Environmental Assessment
for the
North Branch Oconto River Watershed Health Improvement Projects

Hemlock and Knowles Dam Removal

USDA- Forest Service, Eastern Region
Chequamegon-Nicolet National Forest
Lakewood-Laona Ranger District
Oconto County, Wisconsin

March 2004

For questions contact
Wildlife Biologist Tom Moris at
715-674-4481

****
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.
****

TABLE OF CONTENTS

CHAPTER 1 PURPOSE OF AND NEED FOR ACTION 1
1.0 Introduction 1
1.2 Purpose and Need 1
1.3 Proposed Projects 2
1.3.1 Project 1: Hemlock and Knowles Dams removal and channel restoration 2
Site 1: Hemlock Dam 3
Site 2: Knowles Dam 4
1.3.2 Project 2: Improvement of instream habitat 4
1.3.3 Project 3: Campsite obliteration and relocation 5
Chapter 2 PUBLIC INVOLVEMENT AND ALTERNATIVES 6
2.0 Tribal Consultation 6
2.1 Scoping Process 6
2.2 Issues Specific to the Project 6
2.2.1 Issues used to drive alternatives 7
2.3 Alternatives Analyzed in Detail 7
2.3.1 Alternative 1 - No Action 7
2.3.2 Alternative 2 - Proposed Action 7
2.4 Alternatives Considered but dropped from Detailed Study 7
CHAPTER 3-EXISTING CONDITION 9
3.0 Background 9
3.0.1 North Branch Oconto River Watershed 9
3.1 Hydrology and Aquatic Organisms 9
3.1.1 Streamflow Regime 9
3.1.2 Water Uses 9
3.1.3 Data Collection and Analysis 10
3.1.4 Stream Channel Conditions 10
3.1.5 Water Quality 11
3.1.6 Aquatic Biota 12
3.2 Vegetation 13
3.3 Landforms and Soils 13
3.4 Wildlife 14
3.4.1 Management Indicator Species 14
3.5 Recreation 14
3.6 Threatened, Endangered and Sensitive Species 15
3.7 Non Native Invasive Species 16
CHAPTER 4 ENVIRONMENTAL EFFECTS 17
4.0 Introduction 17
4.1 Hydrology and Aquatic organisms 17
4.1.1 Alternative 1 No Action 17
4.1.1.1 Stream morphology 18
4.1.1.2 Water Quality 18
4.1.1.3 Aquatic Biota 18
4.1.2 Alternative 2 Proposed Action 18

4.1.2.1 Project 1 Hemlock and Knowles Dams removal and channel restoration.... 18
4.1.2.1.1 Stream Morphology 18
4.1.2.1.2 Water Quality..... 19
4.1.2.1.3 Aquatic Biota 20
4.1.2.2 Project 2 Improvement of instream habitat..... 20
4.1.2.2.1 Stream Morphology 20
4.1.2.2.2 Water Quality..... 21
4.1.2.2.3 Aquatic Biota 21
4.1.4 Cumulative Effects on Hydrology and Aquatic Organisms 22
4.2 Vegetation 23
4.3 Soils..... 23
4.3.1 Alternative 1 No Action..... 23
4.3.1.1 Project 1 Hemlock and Knowles Dams removal and channel restoration.... 23
4.3.1.2 Project 2 Improvement of instream habitat..... 23
4.3.2 Alternative 2 - Proposed Action 24
4.3.2.1 Project 1 Hemlock and Knowles Dams removal and channel restoration.... 24
4.3.2.2 Project 2 Restoration of in-stream habitat 24
4.3.3.4 Cumulative Effects on Soils..... 25
4.4 Wildlife 26
4.4.1 Management Indicator Species 27
4.4.2 Alternative 1..... 27
4.4.3 Alternative 2..... 27
4.4.3.1 Project 1, Site 1 and 2 27
4.4.3.2 Project 1, Site 1 - Hemlock Dam 27
4.4.3.2 Project 1, Site 2 - Knowles Dam..... 28
4.4.4 Cumulative Effects on Wildlife 28
4.4.4.1 Past Actions 28
4.4.4.2 Present Actions 29
4.4.4.3 Future Actions..... 29
4.5 RecreatioN 29
4.5.1 Alternative 1..... 29
4.5.2 Alternative 2..... 30
4.6 Endangered, Threatened and Sensitive Species..... 30
4.6.1 Federally Endangered, Threatened, and Proposed Species for Listing, and Regional Forester's Sensitive Species 30
4.6.2 Federally Endangered, Threatened, and Proposed Species (Reference Table 1. Appendices F & G) 30
4.6.3 Regional Forester's Sensitive Species 31
4.7 Non Native Invasive Species 31
4.7.1 Alternative 1..... 31
4.7.2 Alternative 2..... 31
4.7.3 Cumulative Effects Regarding NNIS..... 32
4.8 Transportation 32
4.8.1 Alternative 1..... 32
4.8.2 Alternative 2..... 32
4.8.3 Cumulative Effects on Transportation 32

4.9 Effects on other resources 33
4.9.1 Air 33
4.9.2 Heritage Resources 33
Appendix A Issues and Concerns that can be addressed through explanation, analysis or mitigation 35
Appendix B Literature Cited 38
Appendix C Equipment 40
Appendix D Design Features and Monitoring 41
Monitoring 43
Appendix E-Water Temperature Graphs 44
Appendix F-- Species Considered and 46
species Likely to Occur 46
Appendix G--Species Determination of Effects Tables 50
Appendix H - Team members 54

CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.0 INTRODUCTION

This Environmental Assessment (EA) explains the environmental analysis of the following watershed improvement projects on the North Branch Oconto River on the Lakewood-Laona Ranger District of the Chequamegon-Nicolet National Forest. All project sites are located in the vicinity of the town of Townsend (North) and Lakewood (West), Wisconsin. This Environmental Assessment outlines what could be expected to result from implementing any of the proposed activities.

The Wisconsin Department of Natural Resources (WDNR) and the U.S. Forest Service (USFS) have been analyzing the need for multiple habitat restoration projects on the North Branch Oconto River. This project set will consist of three projects: (1) removal of remnant logging Dams and channel restoration, (2) improvement of instream habitat, and (3) campsite obliteration and relocation. Stream inventory work by the WDNR fisheries personnel has identified sections of North Branch Oconto River as having poor trout habitat (Niebur and Sebero, 2004). The proposed projects would be completed by the WDNR and USFS and funded by State Trout Stamp monies, federal funds and/or partnership funds. The Forest Service is completing the analysis for these projects because federal lands would be involved.

Development of this EA is based on direction contained in the National Forest Management Act (NFMA) and its implementing Code of Federal Regulations (CFR) at 36 CFR 219; in the National Environmental Policy Act (NEPA); and in the Council on Environmental Quality (CEQ) regulations at 40 CFR 1500-1508. This EA will provide the deciding officer with sufficient information to select an alternative that achieves the purpose and need and implement the Forest Plan.

This project implements the 1986 Nicolet National Forest Land and Resource Management Plan (LRMP). The Plan establishes direction to provide for diversity of plant and animal communities, maintain viable populations of all species, and improve habitat for Management Indicator Species. It also provides direction through standards and guidelines to maintain Class I and II trout waters in a free flowing condition and coordinate fisheries projects with the Wisconsin Department of Natural Resources.

This project also meets the goals, objectives, standards and guidelines set forth in the Revised 2004 Chequamegon-Nicolet National Forests Proposed Land and Resource Management Plan.

1.2 PURPOSE AND NEED

The purpose of the proposed projects is to improve long-term watershed health by restoring habitat for the cool/cold-water aquatic community. This would be accomplished by restoring: 1) a riverine condition in two artificially impounded segments

of the North Branch Oconto River; (2) instream habitat complexity through the strategic placement of wood and rock; and (3) altered stream morphology by narrowing and deepening the stream channels.

There is a need to restore the cool/cold-water aquatic community in the North Branch Oconto River because historical activities have impacted and degraded this river system. Log drives at the turn of the past century had significant impacts to this river. Remnants of logging dams continue to constrict the stream channel and pond water, creating a wide flooded channel in what was historically a cool water stream ecosystem. This ponding flattens the stream profile, disrupts natural sediment transport and increases water temperatures in summer. Prior to implementing log drives, streams were cleaned to remove large woody debris and boulders. This cleaning facilitated the log drives but removed valuable aquatic habitat. Large quantities of water were released during the log drives that caused extreme flooding. These floods caused stream channels to scour and resulted in many of the wide, shallow channels that exist today. Historical logging methods also resulted in the removal of most of the streamside vegetation that provided stream surface shading, streambank stability and a source of large woody debris. Periodic beaver activity has also compounded degradation at the Hemlock Dam site by restricting fish movement and increasing sedimentation from damming.

1.3 PROPOSED PROJECTS

1.3.1 Project 1: Hemlock and Knowles Dams removal and channel restoration

These dams were constructed 110 and 116 years ago, and created holding ponds for logs and a supply of water to drive logs downstream. An archaeological resource evaluation has determined that these sites do not qualify for the National Registration of Historic places due to loss of site integrity. State Historical Preservation Office (SHPO) compliance has been established for this determination. Only portions of the rock/log sills remain in the stream while much of the earthen dikes are still intact. Hemlock Dam is impounding water approximately 2 miles upstream (up to confluence of Shawano Creek) and Knowles about 1,000 feet. The head of Hemlock Dam is approximately three feet high, and Knowles Dam approximately two feet. The present condition of the existing sills do not block fish passage, but are more of "roller dams", meaning that the stream flow is slowed by the sills of rocks and logs, but not stopped.

The objective of this project is to restore the stream channel obscured by the impoundments back to a free-flowing cool water riverine system. The definition of width/depth ratio is, the width of the channel divided by its *mean* depth. A large w/d ratio equates to a wide and relatively shallow stream. The target width/depth ratio for the new stream channels (within the impounded areas and below the dams) would be less than 20 with target maximum summer temperature of less than 26°C (78.8^{o}F).

Details regarding equipment to be used for these projects are described in Appendix C, p 39.

Site 1: Hemlock Dam

The Hemlock Dam is located in T33N, R15E, Sec 1. The project work would be implemented in cooperation with the WDNR and would be funded by a combination of Trout Stamp monies and federal funds. Lowering of the water in the impoundment would occur in two steps to allow exposed sediments to settle and stabilize, rather than flush downstream. In 2004, the first step would involve removal of the rock dam base with an excavator to lower the water level approximately 2 feet. Additionally, the earthen dike would be sloped back to create a bankfull width of 50 feet, and a floodprone width of 100-150 feet. The remaining dike above the floodprone elevation would be pulled back to a 3:1 slope. The soil material removed from the dike structure would be moved to the upstream and downstream sides of the dike and also returned to existing borrow areas on the site. Sediment in the plunge pool located below the Am sill would be removed with an excavator. Doing this would allow the plunge pool to be used as a trap to catch sediment that moves downstream from the impounded area. Sediment would be removed from this trap prior to the final lowering of the water in the impounded area (2005) and again in 2006. This would trap the initial flush of sediment that would move out of the ponded area. The sediment removed from the plunge pool would be disposed of at one or more upland sites that include the old borrow areas, a gravel pit located in, Sec 2, T33N R16E or natural depressions located in, Sec 12, T33N, R15E. Approximately 400 feet of temporary trails would be created for equipment to access the river for the required work. Appendix D lists the design features including Best Management Practices (BMPs) that are part of the proposed action. BMPs are designed to limit the degree of disturbance to soils, stream channels and riparian areas.

Approximately 500 feet of stream channel below the Hemlock Dam plunge pool has aggraded from deposition of coarse bed material. This material was scoured from the plunge pool as it was being formed during log drives. In order to completely restore the water surface elevations in the impounded area to pre-Am level it would be necessary to remove this material from the channel. The stream channel downstream of the dam has also widened approximately 25' to 35' due to impacts from historic log drives. In 2005, approximately 500 feet of stream channel below Hemlock Dam would be reconstructed using an excavator. The channel on the north side of the wooded island immediately below Hemlock Dam would be blocked at the downstream end using bed material removed during the reconstruction of the main channel. Below this island, channel bed material would be dug from the center of the channel and placed on the sides to form new banks and floodplain. This would create a narrower, deeper channel. The newly formed stream bank would be constructed to the natural bank height, secured with erosion control matting and seeded with an annual/perennial ryegrass seed mix. This would lower water levels in the impounded area to the pre-dam level and effectively restore the riverine conditions upstream. Available boulders and logs generated during the channel reconstruction activities would be dispersed throughout the restored stream section to provide cover and habitat complexity.

If the channel that forms within the impoundment area does not provide adequate habitat for fish and aquatic species, or doesn't have a stable width/depth ratio (i.e. <20) within the first few years, channel width and stability would be restored using one or more of the following techniques. Channel bed material may be dug from the center of the channel

and placed on the sides with an excavator to form new banks and floodplain. The newly formed stream bank and floodplain would be constructed to the natural bank height, secured with erosion control matting and seeded with an annual/perennial ryegrass. Brush bundles or log structure may be installed along the edges of the channel to trap sediment. This would create a narrower, deeper channel.

Site 2: Knowles Dam
Knowles Dam is located in T33N, R16E, Sec 5. The project work would be implemented in cooperation with the WDNR and would be funded by a combination of Trout Stamp monies and federal dollars. Removal of the Knowles Dam would occur in one operation.

The first step would include removal of the rock and log base from the old dam. The boulders that are removed would be placed in the river both upstream and downstream to add to habitat complexity, or hauled off site to the borrow pit near the junction of McCaslin Tower Road and Knowles Creek Road. The large plunge pool located below the sill, which is a remnant from the old logging dam, would serve as a catch basin for any sediment that may flush from the old impoundment when the sill is lowered. Additionally, the earthen dike on the south side of the river would be sloped back to create a bank full width of 50 feet. The term bank full is when a river or stream is near flood stage, meaning the water is at the top of the banks (Verry etal, 2000). The remaining dike above the bank full elevation would be pulled back to a 3:1 slope. Soil material removed from the dike structure would be moved to the existing borrow site southwest of this dike, or hauled off site. The dike on the north side would be pulled back 25-50 feet and left as a steep slope facing the river to ensure future nesting conditions for turtles. The remainder of the north dike would have the top portion of it removed in 3-4 areas to break up its outline on the landscape. The fill would be disposed of in the small borrow pit located at the dispersed campsite away from the river on the north side of the river. If more spoils are removed than the immediate area will accommodate, the remainder would be trucked to the borrow pit near the junction of McCaslin Tower Road and Knowles Creek Road. Approximately 15-20 trees that are growing on the grade would need to be removed. If feasible, these trees would be placed into the river to create habitat for aquatic species. Approximately 200 feet of temporary trails would be created for equipment to access the river. Appendix D lists the design features including BMPs that are part of the proposed action. BMP's are designed to limit the degree of disturbance to soils, stream channels and riparian areas.

If the channel that forms within the impoundment area does not provide adequate habitat for fish and aquatic species or doesn't have a stable width/depth ratio (i.e. <20), within the first few years, channel width may be restored using an excavator. Channel bed material would be dug from the center of the channel and placed on the sides to form new banks and floodplain. This would create a narrower, deeper channel. Boulders removed from the dam site would be incorporated into this section of river in clustered groups to re-create pre-dam channel conditions. The newly formed stream bank/floodplain would be constructed to the natural bank height, secured with erosion control matting and seeded with an annual/perennial ryegrass seed mix.

