However, understory trees will be larger, and therefore, some thinning or harvesting of these understory trees may be required. Much of the understory in these large pine groves is sapling-sized aspen.

One hundred years from now it is anticipated that the desired appearance, biological characteristics and values of large old growth pine and mixed pine/hardwood forest will be achieved in the managed old growth zone. There no longer will be a distinction between the plantation and natural pine stands. They both will be predominately large sawtimber sized white and red pine trees with smaller and younger pine trees also represented. Other longer-lived tree species will be mixed in as well and understory brush and trees will be well represented. Large standing dead snags and fallen trees will be present throughout.

Zone of Mixed Age Aspen

The Mixed Age Aspen zone includes those areas not described as old growth reserve or

managed old growth. This zone is generally located west of the river corridor and extends to the western property boundary. There are 1,232 acres in the zone. The majority of the zone is aspen (1,016 acres) and the remainder (216 acres) contains small stands of oak, swamp conifers, pine, birch and red maple. Eighty-three percent of the aspen is sapling sized from 17–28 years old.

The goal for this zone is to maintain and enhance the extensive aspen habitats for the benefit of the many birds and animals that utilize aspen habitats of all age and size classes. This will be done by creating a greater mix of age and size class diversity for the aspen using early and delayed harvesting practices. A minimum of 900 acres of aspen will be maintained in this zone. The other stands of timber found in this area will be managed to maintain or expand their presence depending on their health and vigor and the site capabilities of their location. It is anticipated this will lead to a patchwork of different aged and sized aspen stands rather than the larger blocks of homogeneous aspen saplings present at this time. This patchwork will greatly improve the diversity of habitats available to the wildlife of the aspen forest. The other stands of timber that are not dominated by aspen will help to break up the continuity of the aspen and lead to greater diversity in the zone as well.

Even-aged management practices are best suited for the timber types in this zone including intermediate thinning, shelterwood, seed tree, and for the aspen types, clear-cut harvesting. The aspen patchwork cutting will be done using a minimum clear-cut size of around 20 acres and a maximum size of around 50 acres.

There are four distinct areas within the zone of mixed age aspen. Management prescriptions for each of these areas are detailed below.

The mixed age aspen area in the southern two miles of MRNRA is interspersed with swamps, rock outcrops and old growth pine. Because of this, the stands of aspen on the south end are smaller in size than in the rest of the zone. Also several stands of oak, spruce and swamp conifers further break up the size of the aspen stands. In addition, the adjacent zones of old growth reserve and managed old growth in this part of the property do not have straight edges and this natural appearance will be continued when planning specific timber harvests. This also helps vary the appearance of the aspen sapling stands.

The site capabilities here are well suited to aspen management and the saplings and poles are growing well. They potentially could reach 75 feet tall by 50 years of age. Because of this, not much if any conversion to other species will be done in this area of the zone. As the sapling aspen matures decisions on when to harvest and regenerate new aspen stands will be made. At this time the foresters and property manager will decide what areas are harvested early, on time, or delayed to create better age class diversity. Normal rotation age for this aspen is 45-50 years old. Presently, the saplings are around 23 years old, with a few sites having older pole sized aspen, which will be harvested sooner than the saplings.

From the southern area north to the mouth of the Pemebonwon River is an area of mostly

aspen with some small stands of oak, black spruce and large white pine. A couple of the aspen stands are mature or slightly overmature. They are mixed with fir, birch, pine, and oak trees. Because of this mix these overmature stands could be considered for conversion to other timber types, depending on the dominant understory species. Conversion to pine or fir-spruce may be attempted if the habitat types in these stands are suitable for pine or fir-spruce, and the post sale residual basal area is greater than 40 square feet with more than 50 percent pine or fir-spruce trees at the time conversion is considered. The best method of making this determination will be through a pre-harvest timber cruise. Just prior to the time of harvest the stand to be treated will be cruised to determine the basal area and volume present for each species. This cruise is much more accurate than the field reconnaissance used to determine general timber types and will give the foresters the information needed for decisions about converting timber types at harvest time.

The remaining aspen is sapling sized. It varies from an 18-year-old stand of almost pure aspen to stands mixed with some balsam fir and red maple. Both of these mixed stands are around 27 years old. The site capabilities for aspen in this area are good and the expected rotation age is 45-50 years old. None of the aspen stands in this area are very large but when harvesting decisions are made, age class diversity will be enhanced through early and delayed cutting schedules.

North of the Pemebonwon River is a large extensive area of almost pure aspen saplings. It is bounded on the north by a large swamp conifer stand. It contains around 350 acres of aspen with two thirds of it being about 25 years old and the remainder about 20 years old. Around 40 acres has scattered white pine pole timber rising above the saplings. Scattered red maple also offers some species diversity. The site capabilities for aspen are excellent in this area. Tree heights at 50 years will be around 70 feet or greater. This extensive area will benefit greatly from age class diversity decisions when it's time for regeneration of the stands at 45-50 years of age. Like the other aspen sapling stands portions of this tract will be harvested either early, on time or delayed to create the age class diversity desired here. The scattered white pine pole timber will be maintained for their seed source and aesthetic qualities. Scattered oak will be released from competing aspen by harvesting aspen but leaving the oak.

The final area of this zone is located at the northern portion of MRNRA and consists of scrub oak pole and sawtimber with some red maple. There is enough mortality showing up in the oak stands that if these stands continue to decline, oak maintenance may not be viable. This will be determined based on field observations. These are dry sites suited to scrub oak and pine. Pine seedlings and saplings are scattered in some of the area already. Because very little oak is found on the MRNRA, it is desirable to maintain as much of it as possible. Whether the oak stands can be maintained or converted to pine will be determined during a pre-practice timber cruise. This is the best means of assessing the potential of the understory species.

In 15 years there will be little change in the zone of mixed age aspen except for the increased size of the saplings. These stands will have poletimber-sized trees. Those

areas with pine and fir seedlings now, will have pine and fir saplings. Today's mature aspen will be harvested and either converted to a different type, where suitable, or growing new aspen saplings. Possibly some of the first early harvests to create age class diversity will be either just completed or set up for harvest. It is anticipated that mature oak stands will be in the process of regeneration through either a clear-cut or shelterwood harvest schedule. Again, a pre-practice timber cruise will be used to make the determination.

One hundred years from now there will be significant change in this zone. Using a rotation age of 45-50 years for the aspen and counting the present rotation the second, then in one hundred years the stands will be mid way through their fourth rotation. There will be an excellent mix of age and size class diversity in the zone. Individual stand sizes will range around 20 to 40 acres instead of the 80 to 150 or more acres at present. Neighboring stands will be separated in age by maybe 5-10 years. The zone will have a true patchwork of aspen, pine, oak, and swamp conifers all at different ages. The management goals will not change and the zone will be managed to maintain the age and size class diversity it has attained.

Public Access Overview

The overall access plan is to provide a series of peripheral entry points to the property, each with a small parking area a short distance inside the property boundary and appropriate informational signage. Direct vehicular access by the public to the interior of the property beyond the parking areas will not be available. Travel within the property will be on foot. Designated trails within the property may utilize old logging roads where appropriate, or if necessary, new segments of lightly developed trail will be established. Lightly developed trails may have some of the stumps and rocks removed for ease of travel, but generally rely on native or natural materials for surfacing. A limited amount of official vehicular access for emergency purposes or for conducting management activities will be provided. Designated trails will be signed and maintained to primitive or lightly developed standards. Their location will be shown on all use area maps published for the property. Note that map 2 in the appendix illustrates the location of designated trails and parking areas.

Service roads used for official and emergency access to the interior of the property will be gated and locked. The gates will be located to avoid interference with any private landowner's access to their own property. All other routes into the property will be permanently blocked off at the property boundary.

The entire 1922-acre project site is laced with a maze of old logging roads. Some of these logging roads are becoming obscured and obliterated by saplings and larger trees. Others are becoming eroded and deeply rutted due to motor vehicle use, although a person on foot can still follow them. Others of the two-rut type, remain open and free of trees, due mainly to use by trucks or other vehicles. There are no town roads that completely traverse the property on the Wisconsin side of the Menominee River. One town road, Pemene River Road enters the property from the northwest and from the west-central area, but is interrupted at a snowmobile bridge over the Pemebonwon River. This

bridge is not useable by automobiles, thus forming a barrier to continuous automotive travel.

Public access to the property from the south will be permitted via Verhayen Lane from County Highway Z. Within a short distance the road will be gated and a small parking area provided. Signs explaining the objectives of the property and welcoming foot travel to Pemene Falls will be erected. Gravel surfacing of the parking spaces will be provided if necessary. Landowner access to the existing privately owned properties within this part of the MRNRA boundary will continue to be provided.

