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Environmental Assessment

Baraga Plains Restoration Project

Kenton and Ontonagon Ranger Districts
Ottawa National Forest
Baraga and Houghton Counties, Michigan

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ENVIRONMENTAL ASSESSMENT SUMMARY

This Environmental Assesment displays the analysis of site-specific data and alternatives for the Baraga Restoration Project. The proposed activities were designed to move the project area toward, or maintain the area within, the desired conditions as outlined in the Ottawa National Forest Land and Resource Management Plan. This Environmental Assessment contains four chapters and several appendices. Chapters 1 and 2 serve as an executive summary of the document. Chapter 3 contains supporting information per resource (e.g., effects analyses) for each alternative developed. More specifically:

- Chapter 1 introduces the project area, summarizes direction that the Environmental Assessment must follow, and includes the decisions that must be made by the Deciding Official. Discussion of the purpose and need for action, the proposed action, and a summary of the scoping process are included;

- Chapter 2 describes all alternatives developed and considered for the project area, including the No Action Alternative. This chapter also includes alternatives considered, but eliminated from detailed analysis; project specific design criteria; and a summary of each alternative considered in detail. Several tables are located within this chapter to aid in displaying the alternative comparisons;

- Chapter 3 describes the affected environment, including the physical, biological and human aspects of the environment that may be changed by implementation of an alternative. This chapter presents baseline information for the existing environment conditions that provides a framework against which effects can be evaluated and progress toward the Forest's desired conditions can be measured. Direct, indirect and cumulative impacts (effects) of alternative implementation for several resources are discussed; and

- Chapter 4 identifies the Interdisciplinary Team members and their roles in developing this document.

A reduction of paper as specified by 40 Code of Federal Regulations (CFR 1500.4) has been an important consideration in the preparation of this EA. Generally, the objective is to furnish enough site-specific information to demonstrate a reasonable consideration of environmental consequences of alternatives. More detailed information is available in the Project File, located at the Kenton Ranger District.

Terms that are in bold are defined in the glossary (Appendix F).

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

INTRODUCTION

The Kenton and Ontonagon Ranger Districts of the Ottawa National Forest (the Ottawa) are proposing to address multiple resource needs within the Baraga Plains Restoration (herein referred to as the BPR) project area. An Interdisciplinary (ID) Team of resource specialists was formed to assess the potential effects and consequences resulting from implementation of a range of alternatives for the project area. This Environmental Assessment (EA) documents the analyses of proposed activities in the BPR project area. This document, as well as scoping package, is also available on the Internet at the following website link: www.fs.usda.gov/ottawa

Development of this EA is in accordance with the requirements of the National Environmental Policy Act (NEPA), the National Forest Management Act (NFMA) and the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508). The purpose of this EA is to disclose the effects and consequences of alternative strategies being considered in detail. This information enables the Deciding Official to make decisions with an understanding of the alternatives' environmental consequences and also allows the Forest Service to disclose to the public, the nature and potential consequences of proposed actions. This analysis will be used by the Deciding Official to determine whether this project requires preparation of an Environmental Impact Statement.

FOREST PLAN DIRECTION

The Ottawa's land base is divided into several management areas (MAs) that are managed using differing emphases (Forest Plan [FP], p. 3-1). The BPR falls within portions of MAs 4.1a and 4.2a., where management emphases are identified in the FP, pp. 3-21 to 26 and pp. 3-27 to 31. Additionally, this project proposed some minor recreation enhancements within MA 5.2, which is described in the FP on pp. 3-38 to 43. More detailed information with respect to the desired vs. existing conditions of each MA is presented in the following section. See Appendix A, Map 3 for a display of the MAs within the project area.