1.3.2 Project 2: Improvement of instream habitat

Habitat restoration work is proposed ½ mile downstream of the Hemlock Dam, and ½ mile upstream and downstream of the Knowles Dam. Stream inventory work by the WDNR fisheries personnel in 2003 identified the sections of North Branch Oconto River immediately upstream of the dams as having poor trout habitat (Niebur and Sebero, 2004). Habitat improvement work would be done in cooperation with the USFS, WDNR and would be funded by a combination of Trout Stamp monies and federal funds.

Boulders would be dispersed throughout the river section to provide cover habitat complexity and scour substrate to clean gravel. Logs, trees and brush bundles would be placed in the river channel. The ends of these logs and trees would be pushed into the riverbank using a tracked excavator in order to anchor them.

Approximately 300 feet of temporary trails would be created for equipment to access the river. Appendix D lists the design features, including BMPs that are part of the proposed action. BMPs are designed to limit the degree of disturbance to soils, stream channels and riparian areas.

1.3.3 Project 3: Campsite obliteration and relocation

Knowles Dam: on the north side of the river is a campsite on top of the grade immediately adjacent to the river. This campsite is small in size and drops off steep on three sides. This site would be removed due to public safety concerns and erodible soils being deposited into the river. The bank would be pulled back from the river 20-50 feet to reduce erosion and recreate the historic flood plain. The existing toilet facility would be removed and relocated in a nondescript location within easy walking distance of the dispersed campsite out closer to Knowles Creek Road.

On the south side of the river are two dispersed campsites. The one furthest to the east (downstream, next to river) would be obliterated by scarification and tree/boulder placement and relocated approximately 50 yards from the river on the first elevation bench. Temporary trails would be used to access the sites with heavy equipment.

CHAPTER 2 PUBLIC INVOLVEMENT AND ALTERNATIVES

2.0 TRIBAL CONSULTATION

Ten local and regional Native American tribal governments and the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) were contacted on July 29, 2003 to determine interest in the proposed projects prior to sending the proposal out to the general public. One comment was received from Lac du Flambeau Band of Lake Superior Chippewa Indians.

2.1 SCOPING PROCESS

Initial scoping started October 18, 2002 by posting information posters at each dam location. These posters were left in place through October 2003. Approximately 10 comments were received. A mailing of a detailed description of the proposal was sent on September 17, 2003 to approximately 92 members of the public who were identified as being interested or affected by the proposal. Individuals and groups with a cross section of interests were contacted including special interest groups, forest users, local governments, and other public land management agencies, Forest Service employees both at the District and Forest level were also contacted. On September 24, 2003 the scoping letter was published in The Forest Republican, official newspaper for Forest County. Although this article did not elicit any comments it did prompt several individuals to attend an open house organized to explain the project. The meeting took place on October 9, 2003 at the Lakewood Ranger Station. A total of five people attended to comment or get more information on the proposal.

Thirty six responses were received to the initial requests for comments to the proposal. These responses were considered in the analysis and documentation. Most of the comments were favorable and supportive of the project. Most commenters felt that the proposed action is necessary for watershed health. Several commenters were against the project, but once the facts about the project were explained, most of them became neutral or in support of the projects. Detailed information regarding public contacts is available in the documentation folder for this project located at the Laona Ranger Station. Also see Appendix A in this document.

2.2 ISSUES SPECIFIC TO THE PROJECT

Two issues were used to develop alternatives because of their intensity and resource conflict concerns. Other issues and concerns that were raised during scoping that can be addressed through explanation, analysis or mitigation are addressed in Appendix A

2.2.1 Issues used to drive alternatives

Issues are listed below with the Forest Service response in bold print.

1. A few commenters were concerned that removal of the Hemlock Dam sill would release large amounts of sediment downstream, which could detrimentally affect fish, invertebrate and other aquatic habitat downstream.

   R: Alternative 2 was modified in response to this issue. This alternative includes utilizing the plunge pool below Hemlock Dam to trap the initial flush of sediment from the impoundment to minimize the amount of sediment that would be transported downstream. The effects of implementing Alternative 2 are described in section 4.1.

2. One commenter stated, that due to the loss of the large deeper pool above Hemlock Dam there might be a loss of fall/winter holding habitat in the area for fish, specifically trout.

R: Alternative 2 was modified from the original design to address this issue. Along with temporarily maintaining the plunge pool below Hemlock Dam the channel reconstruction below Hemlock Dam will create deeper water within the area. Also deeper water areas will likely be created naturally within the newly formed channel upstream as the channel scours and narrows. Although individually smaller in size than the remnant plunge pool, these pools would provide holding habitat for trout.

2.3 ALTERNATIVES ANALYZED IN DETAIL

2.3.1 Alternative 1 - No Action

Under this alternative the Forest Service would not permit the dams to be removed (Project 1) on North Branch Oconto River or the channel restoration work (Project 2) to be implemented by the WDNR. This alternative would not meet the purpose and need of this project.

2.3.2 Alternative 2 - Proposed Action

This alternative was generated in response to the purpose and need and is the same action listed in Section 1.3 of this document. This alternative addresses the watershed restoration projects needed within the project area to fully restore this section of river to pre-dam conditions.

2.4 ALTERNATIVES CONSIDERED BUT DROPPED FROM DETAILED STUDY

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives

that were not developed in detail (40 CFR 1502.14). Although there were issues raised from receiving public comments to the Proposed Action, no suggestions for alternative methods of achieving the purpose and need were received. This guided us to modify the initial alternative 2 to what it currently is. No other alternatives were developed.

CHAPTER 3-EXISTING CONDITION

3.0 BACKGROUND

3.0.1 North Branch Oconto River Watershed

The geographic scope of the affected water resource environment includes the entire North Branch Oconto River drainage upstream of the confluence with McCaslin Brook. The watershed area above this point is approximately 70,390 acres. The boundary follows the topographic watershed divide (reference Map 4).

The North Branch Oconto River is a 4th order tributary to the Oconto River. Bluegill Lake, Spring Lake and Long Lake are within this project area. The stream restoration and enhancement projects identified in Chapter 2 are located on the upper reaches of the North Branch Oconto River. The climate of the analysis area is typical of the upper great lakes region of the Midwest. There are four distinct seasons. Average annual precipitation for the analysis area is 31.5 inches. The majority of the precipitation usually occurs in the months of May through September as a result of rain events.

3.1 HYDROLOGY AND AQUATIC ORGANISMS

3.1.1 Streamflow Regime

The North Branch Oconto River generally exhibits a watershed dominated by both snowmelt and rainfall runoff. Spring runoff from snowmelt in March and April typically accounts for the highest annual peak flows. Large runoff events often occur in the smaller tributaries during summer due to intense rainfall from thunderstorms. These runoff events produce peak flows near or above spring runoff. These runoff events are somewhat moderated in the mainstem North Branch Oconto River due to the large size of the watershed. Annual low-flows generally occur in January and February.

The North Branch Oconto River is listed as an exceptional resource water under the Wisconsin Administrative Code (WAC. NR102.11)

3.1.2 Water Uses

Consumptive use of surface water within the project area is primarily by wildlife. Nonconsumptive uses include maintenance of fisheries and macro-invertebrate biota and secondary contact recreation (e.g. fishing).

The 23.6 miles of the North Branch Oconto River above Hwy 32 are considered Class I trout waters. The 5.4 miles between Hwy 32 and Chute Pond are considered Class II trout waters (WDNR, 1980). Class I trout streams support or have the potential to support self-sustaining populations of brook trout at or near carrying capacity and need no stocking supplements; these tend to be the premier trout streams. Class II trout streams support some natural reproduction but not enough to utilize available food and space, thus stocking is sometimes needed to maintain the fishery. Several factors could be limiting reproduction including high water temperatures. Like many class I trout streams, the NB Oconto River is currently not meeting its potential in terms of brook trout

carrying capacity. This is primarily due to historical land use practices, particularly early log drives, remnant logging dams and harvest within the riparian areas.

3.1.3 Data Collection and Analysis

Stream temperature data was collected in 2002 at Hemlock and Knowles Dams, but one temperature-monitoring device on the North Branch Oconto River above Shawano Creek failed and thus this data was incomplete. Stream temperature data was again collected in 2003 at these three locations of North Branch Oconto River. Stream channel cross-section surveys were also conducted in the stream reaches where habitat restoration work is proposed, and in the plunge pools below the remnant dam sills. A fish population assessment was conducted within the analysis area in spring and summer of 2003. This data was collected to find out what the fish community was comprised of before Hemlock Dam was removed. This information will also allow us to monitor changes to the fish community after the dam is removed. See section 3.1.6 for more information on the data collected. Data from these surveys is available at the Laona and Park Falls Offices.

3.1.4 Stream Channel Conditions

The remnants of Hemlock Dam include a dike that constricts the bankfull and floodprone widths to 30 and 40 feet, respectively, plus a rock sill that extends above the upstream bed by 2-3 feet. The dam is located at the outlet of a large wetland. These factors combine to back water upstream for a distance of nearly two miles resulting in a wide, flooded channel with very low water velocities. Over this distance, the water surface only drops about one foot or 0.01 percent. Without the dam the drop would be about 3 feet or 0.03 percent. The slow water causes sediments such as muck, silt and sand to accumulate in the channel. The impounded channel has the following average bankfull characteristics: width of 99 feet, depth of 2.2 feet, width/depth ratio of 45 and area of 220 square feet. At the upper end of the impounded channel and just below Shawano Creek, where the influence of Hemlock Dam is least, the channel has the following bankfull characteristics: width of 49 feet, depth of 2.3 feet, width/depth ratio of 21 and area of 115 square feet. The remnant dam has caused the bankfull width and area to increase by about 100 percent. The increased width is partially the result of sediment deposition and ponding but may also have been caused by the operation of the logging dam. Filling the entire impoundment with water could have killed most of the riparian vegetation which helps to stabilize streambanks, then releasing all the water over a short period of time could have drawn the reservoir down near to stream level and the resulting high velocities could have eroded the unprotected banks. Streams that have high width/depth ratios generally have higher than normal bank scour since stream energy is focused on the banks. Bank erosion is moderated above Hemlock Dam by the low gradient and abundant bank vegetation. Therefore, widespread areas of unstable banks are not evident.

Below Hemlock Dam a large plunge pool formed from the release of high volumes of water used to flush logs. This plunge pool extends for a distance of about 50-75 feet and is up to eight feet deep. The thalweg (the main current area) of the channel immediately downstream from the plunge pool is flat for 150 feet and then drops at a rate of one percent. The channel materials are primarily boulder and cobble. The flat segment is only 0.8 feet below the crest of the dam sill and is one to two feet above the channel thalweg upstream from the dike. This flat segment was apparently caused by the

deposition of coarse channel materials scoured from the plunge pool (If the rock sill and dike were removed, this segment of channel would still cause some water ponding above the dam site and would likely prevent a full restoration of the upstream channel). Below the flat segment, the bankfull characteristics are: width of 76 feet, depth of 1.4 feet, width/depth ratio of 56 and area of 104 square feet. Floodprone width was 100 feet and entrenchment was 1.3. This segment naturally has much greater slope and entrenchment than the channel above the dam. However, channel scour from the log drives is probably responsible for the high width/depth ratio and F channel type that now exists (Rosgen 1994). It is likely that prior to the log drives this channel was a B type and the width/depth ratio was closer to 20 or 25.

At Knowles Dam there are similar conditions but with the following exceptions. The entire channel above and below the dam is more entrenched (i.e., narrower floodprone width) and has greater slope. Therefore, the influence of the dike and rock sill only extends upstream about 1,000 feet. In addition, the channel below the plunge pool has less aggradation that at Hemlock.

3.1.5 Water Quality

Water quality has three components: chemical, physical, and biological. Chemical components include toxins, metals, ions, and biocides. Biological components include bacteria and other disease causing organisms. The proposed project would have little chance to affect these chemical and biological components of water quality and, therefore, they will not be discussed further. Physical components include temperature and sediment.

The North Branch Oconto watershed is located in the northern highland province, which has the lowest average annual suspended-sediment yields in the state (Hindall, 1976). Large areas of heavy forests, very little crop farming, and gentle topography all combine to keep yields low. Natural annual suspended sediment yields for the North Branch Oconto River at the Hemlock Dam site were estimated to be 500 yd^3 (Hindall 1976). A large portion of this sediment is deposited in the impounded channels above Hemlock and Knowles Dams and is partially responsible for the high width/depth ratios.

Currently the water temperatures are being artificially raised due to the impounding of the water upstream of each dam. The water temperature is being impacted to a much higher extent upstream of Hemlock Dam than above Knowles Dam. Water temperature plays a key role in determining the biological community in a stream. This is particularly true for brook trout and their associated coldwater community. Brook trout are the most common trout species on the Chequamegon-Nicolet NF and the only trout native to inland streams of northern Wisconsin. Habitat components primarily responsible for regulating water temperature in streams include shade, flow and channel morphology. Of these, shade is the most critical component for maintaining cold or cool water in streams because it protects the stream surface from direct solar radiation. Activities that can cause the loss of shade include timber harvest, brushing and flooding by beaver. Depending on the type and extent of timber harvest, the effects on shade can range from none to complete removal. Decreased flow can result in higher water temperatures in streams exposed to sunlight because the solar energy is concentrated in a smaller volume of water. Damming of a stream by beaver can reduce streamflow in summer. Streams

that become wider and shallower because of beaver flooding, heavy sedimentation or other impacts can also heat more than narrow, deep streams. Also, more heat energy will escape during winter months possibly causing anchor and frazzle ice to form. Both these conditions can be detrimental to aquatic life.

The North Branch Oconto River historically had much smaller width/depth ratio; that is to say, it was much narrower and deeper. However, the remnant logging dams at Hemlock and Knowles constrict and back water up in the channel, causing it to be wide and stagnant above the dams. These wide, flooded channels allow more water surface area to be exposed to the atmosphere, thereby increasing summer water temperatures.

June-September 2002 and 2003 the WDNR and USFS collected water temperature data above and below the proposed project area. Water temperature loggers were placed in three sites; Hemlock Dam, Knowles Dam, and above the upper impoundment upstream from where Shawano Creek enters the North Branch. Although one site failed in 2002, above the upper impoundment, data was analyzed and compared to determine trends.

On average the summer of 2002 had higher daily air temperatures than 2003. This was evident as maximum water temperatures found at the impoundment above Hemlock Dam almost reached 30°C (86°F) in 2002 (refer to table 3.1.2c in Appendix E) and only 26°C (79° F) in 2003(refer to table 3.1.2b in Appendix E). The upper impoundment is wide and shallow where the water rapidly warms up. Moving downstream to Knowles Dam where the surface area becomes less; the water generally cools by 0.5-1.0°C. Above the upper impoundment, where Shawano Creek enters the North Branch Oconto River, the temperature ranged from 23°C (71°F) to 10°C (50°F) in 2003. The temperature found above the impoundments is generally three degrees cooler than the downstream temperatures found at Hemlock Dam (refer to table 3.1.2a in Appendix E) and Knowles Dam.