Similar access points will be provided to the north. If approved by Marinette County, a parking area and signed access point will be provided adjacent to Mullaney Creek Road and Horseshoe Road. Additional signed parking areas and walk-in access points also will be provided along Pemene River Road. Wooden posts or other natural materials will be used to form a barrier to vehicular access as needed.

No new snowmobile trails are planned for the property. Snowmobile use will continue on the existing trail along Pemene River Road through the northwest portion of the property. No other snowmobile trail will be developed. ATVs are prohibited on the property.

Designated access roads within the property will be maintained to “primitive standards” as defined in under Chapter NR 44, Wisconsin Administrative Code. This generally means a width of twelve feet or less, little or no roadbed grading, and natural surfacing material.

Development

Parking and Access to Quiver Falls Overlook

A small parking lot and handicap accessible trail to a viewing area will be established at Quiver Falls. A gravel parking lot with up to ten parking spaces will be established and an interpretive sign explaining the significance of Quiver Falls, will be erected. A site presently used for canoe launching and take-out is located at Quiver Falls, immediately downstream from the falls. This will be upgraded and maintained for continued use as a put-in / take-out site.

Parking and Access to Pemene Falls

A two-mile looped hiking trail to a viewing spot at Pemene Falls will begin and end at the southern access point. A five-car parking area will be provided here as well as a walk in campsite along the river.

Peripheral Parking and Entry Sites

Access to the interior of the property will be provided at three additional sites around the property and by water from the Menominee River. Three entry points, each with five-car parking, will be established at Mullaney Creek Road, off Horseshoe Road and Pemene River Road. These sites are shown on the plan map in the appendix. Access from the Menominee River also is possible from the river at many points along the shoreline.

Camping

Wisconsin Electric Power Company (WE) is planning a canoe trail along the entire Menominee River corridor. The canoe campsites proposed in the MRNRA are intended to complement this plan.

This master plan designates two primitive campsites along the Menominee River within the MRNRA. These will be established at two sites traditionally used for this type of camping in the past. These sites are located as shown on map A-2 in the appendix.

These two sites will only be accessible by river or on foot. There will be no fee or registration required for camping and use will be on a first-come, first-served basis. Camping at these sites will be limited to a maximum stay of 3 nights. Each campsite will consist of a designated area for tenting, a fire ring and a primitive box-latrines. These campsites will be single unit sites, which are campsites designated for use by families or groups of 6 persons or less. At times, campfires may be prohibited due to danger of forest fires. There will be no trash collection. Refuse management will consist of a carry-in / carryout policy. A revision to NR 45 is needed to allow camping at these sites without requiring fees or registration.

Camping on the islands in the Menominee River within the MRNRA boundary will be permitted. This type of camping is very primitive. Fees are not charged, numbers of campers are not regulated, and no services are provided. Campers are expected to provide for all their own needs and to abide by the carry-in / carryout policy. Camping on the islands will be allowed by posted notice with a maximum stay of 1 night.

Hiking Trails

About two miles of hiking trail will be designated at the Verhayen Lane/Pemene Falls location. This trail may utilize old logging roads where appropriate, or if necessary, new segments of primitive trail will be established. Primitive trails may have some of the stumps and rocks removed for ease of travel, but generally rely on natural materials for surfacing. Primitive trails have a maximum cleared width of eight feet and a tread width adequate for single-file walking. A limited amount of official vehicular access for emergency purposes or for conducting management activities will be provided. This trail will be signed and maintained to primitive or lightly developed standards. The location will be shown on all use area maps for the property.

Many other old roads and trails exist throughout the property. These trails will not be designated or maintained for public uses, however, they remain open for public uses. Although no cross-country ski trails will be designated or maintained, these trails may be used for skiing.

Estimated Cost of Development

1. One-time Initial Needs		\$ 25,000
Site cleanup – trash, tires, etc.	\$ 2500	
Boundary posting	\$12500	
Block off twenty old roads at boundary	\$10000	
2. Quiver Falls Overlook		\$19,600
Road repairs	\$7200	
Grade and gravel ten-car parking area	\$1800	
Accessible path to overlook	\$ 900	
Accessible overlook	\$4500	
Interpretive sign/map	\$1500	
Canoe launch repairs, sign	\$1200	
Remove cable	\$2500	
3. Pemene River Road Entry		\$6,550
Road repairs	\$2400	
Grade and gravel five-car parking area	\$1800	
Gate or permanent road barrier	\$ 850	
Interpretive sign/map	\$1500	
4. Mullaney Creek Entry		\$11,350
Road repair	\$7200	
Grade and gravel parking five-car area	\$1800	
Interpretive sign/map	\$1500	
Gate or permanent road barrier	\$ 850	
5. Verhayen Lane Entry		\$21,930
Road repairs	\$14400	
Grade and gravel five-car parking area	\$ 1800	
Gate or permanent road barrier	\$ 850	
Trail improvements	\$ 1980	
Culvert– McAllister Creek tributary	\$ 500	
Interpretive sign/map	\$ 1500	
Pemenee overlook	\$ 900	
6. Other Entry Point – from Horseshoe Road		\$15,100
Minor road repairs	\$7200	
Grade and gravel parking area	\$3200	
Permanent road barrier	\$1700	
Signage	\$3000	
7. Primitive Campsites – Two		\$ 8,300
Fire rings 2 @ \$150 ea.	\$ 300	

Site preparation, cleanup	\$ 5000
Latrines 2@ \$1500 ea.	\$ 3000

Total Estimated Development Cost **\$107,830**

Project start-up costs

Two-year project position ½ time manager	\$25,000
Two limited term employees	\$30,000
One heavy duty 4wd pickup	\$25,000
Other equipment and supplies	\$ 5,000
Total	\$85,000

Annual operation and maintenance costs

One manager ¼ time (shared position)	\$12,500
One half-time limited term position	\$ 7,500
Equipment and supplies	\$ 5,000
Total	\$25,000

Operations and Administration

The MRNRA will be managed, operated, developed and maintained according to the principles and details provided in this master plan.

Because of the type of property and the low-impact public use and recreation planned, there is no need for a headquarters building or storage building for equipment or offices at the present time. Existing WDNR stations and service buildings located in the vicinity will be relied upon to provide office space for the management staff and parking for vehicles and equipment associated with the property.

Proposed Land Acquisition and Costs

The Foundation lands total 1,922 acres. It is proposed to add 197.36 acres of adjacent land. The total proposed fee ownership in Wisconsin is 2,119.36 acres. This addition has two purposes: to either extend protection of resources not included in the original MRNRA or to create a more understandable boundary. Inclusion of these properties within the project boundary will enhance the state’s ability to act in a timely manner when properties are offered for sale. These parcels are shown on the property map in the Appendix and are described as follows:

Beecher TWP Section 17, Larsen 40.0

The purpose for inclusion of the parcel is consolidation and simplification of the boundary line.

Beecher TWP Section 17, Dishneau 40.0

The purpose for inclusion of the parcel is consolidation and simplification of the boundary line.

Pembinе TWP Section 06, Harvat 38.8

The purpose for inclusion is for protection of frontage on the Pemebonwon River and boundary consolidation.

Pembinе TWP Section 06, Rostagno, et al 19.28

Pembinе TWP Section 06, Rostagno 19.28

These two parcels represent a subdivided 38.56-acre block of land. The purpose for inclusion is for protection of frontage on the Pemebonwon River and boundary consolidation.

Pembinе TWP Section 08, Marinette County Forest 40.0

One forty-acre parcel located in Pembinе TWP Section 08, within the MCF, is also proposed for addition to the project boundary for the purpose of boundary consolidation or simplification.

Total additional acreage proposed inside the project boundary: 197.36 acres

Estimated Cost to Acquire Additional Lands within the Boundary

It is proposed to acquire 197.36 acres of land, in parcels of 40 acres or less, directly adjacent to the Foundation lands. The project boundary has been expanded to encompass these parcels of land. It is estimated the present cost of purchasing the land is \$178,000.

Value of Foundation Gift (Acquisition Cost)

The initial acquisition of the former WPSC lands by the Foundation and the Conservation Fund was a fee transaction. Inasmuch as the WDNR and the Michigan Department of Natural Resources (MDNR) will in the year 2,000 be recipients of their respective portions of this property as a gift, it will have the effect of saving the two state governments three million dollars in acquisition costs. The estimated value of a property depends upon several factors and it changes over time. Therefore, the estimate of costs-to-acquired are subjective and dependent on market trends and changing circumstances.