OVERVIEW OF THE PROJECT AREA

The Baraga Plains is an extensive, nearly level, glacial lake landform consisting of sandy soils overlying sandy outwash and **lacustrine** (Appendix F) sediments and contains stabilized, post glacial, wind blown (dune) features. In its entirety, the Baraga Plains is about 30,000 acres in size and approximately one-third of this area is managed as part of the Ottawa. Most of the remaining acres are managed by the State of Michigan. Historically, wildfire was the primary stand-replacing agent in the Baraga Plains. This resulted in a mosaic of open areas, partially-treed savannahs, and regenerating jack pine forests commonly known as a "pine barrens community". Seldom did stands develop old growth characteristics due to frequent fires. Timber harvest has replaced fire as the primary disturbance agent. Presently, the area is

largely forested, with much less open habitat than naturally would have developed in a fire-dominated ecosystem.

The BPR project area is comprised of about 9,664 acres of land, with about 9,481 acres managed under National Forest System (NFS) ownership. The proposed management activities outlined in Chapter 2 would only occur on NFS lands and follow direction outlined in the Ottawa's 2006 Land and Resource Management Plan (Forest Plan). The project area is located in the northeast portion of the Ottawa on the Kenton and Ontonagon Ranger Districts; approximately 10 miles southwest of Baraga, Michigan and approximately 7 miles northwest of Covington, Michigan (see Appendix A, Map 1). The legal description is as follows: Baraga County, Michigan; Covington Township, Township (T) 48N, Range (R) 35W, portions of sections 1 and 2; Baraga Township, T49N, R35W, all or portions of sections 2-3, 10-15, 22-26, and 35-36; Houghton County, Michigan; Laird Township, T49N, R35W, Sections 4, 5, 9, and 16.

Private lands account for less than 1 percent of the total acres within the project area and consist of one 40 acre parcel on the northwest boundary. No activities are proposed for private land.

The major roads within the BPR area include Forest System Roads 2200 and 2270 (see Appendix A, Map 1). The Forest Service manages approximately 50 miles of road within the project area. Some are closed to all motor vehicles, some are open to passenger vehicles, some are open to **off-highway vehicles (OHVs)** (Appendix F), and some are open to both. Currently designated motorized access, as well as proposed change are shown on the Ottawa's 2010 Motor Vehicle Use Map (MVUM), which are depicted on Maps 10 and 11 of Appendix A (see Chapter 2 for more information).

Additional site-specific information for the project area's resources is presented in the purpose and need section of this chapter and the affected environment discussions for each resource in Chapter 3.

Management Area MA 4.1a emphasizes mid to late successional conifers such as red and white pine and white spruce. The MA 4.1a portion of the BP comprises the northern approximate one-third portion of the project area. This area, comprised of 107 and 110 is a combination of steeply dissected, and nearly level to gently rolling landscapes, with richer soils and a higher diversity of plant species than in the 4.2a management area on the Baraga Plains. Here, mixed stands of oak, pines, hemlock, spruce and northern hardwoods are common. There are also large stands of bigtooth and quaking aspen and paper birch of various ages. Long-lived conifer species (white pine and eastern hemlock) are common in the mixed stands and appear to be regenerating well.

Long-lived conifer species are common in the mixed stands and appear to be regenerating well (especially white pine), which creates an opportunity to enhance long-lived conifers through vegetation management. Also, the area presents opportunities to promote several other species of interest, including paper birch, red oak and bigtooth

aspen, through forest management. Further, there are opportunities to create and manage openings on these soils that can become habitat for rare plants and insects, such as dwarf bilberry and northern blue butterfly.

Management Area 4.2a emphasizes early to mid successional conifers as well as moderate to high amounts of short-lived conifers (e.g., jack pine and balsam fir). Management Areas 4.1a and 4.2a emphasize a **Roaded Natural** (Appendix F) recreation setting. The North Country National Scenic Trail (NCNST) traverses the project area from north to south (see Appendix A, Map 2).

Figure 1 - Kirtland's warbler seen in Baraga Plains (July 2008).