3.1.6 Aquatic Biota

The North Branch Oconto River supports an aquatic community that is indicative of a coolwater system with some warmwater species being present. Above County Road T, the river has been classified as wide, alkaline, and cool with local groundwater influence (WLOg). This type has an average bankfull width greater than 50 ft, alkalinity > 20 mg/l and summer maximum water temperatures between 23 and 26 degrees C. The aquatic community associated with WLOg type can be diverse and includes several species of dace, sucker, and darter. Trout can also be found within this type, particularly those systems with the local groundwater input. One to four species of mussels can be found in low-moderate densities. Lower sections of the North Branch Oconto River change in classification to a warmwater system. The fish community increases in diversity with the number of brook trout decreasing.

Currently both brook and brown trout are found throughout the river system. Populations tend to be spotty and seasonal with much of the spawning thought to occur in the coldwater tributaries that flow in the North Branch Oconto River. Water temperature plays a key role in the distribution of brook trout in the river. It appears that during spring and early summer trout are well distributed, but as water temperatures warm the trout seek out the cooler areas.

Macro-invertebrate populations are healthy and diverse within the river system.

The fish community found in the impounded area above Hemlock Dam differs significantly from non-impounded areas of the river. Fish surveys by the WDNR in the impounded area above Hemlock Dam during spring/summer of 2003 found a fish community comprised of 20 species dominated by northern pike, brook trout and white suckers. The northern pike were found in the spring in the lower end of the impoundment near the spring pond outlet but generally disappeared after May. Brook trout were found in low densities in the upper reaches of the impoundment near where Shawano Creek enters the river, and very few were found in the middle and lower sections of the impoundment. White suckers were found through out the sampling period and were the dominant non-game species. Temperature monitoring above, in and below the impoundment indicated a significant warming within the impoundment. This helps explain the lack of brook trout and the abundance of white suckers.

3.2 VEGETATION

The type and degree of vegetative cover within a watershed is largely defined by the climate and soils that allow it to grow and reproduce. Alder is often the dominant species along the river. Northern hardwoods dominate the highly productive upland soils within the watersheds. Swamp conifers mostly dominate the lowland areas within the watersheds but there is often a scattered mix of black ash, white birch, and elm as well.

3.3 LANDFORMS AND SOILS

The portion of the North Branch of the Oconto River where the projects are proposed falls within the northern edge of the Lakewood Plains and Moraines Land Type Association (LTA). The landscape pattern is characterized by the rolling topography of collapsed outwash plains. Loamy windblown sediments overlie sandy outwash materials deposited by melt-water streams from Green Bay Lobe ice. The Wabeno Drumlins LTA to the immediate north of the project area is primarily rolling drumlin uplands with some areas of exposed quartzite bedrock ridges. Here, loamy sand glacial till deposited by Langlade Lobe ice is covered by windblown silt and fine sand.

Soils within the project areas mainly consist of the Padus series. The soil texture is fine sandy loam to a depth of about 20 inches, over medium and coarse sand. These sites are well drained. Permeability is moderate in the surface and rapid in the subsoil. Ratings for operation of heavy equipment are moderate. Season of operation would be restricted during spring thaw and following significant rain events that saturate the soil surface. Potential for erosion is slight when the ground remains covered with vegetation. Potential for soil compaction, rutting, or displacement is slight if operation of equipment occurs when the surface is dry.

3.4 WILDLIFE

Generally, prior to the project proposal, some of the upland portions of the project areas had received treatments that included timber harvest and road construction and reconstruction.

The area around the Hemlock Dam provides habitat for many species of wildlife, including great blue herons, king fisher, beaver, otter, muskrat, and mink. Information on Threatened, Endangered or Sensitive (TES) species can be found in section 3.6, p. 15.

General effects of past management on the fish and wildlife resources are described in the Nicolet Forest Plan FEIS, 1986, pages 4-107 and 4-108; and riparian area effects are described on page 4-106

Turtles are known to nest on the north bank at Knowles Dam. See wildlife section in 4.4 for design features.

3.4.1 Management Indicator Species

Brook trout is the one MIS that would be expected to show a response to the proposed activities. In the project file, an analysis has been completed which provides population trend data for key MIS species identified in the Chequamegon-Nicolet NF Proposed Land and Resource Management Plan. This analysis is available upon request from the wildlife biologist at the Laona Ranger Station. Brook trout was selected because it is most representative of the habitat affected in the Project Area.

Regarding these projects specifically, the brook trout is the selected MIS. The WDNR has over the years, collected fisheries sampling data specific to North Branch Oconto River.

The MIS selected represents a suite of species that have similar habitat needs. This species was selected because some aspect of its life cycle could potentially be affected by the proposed project. For these projects, the brook trout was selected because it and the community it represents require clean, cold, clear, oxygen rich water in addition to streams with a mostly sand, gravel or cobble substrate. According to Becker, (1983) brook trout do best at stream water temperatures of 68°F (20°C), while the upper lethal limit is 77°F (25°C). Water quality is important for sustaining the healthy populations of invertebrates, which are fed on by trout and their cold water associates. Insufficient levels of dissolved oxygen and excessive sedimentation can inhibit or reduce the proliferation of invertebrate populations. Some of the many families of aquatic or semi aquatic invertebrates important to brook trout and other cold-water fish would include adult and larval forms of stoneflies (plecoptera), caddisflies (tricoptera), beetles (coleoptera), midges (chironomidae), and black flies (simuliidae). Reference the Hydrology and Aquatic Organisms section 4.1, p. 17 for effects on brook trout.

3.5 RECREATION

The North Branch Oconto River is a popular recreational trout fishing stream. Anglers enjoy the quality of the stream in pursuit of brook and brown trout. Access is provided to

the river by numerous road crossings and dead end roads on National Forest land. Fishing pressure within the project area is considered moderate. A limited amount of dispersed camping occurs in the area, mainly associated with hunting and fishing.

The 23.6 miles of North Branch Oconto River above Highway 32 in Oconto County are considered Class I trout waters (WDNR, 2002). The proposed project is located in this section of river. Class I trout streams support, or have the potential to support self-sustaining populations of brook trout at or near carrying capacity and need no stocking supplements. These tend to be the premier trout streams.

3.6 THREATENED, ENDANGERED AND SENSITIVE SPECIES

No analysis of impacts to gray wolves or Canadian lynx is necessary because the project area does not contain habitat suitable to wolves or lynx, (Anderson in McCaslin EIS, 2003). Habitat within the North Branch Oconto River Project Area is considered suitable for bald eagle. Bald eagles are known to utilize the area above Hemlock Dam for foraging. The closest eagle nest site is just over one mile away. There are large areas of adequate foraging habitat near the nest. With the removal of Hemlock Dam the water surface area will be reduced by about 1/3, but the reduction in eagle foraging habitat should be negligible. The fish community will likely change from a warm water fishery to a cool water fishery, this change may reduce the amount of forage for bald eagles in the area one mile upstream of Hemlock Dam. Limiting factors for eagle include large, usually super-canopy trees near lakes and large rivers, and lakes or rivers with adequate fish forage.

Habitat within the North Branch Oconto River Project Area is considered suitable for northern goshawk *(Accipter gentiles)* and red-shouldered hawk *(Buteo lineatus)* Surveys for raptors were done in the vicinity of the projects in 2002/2003 for the McCaslin EIS. One Red Shouldered Hawk nest was located in the area. A professional raptor biologist was contacted for an opinion on if the activity from this project would need to be mitigated. The issue of timing was discussed, if the nest stays where it is there wouldn't be any negative impact to it from the noise of heavy equipment (John Jacobs, personal communication). Additional broadcast surveys will be completed in spring of 2004 to see if there is a nesting territory in the immediate work area for projects 1-3.

If these species were to occupy habitat in the project area during project implementation, direct effects on northern goshawk and red-shouldered hawks could potentially cause a loss of young or nest abandonment as a result of disturbance associated with project. Habitat is considered good at Project Sites 1-3. Indirectly, reducing the width of the stream could eventually allow the canopy to enclose slightly along the North Branch Oconto River, thus improving closed canopy conditions preferred by these species.

If either goshawk or red-shouldered hawk (RSH) nests were found prior to or during project implementation, Forest Plan standards and guidelines would be implemented and protect nesting sites by establishment of a 20 acre no entry zone around the nest tree according to the Chequamegon-Nicolet Land and Resource Management Plan (LRMP, 2004). No adverse effects are anticipated on this species so long as nest sites are discovered prior to project implementation.

Butternut (*Juglans cinerea*) occurs in the project area and goblin fern (*Botrychium mormo*) is known to occur a ¼ mile from the project area. In the project area, potentially suitable habitat also exists for Missouri rock cress (*Arabis missouriensis var deamii*), blunt-lobed grapefern (*Botrychium oneidense*), ginseng (*Panax quinquefolius*), small yellow water-crowfoot (*Ranunculus gmelinii*), and American elm (*Ulmus americana*). No locations for these species were identified during surveys in 2003. These surveys were conducted in suitable habitat that may be impacted by project activities.

Zebra clubtail (*Stylurus scudderi*) have been documented on the North Branch Oconto River near Bagley Rapids. A forest wide inventory for three of the Forests Regional Foresters Sensitive Species dragonfly species was conducted by Kurt Schmude, Ph.D., Lake Superior Research Institute, in conjunction with the WDNR and the Chequamegon-Nicolet National Forest. The species included in this survey were: Green-faced clubtail (*Gomphus viridifrons*), Extra-striped snaketail (*Ophiogomphus anomalus*) and Pygmy snaketail (*Ophiogomphus howei*). This survey included several sites on the NB Oconto River, including Knowles Dam. These sites were surveyed between 6/13-6/16 2003. None of the three additional RFSS dragonfly species were found. Although the survey targeted the 3 species listed above, all species were collected and identified. Zebra Clubtail was not collected at the site during the 2003 survey.

3.7 NON NATIVE INVASIVE SPECIES

Non-native invasive species (NNIS) sometimes referred to as "exotic" species, have not been verified within any of the project sites. However, reed canary grass is present at other sites within the watershed and has been used in the past to stabilize stream banks. Reed canary grass prefers fertile, moist organic soils that are in full sunlight. Purple loosestrife is another NNIS that has invaded wetlands throughout the state. This plant's optimal habitat includes marshes, stream margins, alluvial flood plains, sedge meadows, and wet prairies. To date, purple loosestrife has not been documented within this watershed although it is likely to be present.

CHAPTER 4 ENVIRONMENTAL EFFECTS

4.0 INTRODUCTION

This section displays the potential environmental effects of implementing the alternatives. The analysis primarily concentrates on the concerns of Forest Service managers and environmental issues raised by the public that are related to the purpose and need for the proposal and the proposed action. The environmental effects section considers direct, indirect and cumulative effects, and evaluates these effects as they relate to physical, biological, economic and social factors.

The purpose of the environmental effects section is to disclose the environmental consequences of the Action and No Action alternatives. This section gives each Forest Service decision maker sufficient information for selecting and implementing an alternative or combination of alternatives. It also allows the decision maker to make a finding as to the need for preparation of an environmental impact statement.

4.1 HYDROLOGY AND AQUATIC ORGANISMS

Under natural conditions, a stream system is in a state of dynamic equilibrium. A stream channel has developed over time by adjusting to changes in climate, flow regimes, sediment inputs and vegetative influences. Land management activities can upset this balance by directly impacting the stream channel or adjacent streambanks. For example, historic logging within the analysis area scoured and input additional sediment in the stream channels. Stream channels that are out of equilibrium would exhibit varying degrees of bank cutting, channel scour, sediment deposition and channel braiding.

Fish populations and habitat are directly, indirectly and cumulatively associated with the water resources in the area. Direct impacts are associated with activities within stream channels and/or riparian areas. Indirect impacts are associated with activities outside of riparian areas. Water quality, in particular sediment levels, is affected by soil disturbance, vegetative cover changes and stream channel alteration. The surface area exposed to solar radiation and the flow velocity primarily affects water temperature in the project area.

4.1.1 Alternative 1 No Action

Direct, Indirect, & Cumulative Effects

The proposed stream restoration project would not occur under alternative 1. However, natural climactic conditions and changes in vegetation would continue to occur, with a corresponding change in hydrologic conditions. Natural events outside the normal cycle do occur however, and may lead to stream changes beyond the normal short-term fluctuations. For example; unusually high levels of snow or rain may result in higher

than average peak flows; or higher than average winds may result in wind thrown trees in the channel. If timing and duration were critical, aquatic insect populations and ultimately, fish populations would be affected. Over time through natural recovery processes, the stream would return to a state of equilibrium.

4.1.1.1 Stream morphology

Stream channel morphology would continue to be out of natural equilibrium because of the ponding caused by the remnant dams. Width/depth ratios would remain above natural conditions at about 44 and natural sediment transport would continue to be disrupted. Bank erosion and channel deposition would continue to be higher with a corresponding reduction in habitat for aquatic species.

4.1.1.2 Water Quality

Maximum summer water temperature in North Branch Oconto River would not be reduced with this alternative and would remain in the range of 26 to 29°C. Therefore, the coldwater community, particularly brook trout, would continue to be negatively impacted and the populations would not reach the natural potential for these streams.

4.1.1.3 Aquatic Biota

Under the No Action alternative, the fisheries communities within the project areas would continue to shift away from a cold/cool water community to a warmwater community dominated by northern pike, white suckers and other warmwater species. Brook trout habitat within the impoundments would continue to degrade resulting in a continued decrease in trout density.

In the long term the dams would still be impounding two miles of river resulting in increased water temperatures and degraded habitat for brook trout (MIS) and associated cold/cool water community.

4.1.2 Alternative 2 Proposed Action

Direct, Indirect, & Cumulative Effects

4.1.2.1 Project 1 Hemlock and Knowles Dams removal and channel restoration

4.1.2.1.1 Stream Morphology

Stream channel morphology is the ultimate integrator of hill slope and stream channel responses (upland erosion, runoff, and large woody debris inputs) to land management activities within a drainage basin. Therefore, it is the primary indicator of water resource effects. Rivers undergo a consistent series of channel adjustments over time to accommodate changes or alterations in their driving variables (Rosgen, 1996). North Branch Oconto River is responding to the past logging disturbances and remnant logging dams within its watershed by widening and becoming shallower. This project would attempt to move these channels closer to their natural un-impacted state by making them much narrower and deeper. The natural channels that most likely occurred on these sites were very stable channels that moved water and sediment very efficiently. The “new” channels should mimic these characteristics.

Removing the dams would lower the water level in the impounded areas, which appear as wide, flooded stream channels. This lower water level would increase velocity and also expose banks, which would quickly re-vegetate. A new stream channel would form in the existing channel and sediments in the impounded areas over time. The new stream channel should respond to the slope of the valley and laws of physics as it down cuts to the original streambed elevation. With higher stream velocity, fine sediments in the old channel would go into transport, but some of these sediments would be trapped on point bars and by vegetation at the edges of the streams, particularly during high flow periods. Over time, this process would lead to a narrower, deeper channel. This would reduce the erosion potential and improve stream stability significantly. There would be an absence of large woody debris in the newly formed channel for many decades, as no trees exist within the bounds of the impoundment now. Therefore the stabilizing effects of this wood would also be absent.

4.1.2.1.2 Water Quality

The actual dam removal (i.e., the rock sills and portions of the earthen dikes) would create very little disturbance or impact water to quality. However, as the new channel forms upstream in the old impounded channel, sediment would be mobilized possibly reducing water quality downstream. Some of this sediment would be trapped within the channel to help narrow it but some would move downstream. Mitigation for mobilizing this sediment would be to utilize the plunge pools below the Hemlock and Knowles Dams to trap sediment.