Wisconsin’s share of this gift, prorated for acreage, is valued at \$1,294,382.

Management by Cooperative Agreement with Wisconsin Electric

Approximately 25 acres owned by Wisconsin Electric Power Company (WE) and located in Section 24 adjacent to Quiver Falls could be managed cooperatively. This site has a history of camping use, and is near the proposed access to Quiver Falls. Access to this property is through MRNRA property. The objective is to provide consistency of management in this area directly adjacent to the northern boundary of the MRNRA property.

Real Estate Management Plan

Each year the property manager will be responsible for inspecting and maintaining the MRNRA property. Landowners on the boundary should be contacted periodically to see if there are any concerns or questions about any phase of the MRNRA management or

development. The WDNR *Land Acquisition Handbook* should be consulted for procedures for documenting contacts with landowners.

Public Communication Plan

The property manager will be the WDNR representative responsible to answer public inquires. News releases may be utilized to notify the public of significant developments on the property. Wisconsin Environmental Protection Act public notice guidelines for future management actions will be followed.

Authority to Conduct a Feasibility Study for Project Expansion

Examination of the land ownership pattern directly adjacent to the Foundation lands reveals an obvious pattern of large-block, utility-owned acreage both upstream and downstream. WE owns both adjacent utility parcels. The northern property, totaling about 4,000 acres in Michigan and Wisconsin, is a site originally chosen for hydropower development. Sufficient lands were acquired by WE to accommodate the anticipated lakebed and shoreline of the impoundment that would be created. The project was never implemented, however, leaving WE with a large undeveloped riparian tract of land in its ownership.

This is the same situation WPSC found itself in with the land currently owned by the Foundation and under lease to the WDNR and MDNR. A hydropower project was originally planned for the site. Downstream, WE owns two active hydropower projects that are fully developed and producing electricity. Known as Chalk Hill and White Rapids, they comprise 5,176 acres in Michigan and Wisconsin. These two properties are licensed by the Federal Energy Regulatory Commission (FERC) and are managed for public access, recreation, and timber management under terms and conditions of their licenses.

FERC licenses are issued for terms of 30-50 years. During the license period it is uncommon for the owners to liquidate these properties although it is sometimes done. The undeveloped WE lands to the north, commonly called “Quiver Falls” are managed for public access, old growth forest and biodiversity under terms of a long-range agreement. This agreement, known as the Wilderness Shores Settlement Agreement (WSSA), was developed jointly through a participatory process involving WE, the US Fish and Wildlife Service, the WDNR, the MDNR, the National Park Service, the Michigan Hydro Relicensing Coalition and the River Alliance of Wisconsin. The Quiver Falls tract and the Chalk Hill and White Rapids properties comprise major amounts of river frontage on both shores of the Menominee River.

This master plan includes authority to complete a feasibility study and start the land acquisition process if these large block properties become available for sale. This will empower the WDNR to acquire the land more expediently if it becomes available. In the mean time, the WDNR would act in a responsive mode only if WE determines that they wish to sell some or all of their holdings.

The reason for receiving authority to conduct a feasibility study is public opinion

solicited during the preparation of this plan. The public emphasized protecting and managing as much of the Menominee River corridor as possible. The potential exists for the addition of up to 2,188 acres to the 2,119.36-acre project. However, securing approval for new land acquisition outside an existing project is often time-consuming and threatened by delays. On occasion in the past, key parcels of land have been lost to WDNR acquisition because of the inability to secure appraisal and option permission in a timely manner.

The acquisition of the Wisconsin portions of the three WE tracts (Quiver Falls, Chalk Hill and White Rapids) and the WEPCO land to the north would bring the total acreage of the project to about 6,380 acres. This would assure long term protection and provide conservation-minded management and public access to approximately twenty miles of the Menominee River in Wisconsin.

In the event that some or all of the WE properties would become available for addition to the MRNRA, the interim response would be to continue the general management themes used by the former owners. The additional land would be added to the project boundary of the MRNRA. The WDNR would conduct the necessary planning tasks required by Chapter NR 44 Wisconsin Administrative Code to amend the MRNRA master plan to accommodate the addition. During this process the general rules and regulations governing state property per Chapter NR 45 Wisconsin Administrative Code would be in force, but no new development would be done with the exception of posting, clean-up, repairs or maintenance of existing facilities.

It is anticipated that the same goals and objectives of this master plan would apply to the added properties, especially where vegetative management, public access and development are concerned. A document describing the management and development of these lands will be prepared and appended to the existing MRNRA master plan if the properties are acquired. A citizen participation process would be used during the planning process to ensure the interests of the public are considered.

V. SUPPORTING AND BACKGROUND INFORMATION

Cultural History and Resources

The Menominee River takes its name from the Indian tribe that settled on its banks near its mouth, the Menominee. The word Menominee is from the Algonquin Indian term for wild rice. Historic accounts refer to the immense beds of wild rice found at the mouth of the river, hence the name was quite appropriate (Cram 1840). The Chippewa Indians lived in the upper portion of the basin. Their name for the river was "Me-ne-ca-ne Sepe" or "Many Little Islands River", also an appropriate name.

Undoubtedly, Indians were using the Menominee from earliest times. There was a great trail that connected large Indian villages throughout the state, and it also ran to the White Rapids area. This trail was in existence in 1634 when Jean Nicolet met the Wisconsin Indians along the Fox River. There was a large village of several thousand Chippewa and

Menominees located along the river at White Rapids (Amberg Granite Grange, 1974). Obviously, Native Americans were drawn to this area because of an abundance of fish, game and wild rice.

White settlement generally coincided with the exploitation of furbearers along the Menominee River starting around 1800. Trade with the Indians was commonplace and trading posts near the mouth of the river developed. A sawmill was built on the Menominee River near its mouth in 1832, signaling the start of the logging boom. Eventually, there were nine large sawmills in Marinette and eleven on the Menominee, Michigan side of the river, in addition to many smaller operations. At the height of the logging era, tens of thousands of logs were handled each day at these mills and eventually over ten billion feet of lumber were sawed.

In 1882, the river started to be used for something other than log transport and sawmills. A hydraulic air compressor plant was built at Big Quinnesec Falls . This compressed air was used to power equipment at an iron mine in Iron Mountain, Michigan. Some of the most important iron ore deposits in the country were found in the upper reaches of the Menominee Basin . Shortly thereafter, as the need for electricity grew, more and more of the river's flow was harnessed for hydropower. Other industries also developed along the riverbanks by 1900, especially in the lower river, and in the area around Iron Mountain. As the cut over forests started to regenerate much of the industry in the watershed centered on pulp and papermaking.

Archaeological Sites

The heavy forest cover makes it difficult to assess the nature and distribution of archaeological remains within the project area. It is entirely possible that the area contains hundreds of archaeological sites that have yet to be discovered. Most sites are expected to lie within 300 feet of the Menominee River, on ground that is well drained and relatively level. Site potential is particularly high near the mouths of tributaries, near rapids, or on islands. Since the area is relatively undeveloped, archaeological deposits are expected to be fairly well preserved. However, such deposits will generally extend no more than ten inches below the ground surface, making them vulnerable to destruction by modern forestry practices.

State Historical Society of Wisconsin (SHSW) records identify six archaeological sites in Wisconsin near, but not within the MRNRA property. Three of these are portions of a group of five conical mounds. Another is a small prehistoric campsite, and two of the sites are limited to reports of isolated finds from vaguely defined locations.

None of the sites lie within the proposed project boundary of MRNRA. They are, however nearby, suggesting care be taken in all development work. It is the policy of the WDNR to have an archaeologist review and, if warranted, test any site where disturbance of the soil will take place.

Historic Structures

Few historic structures have been recorded in the study area. The study area included the

river corridor from Piers Gorge to White Rapids dam. All are 20th century structures, entered into the SHSW Architecture and History Inventory in conjunction with the Great Lakes Archaeological Research Center's (GLARC) 1989 survey of cultural resources that might be affected by FERC relicensing of the hydroelectric dams. They include:

- 96/37 White Rapids Dam
- 91/103 Chalk Hill Dam (determined eligible for National Register)
- 91/104 Four Seasons Clubhouse
- 91/105 Miscauno Island bridge
- 91/106 Miscauno Island bridge
- 91/107 Miscauno Island bridge

Additional Information

Additional undocumented sites may exist where tributary streams enter the Menominee River, for instance at the mouth of the Pemebonwon River and Mullaney Creek. Remnants of dams and cribbing left from the logging era are visible near both Quiver Falls and Pemene Falls. The high probability of finding cultural resources in the vicinity of the river, its tributaries, waterfalls and wetlands should be noted. Before any construction activities or mechanized logging takes place archaeological site investigations will be made. Appropriate measures under state and federal statutes will be taken, should any cultural resources be discovered.