The largest portion of the BPR project area is located in MA 4.2a, where the emphasis is on maintaining jack pine to provide for species needing this habitat type (e.g., Kirtland's warbler, spruce grouse, black-backed woodpecker). The Kirtland's warbler (KW) (Figure 1) is an endangered species and to date, their breeding grounds have been isolated to a few areas within Michigan, Wisconsin and Canada. The Baraga Plains provides for early successional jack pine habitat; this habitat type is a limiting factor for the KW with respect to breeding and nesting. Additionally, the project will provide large openings for species dependent upon large treeless expanses (e.g., upland sandpiper, various sparrows, butterflies, northern barrens tiger beetle and several plant species such as big and little bluestem grasses and blueberries).

This portion of the project area is mostly forested, dominated by jack pine of varying ages. The second-most abundant forest type is red pine, which occurs in plantations ranging between 20 and 40 years of age. Aspen is the third-most common forest type, and oak, cherry, white pine and red maple are mixed within these forest types as well.

The recreational activities proposed as part of the BPR project partially fall within MA 5.2. The management emphasis within this unit is protection and management of the Sturgeon River Gorge Wilderness, and to offer a remote undisturbed area and secluded setting. There is limited work proposed in this project within MA 5.2, which is the Sturgeon River Gorge Wilderness. This work includes hiking trail construction, reconstruction, and maintenance, which would enhance hiking access into the wilderness, as described in Chapter 2.

DECISIONS TO BE MADE

The Deciding Official for the BPR is the Bergland/Ontonagon District Ranger, Darla Lenz. The Deciding Official may decide to select the no action alternative, defer

activities, or may select a management alternative or portions of alternatives to implement.

Based on Forest Plan goals, objectives, standards and management practices, together with public issues and concerns and management opportunities, the ID Team has considered the affected area, formulated alternatives, developed design criteria, estimated environmental consequences and compared the alternatives through the environmental analysis documented in this EA and its associated Project File. From this analysis and the supporting Project File, the Deciding Official will determine:

1. Selection and site-specific location of appropriate vegetative management practices, if any. Included in this decision would be silvicultural prescriptions, logging systems, slash treatment, biomass removal, riparian protection, travel corridors, reforestation, mitigation measures, design criteria and monitoring;

2. Selection and site-specific location of appropriate transportation system management, if any. Included in this decision would be designating public access by class of vehicle; road closures; roads removed from the system through decommissioning; and roads requiring reconstruction, maintenance, construction, and temporary construction necessary to provide access to suitable timberlands and achieve resource objectives. Also included would be road access restrictions or other actions necessary to meet resource need;

3. Selection of the amount, type and distribution of improvement projects for botanical, wildlife and recreation resources, as well as old growth classification, if any. The use of prescribed fire and/or mechanical treatment of vegetation to achieve restoration objectives as outlined in this EA would also be considered.

PURPOSE AND NEED

The BPR project's ID Team includes Forest Service specialists for aquatics, botany, engineering, fire, geographic information systems (GIS), heritage, recreation, soils, silviculture, visuals and wildlife. Each of these specialists has visited the project area and evaluated inventory data to determine the area's current conditions and understand how these conditions differ from the desired conditions described in the Forest Plan.

This review of conditions in the project area has generated management opportunities to: 1) enhance habitat conditions for several species, including wildlife, plants and insects; 2) use fire and mechanical treatments to restore native vegetation communities and reduce fuels; 3) treat vegetation to restore species composition and structure; 4) classify old growth stands; 5) manage transportation network; 6) improve recreation opportunities; and 7) support the local economy.

Enhance Habitat for Wildlife, Plants and Insects

This project will create and maintain suitable habitat for Kirtland's warblers and other jack pine dependent species. There is a need to maintain jack pine acreage in

Figure 2 - Black-backed woodpeckers are linked to habitats that are shaped by fire events.