The plunge pool below the Hemlock Dam would be cleaned out before lowering the channel downstream. The plunge pool below Hemlock Dam can hold approximately 480 yd^3 of sediment. Natural annual suspended sediment yields for the North Branch Oconto River at the Hemlock Dam site were estimated to be 500 yd^3 (Hindall 1976). It is estimated that an additional 18,500 yd^3 could be mobilized as the new channel forms in the old impoundment area. Additional sediment could also be mobilized if a large rain event occurred prior to the exposed streambanks revegetating. The chances of this occurring are slight because the water level will be lowered in two steps exposing only a portion of the bank at each time. It is impractical or impossible to try to trap all the sediment that would be mobilized from the dam lowering. Therefore, the plunge pool below Hemlock Dam would be cleaned out prior to lowering the stream channel below the dam, and possibly one additional time. This would trap the initial flush of sediment that comes out of the impoundment area. However additional sediment would be transported past the plunge pool and travel downstream. This sediment would have some negative affect on water quality downstream. The North Branch Oconto River watershed is located in the northern highland province, which has the lowest average annual suspended-sediment yields in the state (Hindall, 1976). Large areas of heavy forests, very little crop farming, and gentle topography all combine to keep yields low (Hindall, 1976).

Stream water temperatures should be moderated in the impoundment areas and downstream with this alternative to a maximum of less than 26°C. There will be less water surface area exposed to direct sunlight. Therefore summer maximum temperatures should be lower and winter temperatures higher.

4.1.2.1.3 Aquatic Biota

Fisheries

Following the entire dam sill removal, there would be an annual progression to a narrower and deeper stream channel in the impounded areas above Hemlock and Knowles Dams. The restoration of a river channel should result in the moderation of water temperature and improved channel habitat. This in turn should positively affect brook trout and associated cold and cool water communities. There should be a shift in community dynamics with a higher percentage of brook and brown trout and reduced numbers of white sucker and northern pike. Following the completion of the entire project there would be a substantial increase in the numbers of adult brook trout, in response to the restored habitat.

Invertebrates

The impoundment areas have a substrate dominated by sand and silt. The sanded over areas are relatively void of invertebrate species. The silt-laden portions of the stream support primarily Gammarus and species of the chironomidae (midge) family. Up and downstream of the impounded channels, the riverine substrate is a mix of boulder, cobble, gravel and sand. The invertebrates that reside in this area are dominated by species, which require good water quality and also are excellent sources of trout food. These higher water quality invertebrates are dominated by three orders of insects often referred to as the EPT community (i.e., Ephemeroptera, Plecoptera, Trichoptera) plus a few dipteran species and Gammarus. Because of the sand/silt substrate, the higher water quality indicator invertebrates are generally poorly represented in the impounded channel areas.

The invertebrate species in the impounded areas are expected to decrease substantially following the draw down as deposition areas become exposed. However invertebrate numbers are expected to progressively recover and eventually exceed former levels as the coarser more productive substrates become exposed. After recovery the species composition will remain relatively the same but the EPT community along with other better water quality species will dominate the invertebrate biomass.

4.1.2.2 Project 2 Improvement of instream habitat

4.1.2.2.1 Stream Morphology

Stream channel morphology is the ultimate integrator of hill slope and stream channel responses (upland erosion, runoff, and large woody debris inputs) to land management activities within a drainage basin. Therefore, it is the primary indicator of water resource effects. Rivers undergo a consistent series of channel adjustments over time to accommodate changes or alterations in their driving variables (Rosgen, 1996). North Branch Oconto River is responding to the past logging disturbances within its watershed by widening and becoming shallower.

This project would attempt to move these channels closer to their natural un-impacted state by adding habitat components that are currently missing. Placement of rocks and logs in the ½ mile section below Hemlock Dam and the ½ mile segments above and below Knowles Dam would help to narrow and deepen the channel and restore cover and habitat complexity.

4.1.2.2.2 Water Quality

Project 2 would require a tracked excavator to operate within the stream channel for the purpose of placing the boulders and logs into the desired locations. Water quality would also be temporarily impacted negatively, as accumulated stream sediments are disturbed during the excavation process and for a few days after the instream work is finished. Fish and other instream organisms downstream of the project area may be stressed during this period. Long term turbidity and sedimentation would be reduced with this alternative, as these channels would approach a more stable form.

Short temporary spur trails would be used at both dam sites to access portions of the river with heavy equipment to accomplish the necessary work to complete the projects. Appendix E lists the Best Management Practices that would be applied to these trails. BMPs are designed to limit the degree of disturbance to soils, stream channels and riparian areas.

4.1.2.2.3 Aquatic Biota

Fisheries

The proposed stream channel restoration would result in improved habitat for brook trout. The improved habitat would consist of narrow and deeper channels with greater instream complexity consisting of large woody debris and boulder. Similar projects done within similar watersheds have demonstrated a substantial increase in adult fish (over 7 inches long) and a moderate decline in the younger trout age groups (Brum, 2001). Even with a small decline, the numbers of younger trout will be more than adequate to support a viable fishery, especially when complemented by recruits from the outside area. The increase in pool depth would create better over winter habitat for adult fish. The instream project work would most likely occur between late June/early July and late August. Since brook trout lay their eggs in fall, usually October or November, project generated sedimentation would not impact trout eggs.

It is expected that there may be slight changes in the forage fish community composition. The projects would enhance habitat and water temperatures that favor cool water communities. There may be a decrease in the number of fish species found or the numbers of those species could be reduced.

Invertebrates

The substrate below the impounded areas is dominated by rubble and gravel. The invertebrates that reside in this area are dominated by species that require good water quality and also are excellent food sources for trout. These species are dominated by three orders of insects often referred to as the EPT community (Ephemeroptera, Plecoptera, Trichoptera). The placement of LWD and boulders would provide additional habitat for these species. See section 4.1.2.1.3 for discussion of invertebrates within the impounded area.

With the decrease in sedimentation and the addition of coarse substrate materials (logs and boulders), an indirect effect should see a greatly enhanced invertebrate population. Another indirect effect would be a slight increase in overall water quality as a result of the increased number of invertebrate filter feeders.

4.1.2.3 Project 3 Campsite obliteration and relocation

Knowles Dam: on the north side of the river is a campsite on top of the grade immediately adjacent to the river. This campsite is small in size and drops off steep on three sides. This site would be removed due to public safety concerns and erodible soils being deposited into the river. The bank would be pulled back from the river 20-50 feet to reduce erosion and recreate the historic flood plain. The existing toilet facility would be removed and relocated in a nondescript location within easy walking distance of the dispersed campsite out closer to Knowles Creek Road.

On the south side of the river there are two dispersed campsites. The one furthest to the east (downstream, next to river) will be obliterated by scarification and tree/boulder placement and relocated approximately 50 yards from the river on the first elevation bench. Temporary trails will be used to access the sites with heavy equipment.

4.1.4 Cumulative Effects on Hydrology and Aquatic Organisms

Past Actions

Logging activity began in the area in the 1880's. White pine trees were cut and skidded to rivers and streams by oxen or horses. The dams where capable of regulating water flows and logs were driven down the streams with the flush of water. Given the dimensions of the impoundments, the flush of water when the dams were opened up was equivalent to a very large flood event, probably equal to or in excess of a 200-year return interval on these streams. The scouring action of the water along with the logs had devastating effects on the stream channels. As the pine was depleted near the streams, and more hemlock and hardwoods were cut, temporary logging railroads were built to carry the logs to the streams or directly to main railroads. These railroads were frequently built in the floodplains of streams constricting the stream channels. This new efficiency in logging practices allowed large forested areas to be harvested in the late 1800s to early 1900s. The result was vast areas of land being cleared. This undoubtedly increased the amount of sediment that was transported to stream channels.

Present Actions

Many of these historic effects are still evident in the analysis area today as the stream channels are much wider and shallower than they were historically. The management activities proposed in Alternative 2 would restore two miles of river and result in long-term positive benefits to the hydrology and aquatic resources.

There are no known actions presently taking place within this project area that would have measurable effects on the soil resource. Alternative 1 does not propose any new actions. Alternative 2 proposes actions that would include some ground disturbing activities. Most of the actions would occur on previously disturbed land, such as earthen dams, scoured stream banks, existing roads, and campsites. Assessment of potential direct and indirect impacts from activities proposed in Alternative 2 indicates that no appreciable short or long-term detriment to hydrology or aquatic organisms would be expected. A site specific design features and mitigation measures would eliminate or minimize potential adverse impacts from sedimentation.

Future Actions
At this time no other specific actions are planned within this project area that would adversely affect the hydrology or aquatic organisms resource. All future proposed actions on federal lands would be subject to environmental effects analysis and any project implementation would follow a site specific design criteria and mitigation measures that would minimize potential adverse impacts.

Conclusions
The effects of implementing Alternative1 or 2 when added to the effects of past, present, and reasonably foreseeable actions would not be expected to result in appreciable adverse cumulative effects to the hydrology and aquatic organisms.

4.2 VEGETATION

Vegetation disturbance would impact mostly alder. Alder root systems would not be damaged, thus following the completion of the project the alder would recover. Long term the river riparian area above Hemlock Dam will likely revert from a grass meadow to more tag alder and tree species as the area dries out and once again becomes suitable for trees as it was before the dam was built.

The south access would require the use of approximately 200-feet of old closed road and would require the removal of a few smaller diameter trees. This access would not be a road, but a cleared path to permit equipment and materials into the stream.

The relocation of the campsite on the south side of the river at Knowles Dam would be a separate project. Tree removal will be minor, re-vegetation of soil will occur immediately after the equipment is done working. Natural vegetation should fill in the old campsite and re-establish riparian vegetation.

4.3 SOILS

4.3.1 Alternative 1 No Action

4.3.1.1 Project 1 Hemlock and Knowles Dams removal and channel restoration
No new upland soil disturbance would occur with this alternative. Some riverbank erosion and sedimentation would continue to occur associated with the remnant dams.

4.3.1.2 Project 2 Improvement of instream habitat
No new upland soil disturbance would occur with this alternative. The river channel would remain in its present condition with the remnant dams still in place. Seasonal flooding of the channel banks above the dams would continue to cause some bank erosion and stream sedimentation.

4.3.1.3 Project 3 Campsite removal and relocation
No new upland soil disturbance would occur with this alternative. Foot traffic would continue to accelerate erosion and sedimentation from the sandy bank near the dispersed campsite on the north side of Knowles Dam.

4.3.2 Alternative 2 - Proposed Action

4.3.2.1 Project 1 Hemlock and Knowles Dams removal and channel restoration

This project would expose mineral soil on both sides of the river at the remnant dam sites. Upland soil disturbance is primarily associated with removal and re-contouring of remaining portions of the constructed earthen dam materials. The removal of the rock sills at Hemlock and Knowles Dams would also involve digging the cobbles and gravels from the stream bottom and armoring the sides of the channels with this material. The disposal of sediments removed from the plunge pool below Hemlock Dam would also impact upland sites. Access to these sites for heavy equipment would be from existing roadbeds with short temporary spur trails developed where necessary to enter the river. Heavy equipment could potentially cause soil compaction or displacement on these temporary trails.

The removal of Hemlock Dam would occur in two stages with an excavator, allowing the water level to be lowered slowly, reducing potential for erosion of riverbanks. Access would be from the existing road and boat landing north from FR 2598. Thirty to fifty feet of the north earthen dike would be removed, along with most of the south earthen dike. The exposed soil of the reshaped stream banks would be stabilized from erosion by armoring with erosion matting, seeding to a non-invasive annual ryegrass, cobbles and natural re-vegetation over time. Excess earthen dam materials and sediments would be disposed of in existing borrow pits or on the existing roadbed and would not adversely affect productive upland soil.

The removal of Knowles Dam is planned to occur in one stage. Access for heavy equipment would be from existing FR 2598 for the south side and the old grade off of FR 2349 on the north side of the site. The heavy equipment would snake through the woods adjacent to the dike when the soil surface is dry to avoid potential rutting and compaction by heavy equipment. This would be a temporary access route and would be obliterated once the project is completed. The re-shaping and armoring of the stream bank with cobble from the streambed would minimize the potential for erosion, while the exposed soil re-vegetates. Boulder placement on top of the grade on the north side would guide foot traffic to minimize future erosion of the bank. Excess earthen dam materials and sediments would be disposed of in existing borrow pits and would not adversely impact productive upland soils.

Design features in Appendix E further identify measures that will be implemented to minimize potential adverse effects from soil disturbance as a result of this project. Heavy equipment would be operated when the ground is dry to minimize potential for rutting and compaction. Seeding, mulching and erosion control matting would be applied to disturbed sites as needed to minimize potential erosion.

There would be no short or long-term detrimental soil disturbance effects from erosion, compaction or displacement on project sites or adjacent areas, when design features and mitigation measures are followed.

4.3.2.2 Project 2 Restoration of in-stream habitat

This project would expose mineral soil when reconstructing stream banks and would impact soil on the short trails used by heavy equipment to access the river. The majority

of heavy equipment operation during implementation of these projects would occur within the stream channel itself.

The proposed channel enhancements on North Branch Oconto River would involve placing or repositioning trees, and boulders and on a smaller scale digging sediment from the stream bottom and constructing new banks with this material. The newly established stream banks would be prone to erosion if a high water event occurred during or shortly after construction activities are completed. As a mitigating measure to reduce this erosion potential, matting may be used along with seeding an annual grass on the banks immediately after their establishment.

Several (2-3) temporary trails would be located to access the proposed project locations. These trails would be constructed to the minimum standards necessary to provide access. They would be completely rehabilitated and seeded with a native or non-invasive grass/rye mix after their use. As a mitigating measure to minimize potential rutting and compaction of these trails, heavy equipment would be operated only when the ground is dry and firm.

There would be no short or long-term detrimental soil disturbance effects from erosion, compaction or displacement on project sites or adjacent areas, when design features and mitigation measures are followed.

4.3.2.3 Project 3 Campsite removal and relocation

A dispersed campsite would be closed and rehabilitated on the north side of the Knowles Dam site. Compacted soil on the site would be broken up with hand tools and seeded or allowed to re-vegetate naturally. Boulders and whole trees would be placed to discourage use.

A dispersed campsite on the south side of Knowles Dam would be closed and rehabilitated by scarification, seeding, and placement of trees or boulders to discourage use. A new site would be established on level ground further from the river to replace this site. Some soil disturbance would occur to develop the new campsite when removing vegetation or boulders. This activity would not contribute to erosion, the site would then be dedicated to use for camping and the soil would be compacted from this use.

Temporary trails would be used by equipment needed to close the two existing campsites and develop the new campsite. These trails would be constructed to the minimum standards necessary to provide access. They would be completely rehabilitated and seeded with a native or non-invasive grass mix after their use. As a mitigating measure to reduce minimize potential rutting and compaction of these trails, heavy equipment would be operated only when the ground is dry and firm.

There would be no short or long-term detrimental soil disturbance effects from erosion, compaction or displacement on project sites or adjacent areas, when design features and mitigation measures are followed.

4.3.3.4 Cumulative Effects on Soils

Past Actions

Numerous historic natural and human caused ground disturbing events, such as, windstorms, exploitive logging and associated fires, stream log drives, and road and railroad building have taken place in and around the project area. While these events have influenced the existing condition of the soil resource, there are no known adverse residual impacts to the soil as a whole. A low percentage of land has been taken out of productive soil and dedicated to use as roads, railroad grades, campsites, and earthen dams, while the long-term productivity of the land has been maintained for the majority of area surrounding these project sites.