Regional Analysis

Site Qualities

The site is located in northeast Wisconsin in the townships of Beecher and Pembine in Marinette County on the Wisconsin - Michigan border. The Menominee River is about eight miles east of the unincorporated Village of Pembine, Wisconsin. Pembine is located on US Highway 141. The next major municipality to the north is Niagara, Wisconsin and a few miles farther north are Kingsford, and Iron Mountain Michigan.

The landform varies from gently rolling to rugged in some areas. Much of the site appears to be deposits of glacial moraine. The soil has a sandy, gravely character. Basaltic bedrock underlies the area and is exposed most notably in the riverbed itself. The bedrock has several intrusions of harder material, mainly quartz and granite. These more resistant bands of rock form the ledges over which the river cascades at Pemene Falls and Quiver Falls. The bedrock takes on a smooth rounded appearance in some areas due to the relentless abrasive effects of the flowing water. This effect is most evident at Pemene Falls where the entire flow of the Menominee River is forced through a narrow gorge.

The excessive permeability of the soils of the site makes the upland areas more susceptible to erosion and fire damage due to the continual dryness. In the lower areas the reverse is true. The water table is at the surface in the cedar swamps and flows in the general direction of the Menominee River. Vegetation is lush here and fire danger is much lower.

Geographic Location and Transportation

The Menominee River forms part of the northeast border between Michigan and Wisconsin. Originating in Florence County at the confluence of the Brule and Michigamme rivers it flows past the cities of Iron Mountain, Kingsford and Niagara. For the next 100 miles it flows generally in a southerly direction through some of the least developed land in Wisconsin. It's 117-mile trip ends as it flows between the cities of Marinette, Wisconsin and Menominee, Michigan to empty into the waters of Green Bay.

Access to the river is limited. In its 117-mile run it is crossed by only 11 road and 3 railroad bridges. Four of the road bridges and one railroad bridge are near the origin with three road bridges and one railroad bridge running between the cities of Marinette and Menominee. The remaining four county highway bridges and one railroad bridge are spread out along close to 100 river miles. Highway 141 is 7 to 13 miles west of the river and runs parallel to it in Wisconsin, crossing at Niagara, WI. Federal highways 2 and 41 in Michigan also run parallel to the river and are 2 to 10 miles east. Highway 41 crosses at Marinette and Highway 2 crosses at Iron Mountain, Michigan. Wisconsin State Highway 180 parallels the river along its lower 20 miles.

Geological and Ecological Significance

The Upper Menominee River Basin lies on a southern extension of the Precambrian Canadian Shield. This crystalline dome slopes downward from the northwest to the east and southeast. The general orientation of the Menominee Basin, has an average gradient of about 7-10 feet per mile, with some extremely steep reaches. The bedrock near many of the waterfalls and rapids consists of intrusive rocks, some of which are weakly to moderately deformed and metamorphosed volcanic and sedimentary rocks. Although usually buried beneath glacial deposits, Quinnesec schist a heavily metamorphosed series of eruptive greenstone flows and intrusions of granodiorite are found exposed at falls and rapid sites along the river. Many of these sites are now hidden beneath the flowages of the dams on the river.

Northeast Wisconsin and much of Michigan's Upper Peninsula were covered by glacial ice as recently as 11,000 years ago. The glaciers that covered the region deposited immense quantities of till during their advances and retreats, burying the previously existing landscape. Landforms created by this deposition of glacial till overlie the bedrock throughout the region, although bedrock outcrops are common. The depth of the till is generally less than 100 feet. The predominant types of till occurring in the region are outwash, ice-contact deposits, and ground moraines. Lake deposits and end moraines also can be found.

The Menominee River's ecological significance is based on the fact that it is over 117 miles long and drains a basin of over 4000 square miles in Michigan and Wisconsin. It has an average annual discharge of 3173 cubic feet per second at its mouth. Along with its major tributaries the Brule, Michigamme, Paint, Pine, Sturgeon, and Pike rivers, the Menominee River impacts a large area of northeastern Wisconsin. In the late 1800's, the River abounded with lake sturgeon, lake whitefish, walleye, northern pike, and bass.

Pollution, first from sawmills and later from industries and municipalities seriously harmed the rivers ecology. Ten hydropower dams also have changed the river's character. With the advent of pollution abatement since 1960 the water quality has substantially improved in most areas. The damaged fishery has improved and other indicators, such as bald eagle nesting are encouraging. Improvements to the fishery and increases in bald eagle nesting signal the return of the river's ecological significance.

Population and the Basis for Local Economy

The project region is sparsely populated. The 1990 census figures show a total population of 45,138 for the two county area and a population density of 27 people per square mile. This compares to statewide figures of 87 people per square mile in Wisconsin. Florence and Marinette counties have both experienced steady population growth since the 1970's. Florence County, however is the second least populous county in the state. There are no incorporated areas in Florence County. In Marinette County the City of Marinette, the county seat, with a population of near 12,000, represents almost 30 percent of the county population.

Forestry and tourism are the two major bases for local economy. With paper mills in Marinette, Menominee, Niagara, Quinnesec, and Peshtigo, along with sawmills in Goodman, Peshtigo, and Crivitz, processing of forest products is a major economic force. In 1997 Marinette County sold over 1.4 million dollars worth of stumpage from its 231,655-acre county forest. The forest industry has been a steady source capital and jobs in the area.

The economic value of tourism has shown a steady growth in the past 30 years. What at one time were only summer vacations on the rivers and lakes, have turned into year-round use of the abundant public lands. Snowmobiling and cross country skiing have been added to the old standbys of fishing, camping, boating and hunting to make tourism a steady factor in the local economy.

The cities of Marinette, Menominee, and Iron Mountain also have developed industries unrelated to forestry and tourism. These industries have helped diversify the economies of the cities located at either end of the river, bring a more stable economy to the area.

Population Trends and Land Use

The human population occupying the Menominee River Basin has increased substantially since the early 1800's when only a few thousand Menominee and Chippewa Indians were the principal inhabitants. Census figures for 1980 in the five counties that cover the Basin show that probably less than 20 percent actually live outside the Menominee River Basin since county boundaries do not follow watershed boundaries.

Land use patterns also have undergone changes. Although the majority of the land area in the basin is still forested as it was in the 1800's, substantial acreage has been converted to agriculture, residential, and industrial uses.

A great deal of the frontage along the river is open to the public for recreational use. The

hydropower utility owners hold about 44 percent of the frontage along the mainstem of the river in Michigan and Wisconsin, from the confluence of the Brule and Michigan to the river's mouth in Marinette-Menominee. An additional five percent of the frontage is owned by the states and a smaller percentage is in county or town ownership.

Most of the agricultural land in Marinette County lies in the southern part of the county and outside the Menominee River Basin. Conversely, most of the agricultural lands in Menominee County, Michigan lie within the Menominee River drainage area. Menominee County characterizes itself as the dairy capital of Michigan's Upper Peninsula with over 19,000 cattle presently in the county. Primary crops grown are corn and hay to support the dairy industry. Pastureland also occupies a large acreage in the county. Agriculture may have had a substantial impact upon some tributaries to the Menominee and perhaps to the river itself.

The Little Cedar and Little rivers drain primarily agricultural land. Both watersheds have been altered by the clearing of large amounts of land, which may have resulted in increased runoff, erosion of uplands, higher water temperatures and faster runoff of farm pesticides, fertilizers and animal wastes. However, studies are needed to document and measure the magnitude of these suspected changes and their effects on water quality.

Public Lands

The northeastern area of Wisconsin abounds with public lands. MCF, which borders the project, has over 231,600 acres. WDNR projects include the 4,200 acre Pike Wild River, 5,200 acre Pine-Popple Wild River, 4,100 acre Spread Eagle Barrens Natural Area, 1,320 acre Dunbar Natural Area, 1,200 acre Amberg Wildlife Area, 635 acre Miscauno Wildlife Area, and 900 acre Town Corner Wildlife Area. Directly across the river in Michigan is the 2,250 acre Mellon Foundation property, purchased at the same time as the Menominee River Natural Resources Area. This property in Michigan will become part of the adjacent 420,000 acre Escanaba River State Forest. The Nicolet National Forest with its 656,000 acres is within 25 miles of the project. Each of these projects offers a variety of recreational opportunities to the user.