MA 4.2a (FP, p. 3-31), especially in a manner that emulates structure and function of jack pine to benefit key species, including the federally endangered Kirtland's warbler, spruce grouse and black-backed woodpecker (Figure 2). Current average size of jack pine stands in the BPR project area is smaller than optimal from a species-benefit standpoint. As jack pine cones are serotinous (e.g., sealed), fire is beneficial to heating cones to allow seed dispersal.

Improve habitat for wildlife and plant species that rely on sand plains openings. Restoring portions of the Baraga Plains would benefit a large number of Regional Forester's Sensitive vertebrates, invertebrates and plants, as well as the federally endangered Kirtland's warbler. Rare plants and insects, such as the northern barrens tiger beetle exist or could potentially exist on the fire-prone, droughty Baraga Plains ecosystem and surrounding stands. There is a need to maintain openings and determine if other restoration efforts are needed to enhance and/or introduce these species (FP, p. 2-3).

Reintroduce Prescribed Fire and Treat Hazardous Fuels

Restore fire as a natural disturbance agent in the Baraga Plains. There is a long-term need to re-establish fire as a process in the restoration of the sand plains ecosystem without increasing risk to neighboring communities. Historical evidence indicates that the Baraga Plains were burned frequently through natural ignitions and by Native Americans, playing a large role in shaping the vegetation composition and structure of the Baraga Plains ecosystem. Fire was more than just a disturbance event on the landscape; rather, it was in integral process interlinked with all other components of the sand plains ecosystem. Since the 1930s, fire suppression across the western Upper Peninsula of Michigan has led to a decline in the prevalence of species adapted to a landscape interlinked with fire. Reintroducing fire will change structure and composition of vegetation benefiting plant and animal species that rely on this fire dependent ecosystem.

Work with state and private landowners within the Wildland Urban Interface (WUI) to implement fuels reduction treatments. There is also a need to create a model for managing fire use for potential enhancement projects utilizing wildland fire management on the Baraga Plains landscape. In an effort to restore natural processes to the Baraga Plains, prescribed burns are likely to be used as part of a management strategy to encourage a pine barrens community. Fire use in highly flammable forests such as jack pine requires planning and preparedness to ensure that treatments meet objectives without increasing risk to neighbors and important values around its perimeter (FP, p. 2-11).

Treat Vegetation to Meet Multiple Forest Plan Objectives

In MA 4.1a, improve long-lived conifer and mid-tolerant tree species. There is a need to promote long-lived conifers and implement Forest Plan objectives through management of forest stands adjacent to the Baraga Plains (Table 1). The Forest Plan emphasizes middle to late successional and moderate to high amounts of long-lived conifers. The landscape is a spatial arrangement of long-lived conifers featuring red pine, white pine, and white spruce interspersed with short lived conifers, aspen, paper birch, northern hardwoods and upland openings.

Many stands in this portion of the BPR project area have an understory of white pine through natural succession. There is a need to continue to encourage the transition of the stands to longer lived conifers and encourage the existing diversity within the MA. There is also a need to maintain or develop structural and compositional complexity within these stands (FP, p. 2-2). Complexity may be enhanced with any of the following components: a variety of stand densities, gaps in canopy, varying amounts of snags, dead and downed wood, and stands with a variety of conifer species compositions.

Table 1 - Existing Ecological Conditions for MA 4.1a at the Forestwide and Project Area Scales

Forest Type	***Desired Condition (%)***	***Forestwide Existing Condition (%)***	***Project Area Existing Condition (%)***
Aspen/birch	15-25	25	33
Long-lived conifers	30-60	27	22
Short-lived conifers	20-25	24	7
Northern hardwoods	15-25	23	39
Old growth	4-7	7	6.6
Upland Openings	1-10	9	2

In MA 4.2a, restore the vegetation, species composition, and structure that typified the outwash sand plains that existed under a natural disturbance regime. The existing ecological conditions for MA 4.2a are presented in Table 2. Currently the average jack pine stand size is about 34 acres (ranging from 3 to 197 acres), while the Forest Plan guideline calls for large patches generally between 300 to 550 acres (pp. 2-9, 3-25 and 3-31). The arrangement of stands, the large stand size, and the stocking density should mimic the fire regime conditions of the area. The current stand size is smaller and older than what has historically occurred on the Baraga Plains. There are about 380 acres of over mature jack pine that are dying and succeeding to hardwoods and balsam fir.