Present Actions
There are no known actions presently taking place within this project area that would have measurable effects on the soil resource. Alternative 1 does not propose any new actions. Alternative 2 proposes actions that would include some ground disturbing activities. Most of the actions would occur on previously disturbed land, such as earthen dams, scoured stream banks, existing roads, and campsites. Assessment of potential direct and indirect impacts from activities proposed in Alternative 2 indicates that no appreciable short or long-term detrimental soil disturbance would be expected. Site-specific design features and mitigation measures would eliminate or minimize potential adverse impacts from erosion, displacement or compaction.

Future Actions
At this time no other specific actions are planned within this project area that would adversely affect the soil resource. All future proposed actions on federal lands would be subject to environmental effects analysis and any project implementation would follow site-specific design criteria and mitigation measures that would minimize potential adverse soil resource impacts.

Conclusions
The effects of implementing Alternative1 or 2 when added to the effects of past, present, and reasonably foreseeable actions would not be expected to result in appreciable adverse cumulative effects to the quality of the soil resource.

4.4 WILDLIFE

Fish and aquatic organisms are covered under the hydrology and aquatics section.

The effect of these projects on the wildlife and fisheries community will vary with respect to the individual needs and sensitivities of the various types of wildlife in the affected habitat. Protection of riparian areas, streams, lakes and wetlands follow Wisconsin's Forestry Best Management Practices for Water Quality guidelines, otherwise known as BMPs (Wisconsin Department of Natural Resources, 1995).

A raptor (hawk) specialist has been contacted and response calls will be made in the spring of 2004 to determine if any sensitive raptors have set up new nesting territories in the immediate vicinity of Hemlock and Knowles Dams. If a new territory is established, the USFS will consult with a raptor specialist to determine what actions need to occur to protect this territory. One way to mitigate impacts would be to delay activity until after July 4.

Turtles are known to nest on the north bank at Knowles Dam. Since construction activities would occur on this site during the time turtle eggs are still incubating underground, a silt fence would be placed around this eroding riverbank in late April to early May 2004. This would discourage turtles from nesting on this site in 2004 when earth moving would occur. This is also a requirement by the Wisconsin Department of Natural Resources in order to receive a permit to conduct this project. This bank would be monitored immediately prior to earth moving to ensure no turtles are present.

For the purpose of this discussion, the phrase "short term" relates to the period within the next ten years. The phrase "long term" relates to a period greater than ten years into the future.

4.4.1 Management Indicator Species

Every action affecting forest vegetation or water resources affects fish and/or wildlife. Management Indicator Species (MIS) were identified in the Chequamegon-Nicolet National Forest during the Forest planning process to determine the effects of forest management activities (FEIS pp. 3-33 through 3-37). Effects to Brook Trout are discussed under the Hydrology and Aquatic Organisms Sections 4.1.2.1.3, 4.1.2.2.3, and 4.1.2.3.3.

4.4.2 Alternative 1

This alternative would have little or no impact to terrestrial wildlife species. Effects to aquatic organisms are discussed under the Hydrology and Aquatic Organisms Section.

4.4.3 Alternative 2

Under this alternative, the project would be implemented as described in the proposal. While implementing Alternative 2 no direct impacts to individual wildlife species are anticipated but could occur to some amphibian and reptile species. Short term, a small number of species would be affected by the proposed activities, (see below).

4.4.3.1 Project 1, Site 1 and 2

The three projects described in Alternative 2 would likely have a direct or indirect impact on some wildlife and fish and their associated habitats. Specifically, wildlife associated with slow moving or stagnant water, or saturated bog-like conditions would be most affected. Typical species that would inhabit this area include: Bald eagles, osprey, waterfowl such as wood duck, mallard, hooded merganser, also muskrats, and songbirds such as red-winged black birds and song sparrows that would frequent small open wet meadows. Additionally, other wading birds such as great blue heron and green-backed heron also frequent these areas, to forage on fish and frogs. Once the impounded areas are restored back to a more stream-like system, fewer of the above listed species would occur here, and some would likely move on to areas where habitat is more suitable. Because the impounded areas are small, it is likely that only an individual territory or two would be affected.

4.4.3.2 Project 1, Site 1 - Hemlock Dam

This project would include a small area of upland ground disturbance to allow access for equipment into the stream. Ground disturbance would be minimized by operating

equipment on it during dry ground conditions and allowing a low number of entries. Materials would also need to be stored on the uplands adjacent to the stream, and these would be placed in existing open areas like the boat access and would include approximately 75 boulders and miscellaneous equipment and supplies. Wildlife that inhabits the riparian edge could be temporarily displaced; such species as songbirds and various small mammals could be affected.

4.4.3.2 Project 1, Site 2 - Knowles Dam

Upland disturbance impacts would be identical to those described above with the following exceptions. The north access would be on an existing woods road. The south access would require the use of approximately 200-feet of old closed road and would require the removal of a few smaller diameter trees. This access would not be a road, but a cleared path to permit equipment and materials into the stream. The access would be closed upon completion of the project. Wildlife that might be impacted by this portion of the project would include woodland songbirds, reptiles (turtles) and small mammals.

4.4.3.3 Project 2 – Restoration of instream habitat

This activity might temporarily displace wildlife species that utilize the river and riparian area in the immediate vicinity of the activity. Short term there would be a noticeable change in the physical habitat of the river. This physical change would benefit wildlife species by creating deeper water for foraging and for escaping predators. Boulders and logs used to enhance the physical conditions of the river would create basking, foraging and loafing areas for reptiles (turtles), amphibians, furbearers, and wading birds. Long term the river and the riparian areas physical characteristics would revert back to what they were before the dams were built.

4.4.3.4 Project 3 – Campsite obliteration and relocation

The campsite that will be obliterated on the north side of Knowles Dam would be removed during the removal of Knowles Dam so there would be no additional disturbance or impacts to wildlife during this part of project 3. The relocation of the campsite on the south side of the river at Knowles Dam would be a separate project and would temporarily displace songbirds and small mammals. Tree removal and soil disturbance will be minor, re-vegetation of soil will occur immediately after the equipment is done working. Short term, this activity may benefit wildlife species that utilize the river and shoreline, as there should be slightly less human disturbance after pulling the campsite away from the river. Long term, the soil should become less compacted due to freeze thaw cycles and other activities. Natural vegetation should fill in the old campsite and re-establish riparian vegetation.

4.4.4 Cumulative Effects on Wildlife

4.4.4.1 Past Actions

Generally, timber harvesting and occasional fires in the early 1900's removed a high proportion of the existing forest cover. Management activities such as timber harvesting, site preparation, opening improvement, stream improvement, road closures and various levels of road construction and reconstruction have occurred within or near the project

area in the recent past. On nearby private land, past practices have included timber harvesting, land clearing, and the development of permanent and summer homes.

Disturbances caused by past practices could have resulted in cumulative effects on fish and wildlife resources and habitats. Past actions impacting wildlife and fisheries that can still be observed on the landscape include: stream and wetland sedimentation, loss of, or greatly diminished old growth habitat, introduction of exotic plants and animals, and introduction of non-native diseases, as well as the loss of native plants and animals. The effect of these impacts on wildlife and fish has resulted in the decline of some key habitat components that typically could have provided food, cover, or specific habitat niches. Other effects of past management activities would include animal and plant populations existing today at disproportionate levels as compared to earlier times. Typical examples of some of these changes include loss of American elm and butternut, the introduction and spread of rusty crayfish, Eurasian water milfoil, spotted knapweed and other non-native animals and plants. An example of change in forest wildlife can be seen in the extirpation then reintroduction of the fisher.

4.4.4.2 Present Actions

The short-term effects previously discussed in the sections above would probably occur under only one action alternative if that particular alternative were implemented. The McCaslin Environmental Impact Statement (EIS) is a federally initiated project being proposed within this area. It includes fish and wildlife habitat restoration, timber sales, and road construction and reconstruction. None of the timber sales or roadwork will impact water quality within this project area.

Cumulatively, if the projects in alternative 2 – proposed action, are implemented, a large portion of the North Branch Oconto River watershed could gradually be improved, with more and more sections of streams becoming less silted, cooler and the overall carrying capacity of numerous species of fish and wildlife increased.

4.4.4.3 Future Actions

The McCaslin EIS has identified several projects that when completed will positively increase the fish and wildlife carrying capacity of the local habitat. The cumulative impacts of continuing to restore cool water stream habitat would be mostly positive as sources of sedimentation are reduced or eliminated. If the no action Alternative is taken, then some deterioration of habitat would continue, and stream recovery would be delayed. Habitat for some cool water species would also deteriorate.

4.5 RECREATION

4.5.1 Alternative 1

In this alternative, slight effects on recreation would be anticipated if no work occurs. The indirect effect of bank erosion at Knowles Dam would continue to degrade fish habitat and reduce the amount of trout available for anglers. High temperatures caused by both dams would remain a limiting factor on cold-water fish production.

4.5.2 Alternative 2

As stated in the previous sections, the proposed activities would be expected to increase trout populations and increase the number of larger adult fish (see sections 4.1.2.1.3 and 4.2.2.2.3). This should also result in an increase in the quality of recreational fishing in the area. Some short-term disturbances to recreational fishing would occur while these project activities occur. These include increased turbidity a short distance from project work sites and heavy equipment noise in the area. However, most recreational trout fishing occurs on weekends or in dawn/dusk time periods. Since these preferred fishing times are not when most project activities would occur (weekdays), these projects should have limited negative effects on recreational fishing in the short term.

The relocation and obliteration of campsites will displace a very small number of forest users. It should be mentioned that the reason for these actions is because these campsites are causing resource damage. This activity will have a positive cumulative affect on reducing resource impacts.

4.6 ENDANGERED, THREATENED AND SENSITIVE SPECIES

4.6.1 Federally Endangered, Threatened, and Proposed Species for Listing, and Regional Forester's Sensitive Species

The effects of the Proposed Federal Action and its alternatives on Federally Endangered, Threatened, and Proposed Species and the Regional Forester's Sensitive Species are presented in a separate document entitled "Biological Evaluation for the North Branch Oconto River Watershed Health Improvement Projects" which is located in the project file. Appendix F, titled "Species Considered and Likely to Occur", provides a list of the species considered in this evaluation and includes their local and global status. This document also considers species in which habitat may be suitable, although the individual species may or may not have been located either on the forest or within the target habitat. Appendix G, titled "Determination of Effects", describes potential effects of the projects on all species thought to utilize habitat within or near the project area. The biological evaluation is not included with this document because it may contain site-specific location information that if made available to the casual forest user, could result in adverse effects on listed species or their habitats. This document is available upon request.

Data used to evaluate potential project impacts on federally listed species and the Regional Forester's Sensitive Species were derived from district records and survey data; the Wisconsin Department of Natural Resources (WDNR) Natural Heritage Inventory; available research literature; and personal communication with relevant specialists. A summary of the findings of the Biological Evaluations is described below.

4.6.2 Federally Endangered, Threatened, and Proposed Species

(Reference Table 1. Appendices F & G)

For each alternative, including direct, indirect and cumulative effects, the results of the Biological Evaluation for the North Branch Oconto River Watershed Health Improvement Projects has determined a finding of "No Effect" on any of the Federally listed species identified in Table 1., Appendix G.

Design features: Forest-wide standards and guidelines are in place for management of bald eagles should this species be located at a later date following project implementation.

4.6.3 Regional Forester's Sensitive Species

(Reference Table 2. Appendices F & G)

Mitigation measures are described below, in the likelihood that any of these species listed in Appendix E are found during project implementation.

- Mitigation measures for goshawk and red-shouldered hawk: none are needed for Alternative 1. If Alternative 2 is selected, Forest Plan standards and guidelines are in place for management of northern goshawk and red-shouldered hawks, which requires maintaining a no activity zone of approximately 20 acres around the nest site in addition to seasonal activity restrictions.

For species identified in Table 3., Appendix G titled " Regional Forester's Sensitive Species - Likely To Occur", the Biological Evaluation has determined a finding of "May impact individuals, but not likely to cause a trend to federal listing or loss of viability for butternut and American elm. An individual butternut tree will be removed during the removal of the north portion of the grade at Knowles Dam. American elm saplings may be present in the riparian zone and may be impacted by heavy equipment. The remaining species identified in this table have been given a determination of "No impact". Goblin fern is known to occur within a ¼ mile of the project area, but no individuals or habitat will be impacted by project activities.

- Design features for RFSS plants Likely to Occur: Whenever possible, avoid cutting or damage to butternut and American elm.

4.7 NON NATIVE INVASIVE SPECIES

4.7.1 Alternative 1

No actions would be implemented at any of the project sites therefore NNIS spread would not be affected by project activities.

4.7.2 Alternative 2

Under this alternative, ground disturbance would create exposed soil conditions that could provide germination sites for NNIS species. A NNIS seed source would have to be present however, for colonization to occur. In the past, earth-moving equipment contaminated with seeds of NNIS brought from other work locations have been known to spread NNIS to new locations. Seeding of newly disturbed sites to prevent erosion has also been identified as a method of introducing and spreading NNIS, since seed sources are often contaminated with NNIS. The following design features would help minimize the risk of spreading NNIS:

- To reduce the risk of accidental transport and spread of NNIS into the project area, machinery and equipment would be steam cleaned or power washed before moving to the worksite.

- In order to reduce the risk of spreading NNIS, annual ryegrass or winter wheat would be used as "nurse crop" to temporarily stabilize banks until native species become established on these disturbed soils.

4.7.3 Cumulative Effects Regarding NNIS

Past management activities, including land use practices implemented prior to Forest Service ownership, that have occurred in the vicinity of the project area include, logging, fisheries management and transportation system development. Each of these activities could have played a role in the establishment of NNIS species in the area. Although much of the discussion above focuses on plant species, the North Branch Oconto River has populations of brown trout, which was introduced into Wisconsin streams as far back as 1887 (Becker, 1983), and is therefore not native. The activities proposed under Alternative 2 will improve habitat for brown trout, but the types of improvements are intended to favor the native brook trout.

The management activities proposed in Alternative 2 will not result in appreciable effects on NNIS because appropriate design features have been identified.

The potential for adverse effects resulting from the possible introduction of NNIS species from either mechanical site disturbance or seeding is low. Activities similar to those proposed in Alternative 2, if continued into the foreseeable future, should not contribute to the introduction of NNIS so long as the appropriate design features are implemented.

4.8 TRANSPORTATION

4.8.1 Alternative 1

In the long term, continued failure to address the erosion at the access site to Hemlock Dam and the sandy bank at Knowles Dam would continue to cause washouts during high water events.

4.8.2 Alternative 2

Several temporary trails would be required to access the proposed project locations. These trails would be constructed to the minimum standards necessary to provide access. They would be completely rehabilitated and seeded with an annual grass mix after their use.

4.8.3 Cumulative Effects on Transportation

Past management activities (including prior to Forest Service ownership) in the vicinity of the project area included logging, log drives via the stream system, fisheries management and transportation system development. Each of these activities could have played a role in effecting transportation in the area. The management activities proposed

in Alternative 2 will not result in appreciable effects on transportation. Potential risk for adverse long-term effects of proposed activities on transportation is low.