Private Lands

Private ownership along the Menominee River north of county highway "K" is centered in two areas. The first is near Miscauno Island. This area is a popular summer recreation area. Most ownerships are of small lots with recreational or seasonal cabins. A few forty and eighty acre parcels are still found, however the pressure to subdivide has been strong. The second area is near the cities of Niagara, Wisconsin and Norway, Michigan. Development in this area has been for permanent housing, with subdivision pressure increasing each year.

Ownership off-river centers on outdoor recreation. The major activity in the past has been hunting. In recent years other activities such as snowmobiling, ATV riding, cross country skiing, and just getting out of the city have increased in popularity. Growth and harvesting of forest products also are a compelling reason for ownership. There is minimal agricultural activity in the region. Most former agricultural land lies fallow or

has been planted for forest products or Christmas trees. Some ownerships are as large as 300 plus acres, but most are less than 120 acres with 40's being by far the most prevalent ownership category. Recent trends have been to divide ownerships into smaller and smaller parcels.

Local Scenic Resources

The 26 miles of river between the White Rapids Project and Piers Gorge is a beautiful and valuable resource. This section of river is mostly undeveloped and contains several natural waterfalls including Quiver Falls and Pemene Falls. Numerous rock outcrops, rapids, and deep pools make this one of the most scenic sections of the Menominee River.

The view from the river has a natural quality of wilderness due to the nearly complete lack of shoreline development. The only artificial structures encountered are a railroad bridge, two highway bridges, two low-key boat landings, and the remnants of a concrete wing wall at Pemene Falls. At Quiver Falls some remnants of the old logging dam cribs are visible as is the cable stretching across one thread of the river. Otherwise, there is very little obvious evidence of human activity.

While several cottages or cabins exist in the corridor, they generally are separated from the river by vegetative cover, effectively screening them from view. One other exception, although not in the project boundary, is the Four Seasons Golf Course and Resort located on Miscauno Island. Three township road bridges cross the river at this point and the golf course and resort are visible from the river.

Current Recreational Uses of the Property

Recreation on the Menominee River and its tributaries is one of the most important uses of the area. Various recreation activities occurring on or along the MRNRA include, but are not limited to, fishing, boating, camping, hiking, hunting and sightseeing.

The Menominee River system has a very diverse fishery and is well known for excellent smallmouth bass and walleye fishing. Smallmouth bass over 20 inches are not uncommon and several 10-pound-plus walleyes are harvested each year. Northern pike, crappie, bluegill, perch, muskie and sturgeon are other game species found in the Menominee River.

A recreational survey conducted by WE on the Chalk Hill and White Rapids Projects was completed as part of their FERC relicensing studies. The surveys were conducted from mid summer to early fall and alternated between weekdays/weekends and mornings/afternoons. Results showed most activity around the area was from shore fishermen and boaters. The survey concluded that there was light to moderate recreational pressure along the river, with fishing being the dominant activity.

The MRNRA also abounds with wildlife including white-tailed deer, grouse, turkey, rabbit, and bear. The area receives light to moderate hunting pressure from local residents and hunters from the Green Bay/Fox River Valley area. April and May find

turkey hunters throughout the property. In fall, small game and archery hunters pursue their quarry until the traditional nine-day gun deer season in November. Winter months bring light hunting pressure to the area with emphasis on small game hunting. Hunters are attracted to the area not only because of the game, but also the beautiful scenery around Quiver and Pemene Falls. Throughout the seasons, the MRNRA provides popular sightseeing especially Quiver and Pemene Falls. These waterfalls remained after construction of the hydroelectric projects eliminated most other waterfalls and major rapid areas along the river.

Recreational boating within the MRNRA usually centers on canoe travel due to shallow water and the two waterfalls that are within the project area. The unspoiled atmosphere is well suited for canoe trips. A local Girl Scout Camp, along with the general public, often take advantage of peaceful and relaxing trips down the slow moving Menominee River. Rafting also is popular in the Quiver and Pemene Falls area. Motorboat travel generally is confined to the areas above the hydroelectric dams. The White Rapids and Chalk Hill impoundments receive light to moderate boating pressure from fishermen and other recreational watercraft. The area below Pemene Falls also receives light motorboat traffic due to a boat landing on the Michigan shoreline.

The existing Marinette County snowmobile route passes through the northern half of the property, utilizing Pemene River Road and the snowmobile bridge crossing of the Pemebonwon River.

ATV's are allowed to operate only on designated trails in Wisconsin. Under previous WPSC ownership ATV use was prohibited. This policy continues under state ownership. Approximately 86 miles of year-round designated ATV trail are currently provided in the adjacent MCF, in the townships of Dunbar, Pembine, Goodman and Silver Cliff. In Michigan, statutes allow ATVs to operate, at the discretion of the local town government, in public road rights-of-way, but not on the road surface. Faithorn Township, Michigan, has local jurisdiction in this case. There is also a 38-mile winter-only ATV trail in the Town of Stephenson, Michigan.

Land Capabilities – Natural Resource Inventories

Soils

The soils in the Menominee Basin are principally derived from weathering of glacial deposits. The upper portion of the watershed is comprised of sands. These were formed from sandy parent materials derived from the Cambrian and Lake Superior sandstone formations. These soils are generally infertile and mostly acidic. In the lower portion of the watershed, from the mouth of the Pike River to Green Bay, rolling pink loams are the primary soil. These soils have good natural drainage and provide some of the best agricultural lands in the basin.

Geology

The Menominee River Basin lies within the southern portion of the Canadian Precambrian shield. The river flows across crystalline bedrock at a gradient of about

seven feet per mile, with some reaches having much higher gradients. In the lower 40 miles of the river, the gradient drops to two feet per mile as the river flows across ground moraine and glacial lake deposits overlaying Paleozoic sedimentary bedrock. Overall, the Menominee drops from an elevation of 1,150 feet (mean sea level) at its source to 580 feet at its mouth. Being on the edge of the Canadian Shield there is a distinct fall line whenever the river crosses the boundary. Such falls as Big and Little Quinnesec, Twin Falls, Sturgeon Falls, and others are the result. Historic accounts tell of the beauty of these falls and the large rapids on the river. Dams have since inundated most of these areas, with the river gradient being used for hydropower production.

Hydrology

The Menominee Basin encompasses over 4,000 square miles in the states of Michigan and Wisconsin and has an average annual discharge of 3,360 cubic feet per second at the McAllister gauge below the Grand Rapids Hydroelectric Project. The Menominee is formed by the confluence of the Brule and Michigamme rivers, near Florence, Wisconsin and then flows in a southerly direction for 117 miles before joining the waters of Green Bay at the cities of Marinette and Menominee. Other major tributaries in the Menominee Basin include the Paint, Pine, Sturgeon, and Pike rivers. Both the Pike and Pine rivers have been declared state wild rivers in Wisconsin. The Brule River is currently designated for study under the Federal Wild and Scenic Rivers Act, while sections of the Paint River have been designated as a recreational river. The section of the Menominee between White Rapids and Grand Rapids is on the Federal River Inventory at this time.

Forest Cover

The following narrative and tabulations describe only the forest cover found on the Wisconsin side of the Menominee River in the MRNRA.

Overview of Historical Forest Composition

Interpretation of the map of *Original Vegetation Cover of Wisconsin*, compiled by Robert W. Finley of the University of Wisconsin Extension (UWEX) defines a generalized picture of forest cover in Wisconsin previous to the main impact of American settlement. Much of the documentation is derived from land survey notes between 1832 and 1866. The northern part of Wisconsin was surveyed toward the end of this time period. The forest cover of this time is described as a mixed coniferous - deciduous forest in the area that includes the MRNRA. Within this classification further definitions of communities and the area in the MRNRA they covered include:

Hemlock, sugar maple, yellow birch, white pine, and red pine;	55 percent
White pine, and red pine;	25 percent
Jack pine, scrub (hills) oak forest and barrens;	10 percent
Aspen, white birch, and pine.	10 percent

Hemlock, Sugar Maple, Yellow Birch - Pine Forest

This community occupied the largest single contiguous area of any one-forest type in the State of Wisconsin. Sugar maple dominated the stand with interspersed hemlock and yellow birch. Other associated species included basswood, red oak, ironwood and

American elm. White and red pine occurred in various densities within the community. It was located in the central to north central part of the MRNRA.

White Pine - Red Pine Forest

Pure stands of white pine-red pine forest were somewhat limited in occurrence. However, smaller areas of pure pine were believed to exist in Marinette County. Most of these species were found scattered in association with timber types dominated by other species, which is not all that different from the pine represented on the property today. It was mostly located in the south central part of the MRNRA similar to where the main pine area is today.

Jack Pine, Scrub Oak Forest and Jack Pine, Scrub Oak Barrens

Most of these forest types occurred either intermixed or in close association. Although limited areas of representation were found in eastern Marinette County the significance of dense stands of jack pine are mentioned as a large component of the pine forest. On the MRNRA it was located at the north end of the property.

Aspen - White Birch Forest

This forest type was usually the first to come in after destruction of an old growth forest by fire or by wind. Pines and oak sometimes occurred in this community. Scattered patches of aspen-birch forest were mixed throughout most of the coniferous-deciduous forest region. It was located at the very south end of the MRNRA.

Wetland Vegetation

Northern White Cedar was the most abundant tree species present on the lowland sites. Combined occurrence of the cedar with black spruce and tamarack also were common with either or both associated species found on a particular site. A large swamp conifer area continues to bisect the MRNRA today.

Current Forest Composition

In 1998, a comprehensive forest reconnaissance was completed for the Foundation land on the Wisconsin side of the Menominee River. WDNR foresters delineated and mapped forest types in preparation for the master plan.

Natural woodlands and plantations were maintained for decades prior to this recent land transaction. The past practices on the land have resulted in a narrow corridor of unharvested second growth forest along the shoreline of the Menominee River and its tributaries. The corridor consists of various native tree species with all size class of trees represented. The previous ownership (WPSC) held the property in trust and prevented the intrusion of development, thus protecting the natural forest environment.

The forested property consists primarily of aspen forest types in an early successional stage of development. Sixty percent (60 percent = 1151 acres) of the land area is made up of aspen with associated species. Seventy-four percent of the aspen on the property is in a sapling size class with origination dates primarily between 1972 and 1982. Twenty-five per cent of the aspen acreage consists of pole size trees and one per cent of the

occurrence of aspen is greater than 11" DBH .

White and red pine forest types comprise sixteen per cent (16 percent = 298 acres) of the total land area. Trees with DBH larger than nine inches (sawlog size trees) represent Ninety-three percent of the pine types. The remaining seven per cent of pine types consist of pole size trees dominating areas with abundant aspen saplings. Red pine plantations (26 acres) represent nine per cent of the pine types. The big pines are scattered throughout the property in small patches. Often they exist due to their occurrence on inaccessible rock outcrops or within a riparian corridor.

Swamp conifer forest types are comprised primarily of balsam fir, black spruce and northern white cedar. Swamp conifer types occupy nine percent (9 percent = 167 acres) of the total land area. These forest types occur in low-lying areas or along the riparian corridors. Many of these sites are associated with muck or poorly drained mineral soil. Thirteen per cent of the swamp conifer types occur in a sapling size class. The pole size swamp conifer accounts for eighty-one percent while the sawlog size only represents six per cent of the land area occupied by the swamp conifer forest type.

Red oak and scrub oak forest types cover four per cent (4 percent = 84 Acres) of the total land area. Fifty-six percent of the area oak types occur in are occupied by trees larger than eleven inches DBH. Pole size trees are the primary component on forty-two percent of the oak sites. Only two per cent of the oak timber types are in the seedling to sapling size class.

The remaining forest types on the property consist of northern hardwood, white birch and red maple combined for two per cent (2 percent = 50 acres) of the land area. Swamp hardwood forest type accounts for three per cent (3 percent = 53 acres) of the total land area.

Six per cent of the land area is classified as non-commercial or non-forest types. These areas would include open grasslands, upland brush and lowland brush that occur in areas two acres and larger in size.

TIMBER TYPE DISTRIBUTION

SPECIES	% OF TOTAL	ACREAGE
ASPEN	60	1151
WHITE/RED PINE	16	298
SWAMP CONIFER	9	167
OAK/SCRUB OAK	4	84
SWAMP HARDWOODS	3	53
NORTHERN HARDWOOD, SUB-TOTAL FOREST	2 94	50 1803
NON-COMMERCIAL/ NON- FOREST	6	119
TOTALS	100	1922

PRIMARY SPECIES SIZE CLASS DISTRIBUTION BY ACREAGE

Dbh range *	ASPEN	PINE	SWAMP CONIFERS	OAK	SWAMP HARD WOODS
0-5"	858	0	21	2	0
5-11" *	290	21	136	35	53
11-15/15+" *	3	277	10	47	0
TOTALS	1,151	298	167	84	53
%	60	16	9	4	3

*Pine / Conifer: Pole size 5-9"; Sawtimber >9"

TIMBER SIZE CLASS SUMMARY

	dbh RANGE	% OF TOTAL	ACREAGE
SEEDLINGS/SAPLINGS	0-5"	46	881
POLE TIMBER *	5-9" & 5-11"	30	577
SMALL SAW TIMBER*	9-15" & 11-15"	10	188
LARGE SAW TIMBER	15+"	8	157
NON-COMMERCIAL FOREST		6	119
TOTALS		100	1922

*Pine / Conifer: Pole size 5-9"; Sawtimber >9"

Potential Old Growth Forest Stands

The potential for development of stands of old growth forest type is found under two distinctive circumstances. First are areas that will not be actively managed. These reserve areas are the Menominee River corridor, most lowland conifer and hardwood stands and the timbered rock outcrop areas. During the most recent logging episodes, trees in the immediate riparian zone of the Menominee River were spared, giving a more mature character to these forest stands. Because of their wetness, poor growth and unique character, most forested wetlands will not be actively managed for timber or wildlife. Within the property, a number of rocky outcrops are found that harbor remnant oaks and pines that escaped harvest probably due to the nature of the terrain and poor quality of trees. All of these areas will be left to succeed naturally and in time develop into old growth stands.

The second area with potential for old growth development is the existing pine area. This includes the red pine plantation and the natural white pine stands. Because of their longevity white and red pine are well suited for old growth development. Some of the pine stands are already 100 years old and contain large diameter trees

Endangered Resources, Natural Heritage Inventory

A search of Natural Heritage Inventory records for the State of Wisconsin for areas in the vicinity of the Menominee River in the townships of Amberg and Pembine returned only a few notations. These are summarized for the project area as follows:

Pembine TWP Section 31 – Bald eagle sighting, 1992

Pembine TWP Section 8 – Northern dry-mesic forest , 1981

Amberg TWP Section 17 – Northern dry-mesic forest, 1981

This information represents a summary of existing available (Wisconsin) records. Additional occurrences of endangered, threatened or special interest species may be noted during the course of management and development of this project. Appropriate measures will be taken under federal and state statutes if species having special are found.

Endangered resource specialists conducted some limited site investigations during the pre-planning stages of this master plan, with the idea of making a preliminary evaluation of the potential for additional discoveries. Their findings point to the potential for rare species to occur on cliffs near the Pemebonwon and Menominee rivers and in scattered white cedar swamps. Basalt rock outcrops hold more potential for the occurrence of rare species than do the granite outcrops extant in some areas. There is a chance that one or more species of spring-blooming orchids may be found in the cedar swamps.

It is further anticipated that certain open rocky glades may contain species of interest to the endangered resources program. Further field investigations have been recommended and these will occur after the production of this master plan. In order to minimize potential damage to sensitive species of any type, site-specific investigations will be conducted wherever new development is scheduled.

Wildlife Resources

The present habitat cover produces a rich variety of common wildlife species and past management of the area has been consistent with management of surrounding lands. The area is a portion of a larger habitat block. The river and riparian habitats comprise some unique opportunity areas on which to focus management attention.

Game Species

Deer and bear are common in the MRNRA; turkey are present but uncommon. Furbearers include fisher, otter, mink, muskrat, bobcat, coyote, fox, raccoon, and beaver. Small game species include ruffed grouse, woodcock, gray squirrel, snowshoe hare, and cottontail rabbit.

The MRNRA lies within Deer Management Unit (DMU) 41. Carrying capacity of DMU 41 is 43 deer per square mile of habitat and the population goal is 25 deer per square mile. In the last ten years, the population has averaged 26.5 deer per square mile with a low of 11 and a high of 37. The current land cover is good deer habitat. As the forest ages, its value to deer will decline unless management actions to maintain early-successional types are continued.

The MRNRA lies within Wisconsin Bear Management Zone B. The current population goal in Zone B is slightly over one bear for every two square miles and the bear population in the zone is at that goal. The MRNRA provides a good mix of habitat types for bears and should continue to do so although bear use of the area will change as the forest matures.

Furbearers are mostly associated with the aquatic habitat on the area and population levels should remain relatively constant with continuing protection of those habitats. Fisher populations may decline with increased harvest pressure and a natural adjustment after their initial population growth. Fox and coyote populations are secure but will fluctuate based on prey populations in the future.