4.9 EFFECTS ON OTHER RESOURCES

4.9.1 Air

Air quality is generally good in the project area and in attainment with National Ambient Air Quality Standards. No significant sources of aerial contaminants are present in the vicinity of the project area. Very limited amounts of vehicular emissions, dust from road traffic or farming activities and smoke from annual prescribed burns contribute to a very slight short-term reduction in air quality. In the proposed projects, vehicle emissions from heavy equipment operating on-site would cause a very slight, localized reduction in air quality during project operations. These emissions would be regulated at the source by each vehicles own, properly operating, and emission control systems. Since most of the activities related to this project are on-site, dust control should not be a problem.

4.9.2 Heritage Resources

There will be no effects to cultural (heritage) resource sites under this project. Those sites that are eligible or potentially eligible to the National Register of Historic Places will be protected and avoided by the projects. There is one multi-component historic/ prehistoric site within the project area. Consultation with the State Historic Preservation Office (SHPO) and the Forest Archaeologist has identified how the site will be protected and avoided. If for an unforeseen reason the site cannot be protected and avoided, the two courses of action will be: (1) to drop the project from the action, or (2) to evaluate the site to determine its significance to the National Register of Historic Places.

Hemlock and Knowles Dams were constructed 110 and 116 years ago in the pineries river phase of the logging days. The dams were built to create holding ponds for logs to be driven downstream in the spring and later were used as railroad grades. The majority of both dams' structural and site integrity is gone making them ineligible to the National Register of Historic Places. State Historic Preservation Office (SHPO) compliance has been established for this determination.

In Alternative 2, as with any project, new cultural resource sites may be discovered. If this occurs the project will stop until a forest archaeologist is contacted. The Forest Archaeologist will then assess the new discovery and determine methods to protect the new site during the remainder of the project. Monitoring occurs to make certain that protection and avoidance guidelines as outlined by the resource specialist are adhered to. Monitoring of cultural resource sites as well as for other resources may occur before, during, and after the projects are completed to ensure protection.

One of the deficiencies identified in monitoring was the adequacy of initial survey methods used in the past to locate heritage sites. This has been addressed in consultation with SHPO by establishing a more comprehensive methodology for conducting the surveys and ensuring that those conducting the surveys have adequate training (ref. Chequamegon National Forest 1993 Monitoring Report and Revised 1995 CNNF Survey Methodology which was created in consultation with SHPO). In the End of the Decade Monitoring Report (1986-1996) for the Chequamegon-Nicolet National Forests, there

were no specific potential threats to heritage resources mentioned. Most surveys for heritage sites are now conducted under contract by professional archaeologists. In all cases, surveys are done under the guidance of a professional archaeologist.

APPENDIX A ISSUES AND CONCERNS THAT CAN BE ADDRESSED THROUGH EXPLANATION, ANALYSIS OR MITIGATION

1. Commenters were concerned about degradation of water quality in the North Branch Oconto River as a result of the proposed action. Concerns were expressed that sediment stored in the impounded channels will migrate downstream after the dams are removed.

FS Response: Water quality effects of the proposal are included in the Hydrology and Aquatic Organisms Section 4.1 of this assessment. Included in the project proposal is the use of the plunge pools to act as instream sediment basins to trap the initial flush sediment. The pool at Hemlock Dam would be cleaned once or twice in the first five years following dam removal. Specific design features addressing timing are located on Appendix D.

2. Wood turtles have not been found within the project area, but could be present. Currently there is an active turtle-nesting site at Knowles Dam. Several species of turtles are known to nest here. Internal concerns want to maintain the turtle-nesting site at Knowles Dam.

R: Personnel from the Lakewood-Laona District have surveyed this site for wood turtles in 2002 and 2003. No wood turtles have been documented at this site. This data is available at the Laona Ranger Station. Using the habitat criteria that were available at the time, this section of North Branch Oconto River is not considered good wood turtle habitat. Among other factors, there is a lack of sand banks available for nesting. The nesting site in question is the north grade at Knowles Dam. This issue has been discussed with Bob Hay - WDNR and a suitable mitigation measure will allow for the removal of at least a portion of this grade to restore river channel and flood plain integrity, yet allow keep the site intact for future use by turtles.

3. Five commenters were concerned that removing the dams, specifically Hemlock Dam would modify the wetland component upstream. Some concerns were loss of usable habitat for wildlife that currently utilizes this area.

R: Alternative 2 will change the wetland component upstream of Hemlock Dam. A slight reduction in wetland area will result, but the benefits of returning the river to a pre-dam condition will offset this condition. At least a portion of the open grassy area adjacent to the river will likely fill in with tag alder and eventually trees as the area dries out and once again becomes suitable for trees as it was before the dam was built. No changes were made to Alternative 2 as a result of these comments.

4. There was a statement (not necessarily a concern) made that pointed out that the deeper pool area above Hemlock Dam would be lost due to the removal of the Dam. Trout and other fish utilize this area during specific periods of time.

R: The water level upstream of Hemlock Dam would be lowered by 2-3 feet, when the dam is removed. However, this should result in a narrowing and deepening of the channel. By restoring the channel above the Dam, a number of slow, deep pools should be restored that would provide some slow, deep-water habitat.

5. The US Fish and Wildlife Service and the Wis. Department of Natural Resources responded to the scoping announcement. They provided a list of all Threatened and Endangered species that occur in Forest County according to their files. They determined that due to the nature and location of the proposed activities, none of the listed species or critical habitat would be affected by the project. This precludes the need for further action on this project as required by the 1973 Endangered Species Act, as amended.

R: Comment noted. Effects to Threatened, Endangered and Sensitive Species were analyzed in the Biological Evaluation (BE), which is in the Project File for this project. Appendices F and G summarize the information in the BE.

6. Commenters were concerned about wetland loss and alteration.

R: Most of the commenters realize this is a restoration project and although there would be some minor wetland loss, it would restore wetland habitat to pre-dam conditions. The vast majority of wetlands that would be affected would be above Hemlock Dam. The wetland area that will remain after the dam is removed would adjust over time and will likely become more productive.

7. Commenters are concerned about the loss of fishing opportunities above Hemlock Dam, including the impounded river channel, adjacent spring ponds and Spring Lake.

R: Historically the public has fished in the impounded area above Hemlock Dam for northern pike and other fish species. The surface area and water temperatures will be decreased due to the removal of the dam. It was discovered during the public meeting that many of the northern pike anglers were actually fishing in Spring Lake, which flows into the river just above Hemlock Dam. Removal of the dam will not affect Spring Lake and as such northern pike fishing in Spring Lake will not be affected. Removal of the dam will result in restoration of the river channel. Fishing opportunities will reflect this change, as the area will offer better riverine fishing. It is also the hope that with restored river channel and cooler water temperatures the trout fishery will improve within this stretch. It is likely that the fishing opportunities will shift from northern pike to brook trout. It should be noted that the results of the WDNR fish survey in the spring of 2003 showed that northern pike only made up about one percent of the total numbers of fish in this area. So although there are pike present they comprise a very small number of the total fish

numbers present. There are numerous other local lakes in the immediate vicinity that provide for good northern pike fishing.

8. One commenter expressed an interest in how these activities would affect the plunge pools located below each dam, specifically for fishing.

R: The plunge pools would catch sediment deposits that would likely flush from the impounded channels above the dams. This would cause the plunge pools to fill over time and thus reduce the deep-water fishing opportunities in them. However, fishing opportunities should improve throughout the 2 miles of restored river channel.

9. Commenters were concerned about the removal of the dams from a sentimental, historical and recreational perspective.

R: Both the Hemlock and Knowles Dams were evaluated for their significance as heritage resources and both the Forest Service and State (SHPO) Archaeologist concur that both dams "are not eligible for inclusion in the National Register of Historic Places due to a loss of site integrity". Although the dams will be removed and the aesthetic nature of the dams will be lost, we should not forget the purpose is to restore these two river sections to their natural condition, which will benefit the biological community. Some recreational opportunities may be lost or reduced due to the dams being removed but this "side effect" should only affect a small number of public users. It should be mentioned that the planned activities should increase trout numbers thus enhancing fishing opportunities for other forest users.

APPENDIX B LITERATURE CITED

Alexander, G. R., and E. A. Hanson. 1983. Effects of Sand Bed load Sediment on a Brook Trout Population. Mich. DNR Fish. Res. Rep. 1906. Ann Arbor. 50 pp.

Cunjak, R. A., and G. Power. 1987. Cover use by Stream-Resident Trout in Winter: A Field Experiment. Amer. Journal of Fish. Mgmt. 7:539-544.

Hansen, E. A. 1973. In-Channel Sedimentation Basins - A Possible Tool for Trout Habitat Management. The Progressive Fish-Culturist 35(3): 138-142.

Hindall, S.M., 1976. Measurment and prediction of sediment yields in Wisconsin Streams. US Geological Survey Water Resource Investigations 54-75, 33p.

Lyons, J., Wang, L., and T. D. Simonsom. 1996. Development and Validation of an Index of Biotic Integrity for Coldwater Streams in Wisconsin. N. Am. Jour. Fisheries Mgt. 16: 241-256.

Simonson, T. D., Lyons, J., and P. D. Kanehl. 1994. Guidelines for Evaluating Fish Habitat in Wisconsin Streams. U.S. Forest Service Tech. Report NC - 164. 36 pp.

Becker, George C. 1983. Fishes of Wisconsin. The University of Wisconsin Press, Madison, WI. 1052 pp.

USDA Forest Service, 2001b. USDA Forest Service: Guide to noxious weed prevention practices. USDA Forest Service, Washington DC.

Heede, G. H., 1980. Stream Dynamics: An Overview for Land Managers. USDA Forest Service General Technical Report RM-72, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 26 p.

Leopold, L.B., 1995. A View of the River. Harvard University Press

Niebur and Sebero, 2004. Fish Community and Habitat Appraisal North Branch Oconto River (272900). Wisconsin Department of Natural Resources, Peshtigo Fisheries Management. Draft report unpublished.

Rosgen, D. L., 1994. A Classification of Natural Rivers. Catena 22:169-199.

Rosgen, D. L., 1995. Applied Fluvial Geomorphology. Wildland Hydrology, Pagosa Springs Colorado.

Rosgen, D. L., 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs Colorado.

Verry, E.S., Hornbeck, J.W., and A.C. Dolloff. 2000. Riparian management in forests of the continental Eastern United States. U.S. Forest Service. Lewis Publishers, Boca Raton, FL, 402 pp.

Waters, T. F., 1995. Sediment in Streams: Sources, Biological Effects, and Control. Monograph 7, American Fisheries Society, Bethesda, Maryland. 251 p.

Wisconsin Department of Natural Resources (WDNR), 1980. Wisconsin Trout Streams. Wisconsin Department of Natural Resources, Bureau of Fisheries, Publication 6-3600(80), Madison, WI. 130 p.

Wisconsin Department of Natural Resources (WDNR), 1995. Wisconsin's Forestry Best Management Practices for Water Quality. Wisconsin Department of Natural Resources, Bureau of Forestry, Publication FR093, Madison, WI. 76 p.

WDNR, 1999. Wisconsin's Forestry Best Management Practices for Water Quality, 1995-1997 BMP Monitoring Report, Bureau of Forestry, PUB-FR-145-99, pp. 62 and 72)

USDA Forest Service, 1986. Land and Resource Management Plan—Nicolet National Forest. USDA Forest Service, Milwaukee, WI.

USDA Forest Service, 2004. Revised Land and Resource Management Plan – Chequamegon-Nicolet National Forests. USDA Forest Service, Milwaukee, WI

APPENDIX C EQUIPMENT

1.All of the dam removal, boulder and tree placement will be done with WDNR equipment and personnel. Most if not all of this equipment would have environmentally friendly hydraulic fluid, incase a hose is broken. Also addition spill safety equipment and supplies will be on site incase a spill occurs.

2. A tracked excavator, 8ft wide x 12ft long (approx) with a ¾-1 yard bucket.

3. A tracked 450 John Deere dozer with a 6-foot wide blade will also be used.

4. A tracked crawler loader with a winch or wheeled front-end loader.

5. Dump trucks will be used to haul spoils and rock from the project sites.

6. All equipment will be power washed before it is brought to the sites to prevent the spread of noxious weeds.

APPENDIX D DESIGN FEATURES AND MONITORING

Project #	Design Features for Alternative 2
	Page Numbers for Measures 2-6 are referring to the pages in Wisconsin's Forestry Best Management Practices for Water Quality Manual
1,2	1. Appropriate Federal and State Water Regulatory and Army Corps permits, will be obtained prior to project implementation. A Chapter 30 (Wisconsin State Statute) permit is required to dredge or place material in any navigable perennial or intermittent stream. The U.S. Army Corps of Engineers regulations will be followed and necessary permits applied for when project involves a wetland or floodplain.
1,2	2. Use soil stabilization practices on mechanically disturbed soils. Use seed and mulch and install temporary sediment control structures such as straw bales or silt fences immediately following construction to minimize erosion into streams. Maintain these practices until the soil is permanently stabilized. (p. 24)
1,2	3. Limit construction activity in the water to periods of low or normal flow. Keep use of equipment in the stream to a minimum. (p. 24)
1	4. Use mulch and/or seed where necessary to minimize soil erosion into streams, lakes and wetlands. (p. 34)
1	5. Install sediment control structures where necessary to slow the flow of runoff and to trap sediment until vegetation is established at the sediment source. Sediment control structures include straw bale fencing, silt fencing, and sediment traps. (p. 35)
1,2,3	6. Maintain, clean, or replace temporary sediment control structures such as silt fence or hay bales until areas of disturbed soil are stabilized. (p. 35)
1	7. No instream activity will take place between September 15th and April 15th to protect trout spawning habitat.
1,2	8. Stream banks will be seeded with an annual grass species such as annual ryegrass or winter wheat, to be used as a nurse crop until native species become established.
1,2	9. To reduce the risk of spreading non-native invasive species, equipment will be required to be pressure washed to remove weed seeds prior to entering Forest Service land.
1,2	10. Equipment used in stream will be maintained and checked daily for leaks. Biodegradable oils will be used in the equipment and spill clean up materials will be on-site.
1,2	11. Equipment to be used for in-stream work will be tracked rather than rubber-tired to minimize soil disturbance.

1,2,3	12. Erosion control matting will be used to stabilize streambanks and other areas where soil is disturbed.
1,2	13. Access spurs and roads would be completely rehabilitated and, if needed seeded with annual grass mix after their use.
1,2	14. Cultural Resources: Archaeological professionals will flag Sites in the immediate vicinity of project work. No activity will be allowed within this area.
1,2	15. Northern goshawk and red-shouldered hawk: No mitigation measures are needed if Alternative 1 is selected. If Alternative 2 is selected, Forest Plan standards and guidelines are in place for management of northern goshawk, which requires maintaining a no activity zone of approximately 20 acres around the nest site in addition to seasonal activity restrictions.
1,2	16. Forest-wide standards and guidelines are in place for management of bald eagle should these species be located at a later date following project implementation.
1,2,3 Site locations are confidential, on file in District office if found	17. RFSS plants Likely to Occur: Whenever possible, avoid cutting or damage to butternut and American elm.
1,2,3	18. Operate heavy equipment when the ground is dry and firm to minimize potential for soil rutting and compaction.

MONITORING

Fish surveys were completed prior to project implementation. The Forest Service and WDNR will continue to monitor the fishery. The interval will be dependent on the rate of channel recovery above the old dam sites. At a minimum a survey will be conducted 3 and 6 years post-implementation.