Small game species will persist on the area but population levels will reflect habitat management decisions. The current cover type and age class distribution is favorable for the small game species listed above.

Non-Game Species

Some of the more common bird species include American robin and black-capped chickadee. Many passerines use the area, particularly those adapted to young, deciduous forests. Eagles nest on the Menominee River both upstream and downstream of the project. Potential for nesting exists within groves of large white and red pine present on the site. Common small mammals include eastern chipmunk, deer mouse, and red-backed vole. Common amphibians found on the area include spotted salamander, American toad, spring peeper, gray treefrog, and green frog. Although relative abundance of these common, northern forest species might change with maturation of the

forest, it is likely all will persist on the area.

Present Pattern of Utilization

The area receives moderate use by hunters during small game and bear seasons. DMU 41 averages 22 hunters per square mile on the opening day of deer season. The MRNRA is currently open to hunting and has traditionally been viewed as semi-public property.

There has been a long history of hunting for deer and small game on the property for many years. This will continue under management by the WDNR. Wildlife management on the property will assure biological diversity and protection of the natural values associated with the Menominee River area. Habitat manipulations normally associated with lands having wildlife production as their primary goal will not be emphasized here. However, activities that restore or enhance native communities may benefit certain game and non-game species that inhabit the area.

Deer Management Unit 41

DMU 41 is relatively small with only 210 total square miles and 201 square miles of deer range. It comprises the northeast corner of Marinette County. The boundaries of this unit have remained unchanged since establishment in 1955. There has been some comment from the public to split off the southern part of this unit where farms are more common.

The overwinter goal was changed from 20 to 25 deer per square mile in 1995. While the potential for harsh winters is high due to the northern extent of this unit, winter severity was generally not a limiting factor in the late 80's and early 90's. However, the winters of 95-96 and 96-97 saw the winter severity index rise well above 100. Direct losses, at least in the northern part of this unit, may have reached 30 percent, and recruitment dropped off dramatically. However, while not fully understood, recreational deer feeding may be offsetting winter severity impacts.

Human Demographics/Social Issues in Unit 41

Crop damage has been severe in DMU 41. From 1990 to 1994, 350 deer were killed under 31 permits. Appraised losses were just over \$124,000. However, only one shooting permit was issued in 1998. As with many other northern units, changes in the damage program and land use shifts away from agriculture could result in a continued downward trend in requests for shooting permits.

Based on WDNR records, the number of vehicle-killed deer in Marinette County has remained relatively stable over the last decade. About 1365 deer were killed annually by vehicles in Marinette County over the last three years. The southern part of DMU 41 experiences higher rates of vehicle-killed deer.

Opening day hunting pressure has remained relatively stable over the years averaging 22 hunters per square mile of deer range on opening day. When at goal this unit produces a total buck kill of about 650 (3.2 per square mile). Antlerless harvests are approximately 430 when the DMU is near goal. The bow kill has averaged about 19 percent of the total

kill. There is no Chippewa harvest in DMU 41. It is critical to maintain the herd in DMU 41 as close to goal as possible to avoid winter loss and habitat damage. Education concerning the need for adequate antlerless harvests is essential.

Black Bear

The Foundation land is in Wisconsin Black Bear Zone B, which is currently meeting its annual goal of about 1 bear per two square miles. Continuation of this goal is recommended.

Wild Turkey

The property is also within Wisconsin Turkey Zone #31. A low success rate has been noted due to winter stress. Current management goals will be continued.

General

Hunting, fishing and trapping will be allowed in accordance with current state regulations. Small game hunting will be allowed in accordance with the regular seasons, including the spring turkey season.

Fisheries

Historical Fishery

The principal reason for the Menominee Indians maintaining their main village on the banks of the river was the easy availability of lake sturgeon and other species of fish. Historical accounts mention the great runs of lake sturgeon, lake whitefish, and herring at numerous spots on the Menominee. Most of the rapids in the river provided the spawning areas for these fish. Chappie Rapids, Grand Rapids, White Rapids, Chalk Hill Rapids and Pemenee Falls were all historic spawning areas. Most of these historic spawning areas have since been flooded due to logging, mining and later hydropower development.

Sturgeon were originally present in the river upstream to Sturgeon Falls. The entire river at this location flowed through an 80 foot wide gorge and then rushed over a 13 foot falls. This waterfall was the upstream terminus of the lake sturgeon runs and immense quantities of fish would congregate in the pool below the falls. This was an area that was a favorite place for the Indians to spear sturgeon. Fish also concentrated in the Grand Rapids, White Rapids, and Chalk Hill Rapids areas.

Eleazer Ingalls, a pioneer lawyer, wrote that "... fishing had been a prominent business in the area since the first settlement. Principal market species were whitefish and dory (walleye). Besides these, he said, the waters abounded with sturgeon, bass, suckers and pickerel (northern pike) of edible varieties, as well as several varieties considered worthless". The establishment of sawmills on the river and the consequent deposition of great quantities of sawdust in the water, in effect, ruined the fishery. By 1870, no whitefish runs remained in the river and there were only about one eighth as many pike as formerly ran the river. Pollution of the river by sawdust was the chief cause of their disappearance.

In 1874, the first recorded planting occurred when 6,000 young Atlantic salmon were deposited in the Menominee River by the fish commissioners. Very little fish planting has occurred since that time on the Menominee River or its flowages.

Early records mention mainly coolwater fish species as inhabiting the river, however, brook trout were mentioned as abundant in the area at the confluence of the Brule and Michigamme rivers and large numbers of lake trout presumably moved up the lower section of the Menominee.

Menominee River Today

Just as the Menominee River was an important fishery resource to the Indians who originally lived along its banks and the white settlers who came to the basin 150 years ago, it is still an important fisheries resource today. Early inhabitants depended upon the fish from the Menominee primarily for food, while present day anglers also put a value on the recreation provided by fishing as well as the food value of fish caught and kept. Fish species composition and abundance has changed dramatically since the 1800's. While whitefish, herring and lake sturgeon were historically the most dominant species, today the Menominee in this reach supports a diverse coolwater fishery. Principal sport fish residing here include smallmouth bass, walleye, largemouth bass, northern pike and muskellunge. Panfish species include yellow perch, bluegill, rock bass, pumpkinseed and all three species of bullhead. In addition a variety of minnow species and rough fish, including common carp, white sucker and redhorse, are found in these waters. With the exception of muskellunge, all of the other populations are naturally maintained. Michigan has been stocking muskellunge in the Chalk Hill Flowage for a number of years. That population appears to be increasing in these waters.

Lake sturgeon were abundant in this area historically, but were apparently eliminated by pollution during the early to middle 1900s. Now that the water quality in this reach of river has been improved, one of the prime goals of the WDNR and MDNR is to reestablish Lake Sturgeon in this section of river. Toward that end, the WDNR has stocked hatchery-reared sturgeon in the reach of river below the Sturgeon Falls Dam on a number of occasions in the early 1980's and again in the 1990's. The success of these plants has yet to be determined, however surveys are scheduled to assess the status of the current sturgeon population. The Menominee River is managed as boundary water by both states. There is a specific set of fishing regulations that applies to the Menominee River. Fish managers and law enforcement personnel from both the MDNR and WDNR develop these regulations to protect and conserve the aquatic resource of the river.

Pemebonwon River

The MRNRA includes land along the lower two miles of the Pemebonwon River. The Pemebonwon in this reach is considered Class III trout water. Brook trout inhabit this section of the river, mainly in the spring of the year, prior to the water temperatures warming beyond tolerable levels for this species. During the remainder of the year the river in this section supports some coolwater fishing for smallmouth bass and northern pike.

Mullaney Creek

One and a half miles of frontage along Mullaney Creek are also within the MRNRA. This small stream is a Class I brook trout stream that harbors trout on a year round basis.

Special Concerns, Threats, and Opportunities

The section of the Menominee River flowing through the MRNRA contains some of the only remaining vestiges of high gradient rapids left on the entire river. These rapids were the spawning sites for numerous species of fish that inhabited the river. It is essential that remaining areas of this type of riverine habitat, such as Pemene and Quiver Falls, are protected. Although fish still use these areas as spawning sites, the numbers of fish utilizing these areas is much lower than historically, because downstream dams block access to these areas. An objective of the Menominee River Fishery Plan is to provide free access for fish throughout the whole lower eighty miles of river, which includes this section.

As mentioned above, both the states of Wisconsin and Michigan are attempting to reestablish lake sturgeon in this section of the river. This effort includes both stocking sturgeon in this reach of river and attempting to provide free passage of adult sturgeon around the dams in the lower river in an effort to give these fish access to historic spawning sites.