The Forest Service will continue summer water temperature monitoring. Temperature data loggers will be placed above and below the proposed project sites. This data would be used to show project effectiveness in reducing maximum summer water temperatures. Temperature monitoring would continue for several years following project completion.

Several streams on the Chequamegon-Nicolet National Forest including North Otter Creek, Allen Creek, upper Elvoy Creek and Brule Creek have had similar channel reconstruction as is being proposed. Channel cross-section monitoring has been done on these streams to determine effectiveness of the channel reconstruction work, particularly the dig and pile method. Although most of these monitored streams are narrower than North Branch Oconto, permanent cross-sections were installed on Lower Brule Creek in the fall 2003. Lower Brule Creek has a new average width of 30 feet and width-depth ratio of 10, similar to North Branch Oconto River. This type of monitoring will continue on the Forest. The surveys would be conducted by the Forest Service to monitor changes in the restored stream channels. Given the extensive ongoing channel monitoring throughout the Forest, monitoring of the North Branch Oconto River with permanent cross-sections may not occur. However, visual monitoring would occur at a minimum.

The cross section surveys consist of elevation readings from the floodplain on one side of the channel to the floodplain on the other side of the channel. These surveys would show changes in the stream channels such as bank or bed erosion and or channel deposition. This data will be used for designs of similar projects in the future.

The sand bank (north dike) at Knowles Dam will be fenced off in late April – early May to restrict turtles from laying eggs here since this area will be removed and any eggs present would be destroyed. The fence will be monitored to ensure no turtles are digging under or climbing over it and getting inside. This newly reconstructed sand bank (north dike) will be monitored in 2005-2006 for turtle nesting activity.

The areas of disturbed soil from equipment operation will be monitored for success of re-vegetation. If re-vegetation efforts are not effective or fail they will be redone immediately, by replanting with an approved seed mix and/or dressed up with fabric matting if needed to hold soils in place.

APPENDIX E-WATER TEMPERATURE GRAPHS

Table 3.1.2a Water Temperatures - NB Oconto River Upper / Hemlock Dam 2003 (USFS)

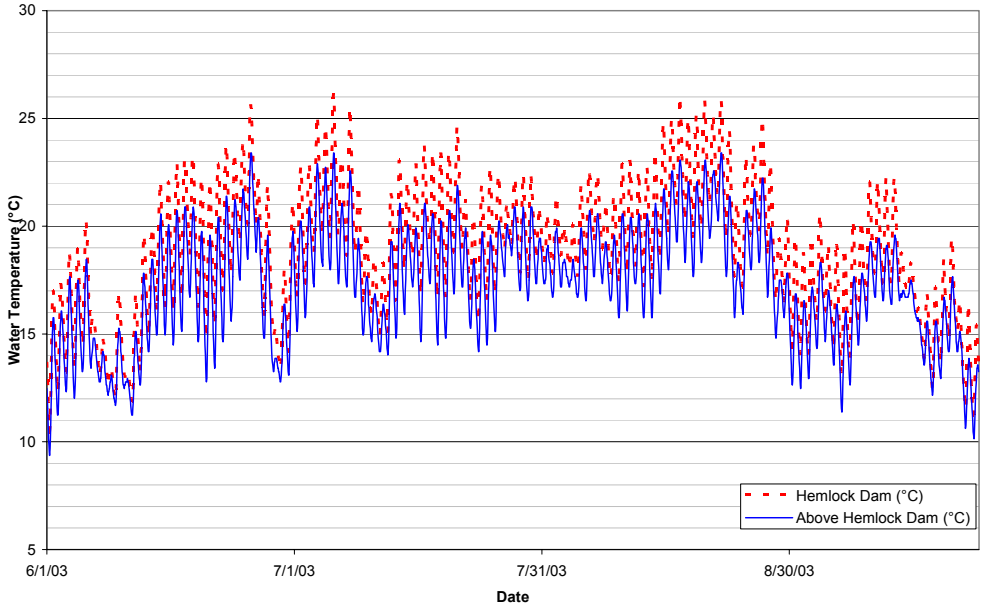


Table 3.1.2b Water Temperatures- NB Oconto Knowles/Hemlock 2003 (WDNR)

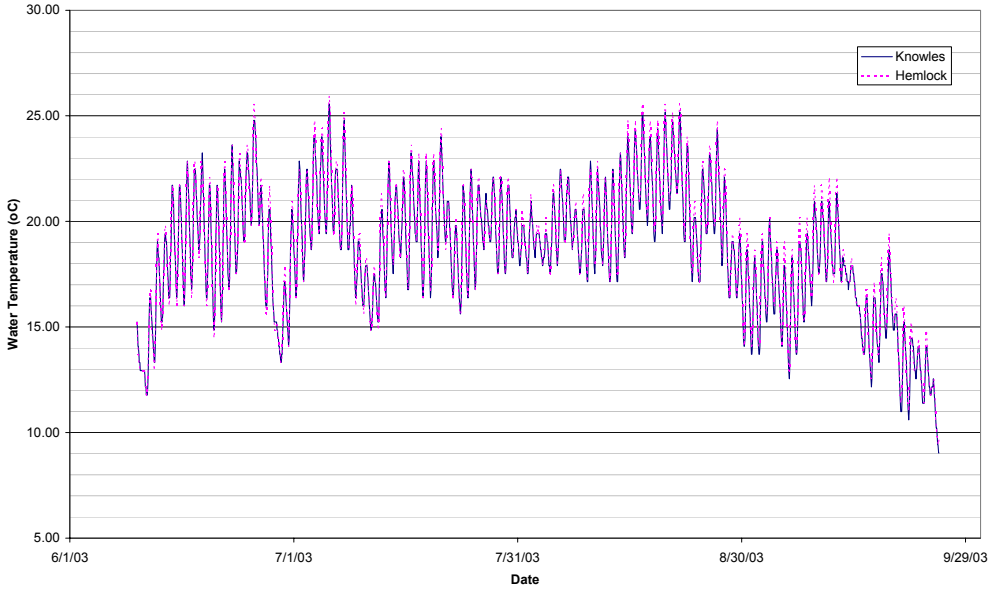
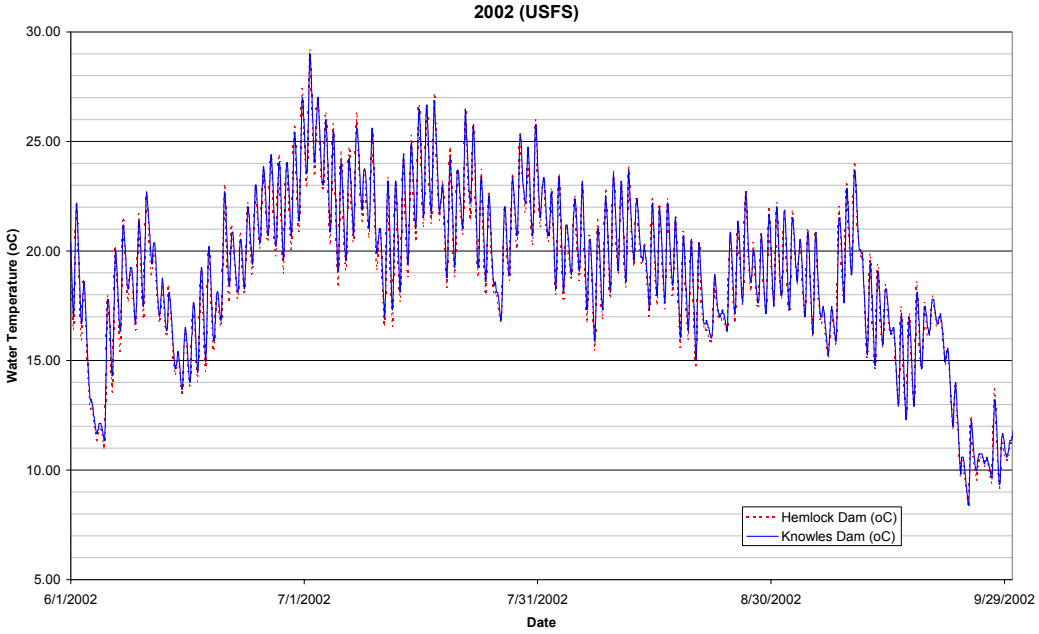


Table 3.1.2c Water Tempertures - NB Oconto River Hemlock/Knowles 2002 (USFS)



APPENDIX F-- SPECIES CONSIDERED AND SPECIES LIKELY TO OCCUR

Status Codes
Revised 10/20/03

Global Element Rank:

G1 - Critically imperiled globally
G2 - Imperiled globally
G3 - Very rare and local throughout range
G4 - Apparently globally secure, rare in parts of range
G5 - Demonstrably secure globally, rare locally

Federal Status:

FT – Federally threatened
FE – Federally endangered
FP – Federally proposed

State Element Rank:

S1 – Critically imperiled
S2 – Imperiled
S3 – Rare or uncommon
SA – Accidental
SH – Historical occurrence
S#B – Long-distance migrant, breeding status
S#N – Long-distance migrant, non-breeding status

State Status:

SE - State endangered
ST - State threatened
SC – State special concern

** - Scientific name may not be uniformly accepted.

Federally Listed Species – Endangered, Threatened, or Proposed – Table 1					
Species	*Common Name*	*Status*	*Known Occur-rence* Y/N	*Potential Habitat**	*Survey C-ompleted P – lanned N – one*
Canis lupus	Gray wolf	G4,S1,SE,FE,FT	N	M	C
Lynx canadensis	Canada lynx	G5,SA,SC,FT	N	N	N
Haliaetus leucocephalus	Bald eagle	G4,S2N,SC,FT	N	C	N
Dendroica kirtlandii	Kirtland's warbler	G1, SAN,FE,SC/M	N	N	N
Nicrophorus americanus	American burying beetle	G1,SH,FE	N	N	N
Lycaeides melissa samuelis	Karner blue butterfly	G5,S2S3,FE	N	N	N
Oxytropis campestris var chartacea	Fassett's locoweed	G5,S1,FT	N	N	N

Regional Forester's Sensitive Species – Table 2					
Species	*Common Name*	*Status*	*Known Occur-rence* Y/N	*Potential Habitat**	Survey C –ompleted P – lanned N – one
Mammals					
Martes americana	American marten	G5,S3,SE	N	N	N
Birds					
Accipiter gentilis	Northern goshawk	G5,S2N,S2S3B,SC	N	M	P
Ammodramus leconteii	LeConte's sparrow	G4,S2B,SC	N	N	N
Bartramia longicauda	Upland sandpiper	G5,S2B,SC	N	N	N
Buteo lineatus	Red-shouldered hawk	G5,S1N,S3S4B,ST	N	P	C and additional P
Catharus ustulatus	Swainson's thrush	G5,S2B,SC	N	N	N
Chlidonia niger	Black tern	G4,S3B,SC	N	N	N
Cygnus buccinator	Trumpeter swan	G4,S1B,SE	N	N	N
Dendroica cerulea	Cerulean warbler	G4,S2S3B,ST	N	N	N
Falcipennis canadensis	Spruce grouse	G5,S2B,S1S2N,ST	N	N	N
Oporornis agilis	Connecticut warbler	G4,S3B,SC	N	M	N
Picoides arcticus	Black-backed woodpecker	G5,S2B,SC	N	N	N
Tympanuchus phasianellus	Sharp-tailed grouse	G4,S2,SC	N	N	N
Reptiles					
Clemmys insculpta	Wood turtle	G4,S3,ST	N	C	N
Fish					
Acipenser fulvenscens	Lake sturgeon	G3,S3,SC	N	N	N
Moxostoma valenciennesi	Greater redhorse	G3,S2S3,ST	N	N	N
Notropis nogenus	Pugnose shiner	G3,S2S3,ST	N	N	N
Mollusks					
Venustaconcha ellipsiformis	Ellipse mussel	G3G4,S2,ST	N	N	N
Insects					
Gomphus viridifrons	Green-faced clubtail	G3,S3,SC	N	N	C *
Incisalia henrici	Henry's elfin butterfly	G5,S2,SC	N	N	C *
Lycaeides idas nabokovi	Northern blue butterfly	G5,S1,SE	N	N	C *
Oeneis chryxus	Brown arctic	G5,S2,SC	N	N	C *
Ophiogomphus anomalus	Extra-striped snaketail	G3,S1,SE	N	N	C *
Ophiogomphus howei	Pygmy snaketail	G3,S3,ST	N	M	C *
Phyciodes batesii	Tawny crescent spot	G4,S3,SC	N	N	C *
Pieris virginiensis	West Virginia white	G4,S2,SC	N	M	C *
Stylurus scudderi	Zebra clubtail	G3,G4,S3,SC	N	P	C *
Plants					
Amerorchis rotundifolia	Round-leaved orchis	G5,S2,ST	N	N	N
Arabis missouriensis var. deamii	Missouri rock cress	G4QT3,S2,SC	N	P	C
Asplenium trichomanes-ramosum	Green spleenwort	G5,S1,SE	N	N	N
Astragalus alpinus	Alpine milk vetch	G5,S1,SE	N	N	N
Botrychium minganense	Mingan's moonwort	G4,S2,SC	N	N	N
Botrychium mormo	Goblin fern	G3,S3,SE	Y	C	C
Botrychium oneidense	Blunt-lobed grape-fern	G4,S2,SC	N	P	C
Botrychium rugulosum	Ternate grape-fern	G3,S2,SC	N	N	N