Many changes have occurred in the Menominee River Basin since settlement by white men began in the early 1800's. These include changes in water quality, population and land use trends, industrial, municipal and hydropower use and recreational use.

Water Quality Issues and Concerns

Pollution, first from sawmills and later from industries and municipalities, has been a serious and persistent problem in parts of the Menominee since the mid 1800's. In the period before 1948, when water quality studies were first conducted on the Menominee, several communities and industries were discharging gross pollution. Raw or inadequately treated wastes from the communities of Caspian, Crystal Falls, Gaastra, Iron Mountain, Iron River, Kingsford, Norway, Marinette, and Stephenson seriously affected fish and aquatic life miles below their respective discharges. Similarly, a paper mill at Niagara and two in Menominee-Marquette discharged wood fibers and other wastes, while a chemical company in Marinette discharged organic chemicals, all of which created conditions unsuitable for aquatic life below their discharges.

Fortunately, great strides have been made in pollution abatement since 1960, so that water quality has substantially improved in most areas. Nine cities, four paper mills, and one chemical plant currently discharge treated wastes into the Menominee. Further improvements in waste treatment have occurred in recent years so that respective state water quality standards are currently being met by most of these communities and industries. Although water quality in the river may be better today than at any time in the

past 100 years, there are still problems which need further attention if we are to realize our goal of a clean, healthy environment with healthy, contaminant free fish and wildlife populations.

Listed below is a brief summary of the known pollution problems, which recently existed.

- Dioxins have been detected in fish from the Menominee in the section between Quinnesec and the river mouth. Although levels in gamefish are generally well below both states' fish consumption advisory level of ten parts per trillion, larger carp from Sturgeon Falls Flowage and in the Marinette-Menominee Area, exceed the action level (see Health Guide for people who eat sport fish from Wisconsin waters, WDNR and Wisconsin Department of Health and Michigan Public Health Advisory, Michigan Department of Public Health). The presence of this very toxic chemical in any quantity is cause for concern.
- Chemical contaminant levels in fish are another problem in some areas of the Menominee Basin. Currently there are restrictive consumption advisories in effect for dioxins in larger carp near Quinnesec, for mercury in fish in the Upper Basin (above Iron Mountain), in the Pier's Gorge to Sturgeon Falls Flowage area and in the Lower Scott Flowage, and for PCB's in most salmonids and larger sizes of other species in Green Bay and the Lower Menominee River. Readers should consult Wisconsin and Michigan advisories for current and more specific information on areas, size of fish affected, and for recommended consumption restrictions.
- Bottom sediments in portions of the Lower Menominee River are still contaminated with arsenic and other chemicals to the point that populations of benthic organisms are suppressed.

A Remedial Action Plan (RAP) for the lower Menominee River is currently being developed by the two states, with the support of the U.S. Environmental Protection Agency and the International Joint Commission. Purpose of the plan is to identify and eventually clean up the toxic contamination problem that persists in the lower river despite the considerable efforts and money that have already been spent to remedy water pollution problems. At this writing, the Stage I Report identifying problems has been completed, and the Stage II Report proposing remedial measures is being drafted.

Conditions relating to water quality have been improved significantly as of 1998 and continue to improve through the joint cooperation of Michigan, Wisconsin, and the industries using the Menominee River.

Hydroelectric development has inundated 37 percent of the riverine mileage formerly present on the Menominee. Most of the mileage lost has been of the higher gradient type. Over 70 percent of the river with a gradient of more than four feet per mile has been flooded for hydroelectric generation. These high gradient reaches in riverine systems are typically the most productive in terms of macroinvertebrates and as fish spawning

habitat.

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VIII. APPENDIX

A. The National Hierarchical Framework of Ecological Units

The National Hierarchical Framework of Ecological Units (NHFEU) is an ecological classification system that divides landscapes into ecologically significant regions at multiple scales. Ecological types are classified and units are mapped based on the associations of biotic and environmental factors which include climate, physiography, water, soils, air, hydrology, and potential natural communities.

In Wisconsin, the Provinces, Sections, and Sub-sections of the NHFEU have been delineated and are being used as large-scale ecological units for resource assessment and planning projects. Wisconsin is currently delineating the finer scale Landtype Associations (LTA) layer of the NHFEU. The LTA's are landscape scale map units corresponding to visible landforms and sometimes-vegetative cover. When completed this important layer of information will supply a spatially oriented, ecological classification tool that can be used in master planning to help set goals and objectives and support management activities.

Although not fully completed, we know basic information about the LTA that includes the MRNRA. It is part of the Northeast Sands Ecological Landscape of the South Superior Mixed Forest Section of the Mixed Deciduous-Coniferous Forest Province.

LTA NAME: Amberg Moraines, #211JK11

BRIEF Description: Rolling bedrock-controlled moraine and outwash plain complex with loamy and sandy soils over calcareous sandy loam till, igneous/metamorphic bedrock, or calcareous outwash. Outcrops of bedrock are many. Common habitat classifications are: Lowland, AQVb, PMV-Vb, QV, and ATM.

General topography: Dominant: Rolling
Range: Nearly Level to Rolling

GEOMORPHIC PROCESS: Glaciated- Middle Inlet Member of the Kewaunee Formation (Green Bay Lobe).

SURFICAL GEOLOGY: Moraines and Outwash Plains

BEDROCK GEOLOGY: Igneous and Metamorphic Bedrock (Many Outcrops)

REPEATING LANDFORM PATTERN: Overall landform patterns: Rolling moraines and outwash plains with bedrock knolls and ridges.

SOIL COMPLEXES:

Dominant: Loamy and sandy soils over calcareous sandy loam till, igneous/metamorphic bedrock, or calcareous outwash. The dominant surface Texture is Fine Sandy Loam.

The dominant soil association 1: Emmet-Michigamme-Mancelona a mixture of sandy loam and loamy sand soil.

The dominant soil association 2: Ishpeming-Michigamme-Rock Outcrop a mixture of loamy fine sand, sandy loam and exposed bedrock.

Common Soil Association 1: Seelyeville-Markey is found in the swamps and consists of muck soil.

COMMON HABITAT TYPES: Lowland, AQVb, PMV-Vb, QV, and ATM.

Possible associated habitat types with soils identified: AFVb, ATFD, ATD, Avio, AH, and TMC.

HYDROGRAPHY:

Drainage Pattern: Dendritic

Lakes: Few Small

Wetlands: Common Small and Medium

OTHER NOTES:

Percent Woodland: 95%

Percent Agriculture 5%

Percent Urban (Major Communities: <1% (Amberg)

As more information becomes available about the LTA layer of the NHFEU in Wisconsin it will be incorporated into the decision making process for management on the MRNRA.

Forest Habitat Type Classification

The habitat type system is a natural classification system for forest communities and the sites on which they develop. Its' primary use is the assessment of biological potential of forest sites necessary for management of various natural resources. It uses potential natural vegetation to recognize ecologically equivalent landscape units - habitat types. A habitat type includes all sites or areas capable of producing similar plant communities at climax. Forest Habitat Type information will be used by land managers when they are deciding to maintain or change species composition on a site in accordance with the master plan for the property.

The common habitat types found in the Amberg Moraines LTA are all found in the MRNRA along with most of the possible associated habitat types. Management implications for the common habitat types are summarized below and listed in order of their occurrence.

QV and PMV-Vb types – most common on the MRNRA, Dry/nutrient poor to medium sites. Management for fiber or wildlife is better suited to aspen, oak and pines. Pines are better suited to large diameter growth rather than the slower growing hardwoods. Sugar and red maple may be present but the dryness and poor nutrient conditions don't allow for successful growth or dominance. Due to its exceptional stature and longevity, white pine perhaps best characterizes the sites with more nutrients.

AQVb type – Dry mesic/nutrient medium sites. Represents the medium ranges for moisture and nutrients in northern Wisconsin. Sugar maple is considered climax dominant but succession toward its dominance is not rapid, nor as complete as on better sites. Red oak and red maple are prominent in early – mid successional stages. These sites are probably optimal for red oak management and white pine management is also a good choice.

ATM type - Mesic/nutrient medium sites. Optimal moisture conditions and considerable variation in species composition exists in present stands. Many management options are available. Successional stands are almost always mixtures of hardwoods with succession towards the dominance of sugar maple. Presence of conifers is expected in mature stands.

Wetlands on the MRNRA do not have habitat types assigned to them.

B. Master Plan Maps

Map One – Project Boundary and Ownership

Map Two – Recreation and Land Management Classifications

Map Three – Existing Cover Types

Map Four – Projected Cover Types and Vegetative Management Zones

Map Five- Regional Land Ownership