Callitriche hermaphroditica	Northern water-starwort	G5,S2,SC	N	M	C
Calypso bulbosa	Calypso orchid - Fairy slipper	G5,S3,ST	N	N	N
Carex assiniboinensis	Assiniboine sedge	G4G5,S3,SC	N	N	N
Carex backii	Rocky Mountain sedge	G4,S1,SC	N	N	N
Carex crawei	Crawe's sedge	G5,S3,SC	N	N	N
Carex gynocrates	Northern bog sedge	G5,S3,SC	N	N	N
Carex livida var radicaulis	Livid sedge	G5T5,S2,SC	N	N	N
Carex michauxiana	Michaux's sedge	G5,S1,ST	N	N	N
Carex sychnocephala	Many-headed sedge	G4,S2,SC	N	N	N
Carex vaginata	Sheathed sedge	G5,S3,SC	N	N	N
Ceratophyllum echinatum	Spineless hornwort	G4?,S2,SC	N	M	C
Cynoglossum virginianum var. boreale	Northern wild comfrey	G5 (N3)	N	M	C
Cypripedium arietinum	Ram's head lady's slipper	G3,S2,ST	N	N	N
Diplazium pycnocarpon	Glade fern	G5,S2,SC	N	N	N
Dryopteris expansa	Spreading woodfern	G5,S2,SC	N	N	N
Dryopteris filix-mas	Male fern	G5,S1,SC	N	N	N
Dryopteris fragrans var remotiuscula	Fragrant fern	G5T?,S3,SC	N	N	N
Eleocharis olivacea	Capitate spike-rush	C5,S2,SC	N	N	N
Eleocharis quinqueflora	Few-flowered spike-rush	G5,S2,SC	N	N	N
Epilobium palustre	Marsh willow-herb	G5,S3,SC	N	N	N
Equisetum palustre	Marsh horsetail	G5,S2,SC	N	N	N
Eriophorum chamissonis	Rusty cotton-grass	G5,S2,SC	N	N	N
Geum macrophyllum var macrophyllum	Large-leaved avens	G5T5,S1,SC	N	N	N
Juglans cinerea	Butternut	G4,S3?,SC	Y	C	C
Juncus stygius	Bog (moor) rush	G5,S1,SE	N	N	N
Leucophysalis grandiflora	Large-flowered ground cherry	G3,S1,SC	N	N	N
Littorella uniflora	American shore-grass	G5,S2,SC	N	N	N
Malaxis brachypoda	White adder's mouth	G4,S3,SC	N	N	N
Medeola virginiana	Indian cucumber-root	G5,S3,SC	N	N	N
Moehringia macrophylla	Large-leaved sandwort	G4,S1,SE	N	N	N
Myriophyllum farwellii	Farwell's water-milfoil	G5,S3,SC	N	M	C
Oryzopsis canadensis	Canada mountain rice-grass	G5,S1,SC	N	N	N
Panax quinquefolius	American Ginseng	G4,S4,SC	N	P	C
Parnassia palustris	Marsh grass-of-parnassus	G5,S1,ST	N	N	N
Polemonium occidentale var lacustre	Western Jacob's ladder	G5T1Q,S1,SE	N	N	N
Polystichum braunii var purshii	Braun's holly fern	G5,S3,ST	N	N	N
Potamogeton confervoides	Algae-like pondweed	G3G4,S2,ST	N	M	C
Potamogeton hillii	Hill's pondweed	G3,S1,SC	N	N	N
Pyrola minor	Lesser wintergreen or small shinleaf	G5,S1,SE	N	N	N
Ranunculus gmelinii	Small yellow water-crowfoot	G5,S2,SE	N	N	N
Rhynchospora fusca	Brown beak-sedge	G4G5,S2,SC	N	P	C
Streptopus amplexifolius	White mandarin	G5,S3,SC	N	N	N
Tiarella cordifolia	Foamflower	G5,S1,SE	N	N	N
Ulmus americana	American elm	G5?	N	P	C
Vaccinium cespitosum	Dwarf huckleberry	G5,S2,SE	N	N	N
Valeriana uliginosa	Marsh valerian	G4G4,S2,ST	N	N	N
Regional Forester's Sensitive Species – Table 3 Species Likely To Occur					
Species	*Common Name*	*Status*	*Known Occur-rence* Y/N	*Potential Habitat**	Survey C -ompleted P - lanned N - one
Animals					
Myotis septentrionalis	Northern (long-eared) myotis	G4,S4,SC	N	N	N
Pipistrellus subflavus	Eastern pipistrelle	G5,S3S4,SC	N	N	N
Plethobasus cyphysus	Bullhead mussel	G2G3,S1,SE	N	N	N
Somatochlora forcipata	Forcipate emerald	G5,S2S3,SC	N	N	N
Plants					
CarDamine maxima	Large toothwort	G5,S1,SC	N	N	N
Carex lenticularis	Shore sedge	G5,S2,ST	N	N	N

Disporum hookeri	Fairy bells, Hooker's mandarin	G4G5	N	N	N
Eleocharis engelmannii	Engelmann's spike-rush	G4?,S1,SC	N	N	N
Listera auriculata	Auricled twayblade	G3,S1,SE	N	N	N
Listera convallarioides	Broad-leaved twayblade	G5,S1,ST	N	N	N
Petasites sagittatus	Arrow-leaved sweet coltsfoot	G5,S3,ST	N	N	N
Platanthera flava var herbiola	Pale-green orchid	G4T4Q,S2,ST	N	N	N
Poa paludigena	Bog bluegrass	G3,S3,ST	N	N	N
Potamogeton pulcher	Spotted pondweed	G5,S1,SE	N	N	N
Pterospora andromeda	Giant pinedrops	G5,S1,SE	N	N	N
Ranunculus lapponicus	Lapland buttercup	G5,S1,SE	N	N	N

Categories:

Confirmed: Species has been observed within or near (within 0.25 miles) the project/proposed project area; a documented occurrence is on file for uncommon or rare species.

Probable: Habitat is suitable, species has been documented on the Forest but not necessarily within the project/proposed project area. Likelihood of occurrence is high. (Consideration is given to transient species such as eastern timber wolf.)

Minimal: Some habitat exists, species may or may not have been documented on Forest. Likelihood of occurrence within the project area or proposed project is low.

None: Species may occur within region, but has no recent record of occurrence on the Eagle River-Florence District, and/or habitat within the project area does not exist, or is not suitable.

* In the column; Survey: Completed, Planned or None. In summer of 2003 a dragonfly survey was completed on the North Branch Oconto River from Knowles Dam downstream to the southern Forest Boundary. None of the dragonflies identified in Table 2 were found in the location of the project sites. One species of dragonfly, the Zebra Clubtail was identified downstream on the North Branch Oconto River approximately 22 miles. Since this species was found on the same body of water it is possible but doubtful that this species would occur in the project area.

APPENDIX G--SPECIES DETERMINATION OF EFFECTS TABLES

Global Element Rank:

G1 - Critically imperiled globally
G2 - Imperiled globally
G3 - Very rare and local throughout range
G4 - Apparently globally secure, rare in parts of range
G5 - Demonstrably secure globally, rare locally

Federal Status:

FT - Federally threatened
FE - Federally endangered
FP - Federally proposed

State Element Rank:

S1 - Critically imperiled
S2 - Imperiled
S3 - Rare or uncommon
SA - Accidental
SH - Historical occurrence
S#B - Long-distance migrant, breeding status
S#N - Long-distance migrant, non-breeding status

State Status:

SE - State endangered
ST - State threatened
SC - State special concern

Determinations for federally listed species:

a) "No effect"
b) "Is not likely to adversely affect"
c) "Is likely to adversely affect"

Determinations for Regional Forester's Sensitive Species:

a) "No impact"
b) "Beneficial impact"

c) "May impact individuals but not likely to cause a trend to federal listing or loss of viability"
d) "May impact individuals and likely to result in a trend to federal listing or loss of viability"

Federally Listed Species – Endangered, Threatened, or Proposed – Table 1					
Species	*Common Name*	*Status*	*No Effect*	*Is not likely to adversely affect*	*Is likely to adversely affect*
Mammals					
Canis lupus	Gray wolf	G4,S1,SE,FEFT	X		
Lynx canadensis	Canada lynx	G5,SA,SC,FT	X		
Birds					
Haliaetus leucocephalus	Bald eagle	G4,S2N,SC,FT	X		
Dendroica kirtlandii	Kirtland's warbler	G1,SAN,FE,SA/N	X		
Nicrophorus americanus	American burying beetle	G1,SH,FE	X		
Lycaeides melissa samuelis	Karner blue butterfly	G5,S2S3,FE	X		
Plants					
Oxytropis campestris var. chartacea	Fassett's locoweed	G5,S1,FT	X		

Regional Forester's Sensitive Species – Table 2						
Species	*Common Name*	*Status*	*No Impact*	*Beneficial Impact*	*May impact individuals /not likely…*	*May impact individuals / likely…*
Mammals						
Martes americana	American marten	G5,S3,SE	X			
Birds						
Accipiter gentilis	Northern goshawk	G5,S2N,S2S3B,SC	X			
Ammodramus leconteii	LeConte's sparrow	G4,S2B,SC	X			
Bartramia longicauda	Upland sandpiper	G5,S2B,SC	X			
Buteo lineatus	Red-shouldered hawk	G5,S1N,S3S4B,ST	X			
Catharus ustulatus	Swainson's thrush	G5,S2B,SC	X			
Chlidonia niger	Black tern	G4,S3B,SC	X			
Cygnus buccinator	Trumpeter swan	G4,S1B,SE	X			
Dendroica cerulea	Cerulean warbler	G4,S2S3B,ST	X			
Falcipennis canadensis	Spruce grouse	G5,S2B,S1S2N,ST	X			
Oporornis agilis	Connecticut warbler	G4,S3B,SC	X			
Picoides arcticus	Black-backed woodpecker	G5,S2B,SC	X			
Tympanuchus phasianellus	Sharp-tailed grouse	G4,S2,SC	X			
Reptiles						
Clemmys insculpta	Wood turtle	G4,S3,ST	X			
Fish						
Acipenser fulvenscens	Lake sturgeon	G3,S3,SC	X			
Moxostoma valenciennesi	Greater redhorse	G3,S2S3,ST	X			
Notropis nogenus	Pugnose shiner	G3,S2S3,ST	X			
Mollusks						
Venustaconcha ellipsiformis	Ellipse mussel	G3G4,S2,ST	X			
Insects						
Gomphus viridifrons	Green-faced clubtail	G3,S3,SC	X			
Incisalia henrici	Henry's elfin butterfly	G5,S2,SC	X			
Lycaeides idas nabokovi	Northern blue butterfly	G5,S1,SE	X			
Oeneis chryxus	Brown arctic	G5,S2,SC	X			
Ophiogomphus anomalus	Extra-striped snaketail	G3,S1,SE	X			
Ophiogomphus howei	Pygmy snaketail	G3,S3,ST	X			
Phyciodes batesii	Tawny crescent spot	G4,S3,SC	X			
Pieris virginiensis	West Virginia white	G4,S2,SC	X			
Stylurus scudderi	Zebra clubtail	G3,G4,S3,SC	X			

Plants						
Amerorchis rotundifolia	Round-leaved orchis	G5,S2,ST	X			
Arabis missouriensis var. deamii	Missouri rock cress	G4QT3,S2,SC	X			
Asplenium trichomanes-ramosum	Green spleenwort	G5,S1,SE	X			
Astragalus alpinus	Alpine milk vetch	G5,S1,SE	X			
Botrychium minganense	Mingan's moonwort	G4,S2,SC	X			
Botrychium mormo	Goblin fern	G3,S3,SE	X			
Botrychium oneidense	Blunt-lobed grape-fern	G4,S2,SC	X			
Botrychium rugulosum	Ternate grape-fern	G3,S2,SC	X			
Callitriche hermaphroditica	Northern water-starwort	G5,S2,SC	X			
Calypso bulbosa	Calypso orchid - Fairy slipper	G5,S3,ST	X			
Carex assiniboinensis	Assiniboine sedge	G4G5,S3,SC	X			
Carex backii	Rocky Mountain sedge	G4,S1,SC	X			
Carex crawei	Crawe's sedge	G5,S3,SC	X			
Carex gynocrates	Northern bog sedge	G5,S3,SC	X			
Carex livida var radicaulis	Livid sedge	G5T5,S2,SC	X			
Carex michauxiana	Michaux's sedge	G5,S1,ST	X			
Carex sychnocephala	Many-headed sedge	G4,S2,SC	X			
Carex vaginata	Sheathed sedge	G5,S3,SC	X			
Ceratophyllum echinatum	Spineless hornwort	G4?,S2,SC	X			
Cynoglossum virginianum var. boreale	Northern wild comfrey	G5 (N3)	X			
Cypripedium arietinum	Ram's head lady's slipper	G3,S2,ST	X			
Diplazium pycnocarpon	Glade fern	G5,S2,SC	X			
Dryopteris expansa	Spreading woodfern	G5,S2,SC	X			
Dryopteris filix-mas	Male fern	G5,S1,SC	X			
Dryopteris fragrans var remotiuscula	Fragrant fern	G5T?,S3,SC	X			
Eleocharis olivacea	Capitate spike-rush	C5,S2,SC	X			
Eleocharis quinqueflora	Few-flowered spike-rush	G5,S2,SC	X			
Epilobium palustre	Marsh willow-herb	G5,S3,SC	X			
Equisetum palustre	Marsh horsetail	G5,S2,SC	X			
Eriophorum chamissonis	Rusty cotton-grass	G5,S2,SC	X			
Geum macrophyllum var macrophyllum	Large-leaved avens	G5T5,S1,SC	X			
Juglans cinerea	Butternut	G4,S3?,SC			X	
Juncus stygius	Bog (moor) rush	G5,S1,SE	X			
Leucophysalis grandiflora	Large-flowered ground cherry	G3,S1,SC	X			
Littorella uniflora	American shore-grass	G5,S2,SC	X			
Malaxis brachypoda	White adder's mouth	G4,S3,SC	X			
Medeola virginiana	Indian cucumber-root	G5,S3,SC	X			
Moehringia macrophylla	Large-leaved sandwort	G4,S1,SE	X			
Myriophyllum farwellii	Farwell's water-milfoil	G5,S3,SC	X			
Oryzopsis canadensis	Canada mountain rice-grass	G5,S1,SC	X			
Panax quinquefolius	American Ginseng	G4,S4,SC	X			
Parnassia palustris	Marsh grass-of-parnassus	G5,S1,ST	X			
Polemonium occidentale var lacustre	Western Jacob's ladder	G5T1Q,S1,SE	X			
Polystichum braunii var purshii	Braun's holly fern	G5,S3,ST	X			
Potamogeton confervoides	Algae-like pondweed	G3G4,S2,ST	X			
Potamogeton hillii	Hill's pondweed	G3,S1,SC	X			
Pyrola minor	Lesser wintergreen or small shinleaf	G5,S1,SE	X			
Ranunculus gmelinii	Small yellow water-crowfoot	G5,S2,SE	X			
Rhynchospora fusca	Brown beak-sedge	G4G5,S2,SC	X			
Streptopus amplexifolius	White mandarin	G5,S3,SC	X			
Tiarella cordifolia	Foamflower	G5,S1,SE	X			
Ulmus americana	American elm	G5?			X	
Vaccinium cespitosum	Dwarf huckleberry	G5,S2,SE	X			
Valeriana uliginosa	Marsh valerian	G4G4,S2,ST	X			
Regional Forester's Sensitive Species – Table 3 Species Likely To Occur						
Species	*Common Name*	*Status*	*No Impact*	*Beneficial Impact*	*May impact individ-uals/not likely…*	*May impact individ-uals/ likely…*
Animals						
Myotis septentrionalis	Northern (long-eared) myotis	G4,S4,SC	X			
Pipistrellus subflavus	Eastern pipistrelle	G5,S3S4,SC	X			

Plethobasus cyphysus	Bullhead mussel	G2G3,S1,SE	X			
Somatochlora forcipata	Forcipate emerald	G5,S2S3,SC	X			
Plants						
CarDamine maxima	Large toothwort	G5,S1,SC	X			
Carex lenticularis	Shore sedge	G5,S2,ST	X			
Disporum hookeri	Fairy bells, Hooker's mandarin	G4G5	X			
Eleocharis engelmannii	Engelmann's spike-rush	G4?,S1,SC	X			
Listera auriculata	Auricled twayblade	G3,S1,SE	X			
Listera convallarioides	Broad-leaved twayblade	G5,S1,ST	X			
Petasites sagittatus	Arrow-leaved sweet coltsfoot	G5,S3,ST	X			
Platanthera flava var herbiola	Pale-green orchid	G4T4Q,S2,ST	X			
Poa paludigena	Bog bluegrass	G3,S3,ST	X			
Potamogeton pulcher	Spotted pondweed	G5,S1,SE	X			
Pterospora andromeda	Giant pinedrops	G5,S1,SE	X			
Ranunculus lapponicus	Lapland buttercup	G5,S1,SE	X			

APPENDIX H - TEAM MEMBERS

Analysis Team Members

Thomas Moris, Wildlife Biologist, Team Leader
Sue Reinecke, Fish Biologist
Dale Higgins, Hydrologist
Jim Mineau, Hydrologist - Consultant
Steve Janke, Plant Ecologist - Consultant
Kim Schoenebeck, Archaeological Technician - Consultant
Cliff Sebero, WDNR Fisheries Technician - Consultant