Table 2 - Existing Ecological Conditions for MA 4.2a at the Forestwide and Project Area Scales

Forest Type	*Desired Condition (%)*	*Forestwide Existing Condition (%)*	*Project Area Existing Condition (%)*
Aspen/birch	10-25	11	16
Long-lived conifers	10-25	19	24
Short-lived conifers	50-60	51	50
Northern hardwoods	0-15	19	<1
Old growth	1-3	2.2	2.2
Upland Openings	1-5	5	3

Classify Old Growth

There is a need to adjust classified old growth to better meet Forest Plan guidance within MA 4.2a. There is a need to provide for areas of mature forest wildlife habitat and understory plant communities that depend on closed canopy conditions and/or large amounts of woody debris. There is also a need to add some old growth classifications, while declassifying other areas to better align with management direction and to provide more effective blocks of old growth (FP, p. 2-24). Approximately 363 acres were identified previously; however, some of the currently classified old growth contains few of the desired characteristics for old growth as outlined in the Forest Plan (pp. 2-25).

Manage Transportation Network

There is a need to reduce overall road density while providing a road system to sustain administrative uses, and correct site-specific locations of soil and water resource damage caused by roads. The desired condition for MA 4.1a (FP, pp. 3-23) is three to four miles of road per square mile of NFS land (miles/mile^2) at the MA scale, and presently the project area has about 8 miles/mile^2, which includes both Forest Service roads (FSR) and unauthorized roads (UNA). The desired condition for MA 4.2a (FP, pp. 3-29) is 2.5 to 3.5 miles/mile^2 at the MA scale, and this portion of the BPR project area has about 4.6 miles/mile^2, which includes both FSR and UNA. Some sites have been identified where current road conditions direct water flow down the road, causing erosion. Forestwide, each MA is currently within or below these established guidelines (Ottawa Forest Plan FEIS, 2004, pp. 3-31 and 3-32); any reduction in road densities at the project scale would assist to maintain road densities for these MAs within desired ranges.

Improve Recreation Opportunities

The recent acquisition of about 1,600 acres occupying the center of the Sturgeon River Wilderness has presented new opportunities for improving visitor access to the wilderness area, more specifically Bear's Den Overlook, and the Sturgeon River Falls

trailhead (FP, pp. 2-4). The acquisition also provides an opportunity to bring the trail to the Sturgeon River Falls in line with our trail standards.

Refinements to the transportation system (i.e., construction, decommissioning, etc.) would change opportunities for public access to the project area. In reviewing these proposed changes, appropriate motorized travel routes have been identified and would be implemented through future additions to the Ottawa's Motor Vehicle Use Map (MVUM). The 2010 MVUM (released in April 2010) is considered the existing condition on which all changes proposed to the MVUM will be analyzed.

Support Local Communities' Economies

There is a need to provide for a mix of forest products to support the economy of local communities. The forest products industry is vital to the local economy of the western Upper Peninsula of Michigan. The demand for forest products on the Ottawa is expected to increase over the coming decades (FEIS, pp. 3-85). This would include providing a mix of species and timber products (e.g. sawtimber, pulpwood, and woody biomass) (FP, pp. 2-26). Tourism for summer berry-picking, wildlife viewing and birdwatching, wilderness recreation, and motorized recreation also provides support to the local communities.

PUBLIC INVOLVEMENT

Scoping Process

A scoping letter explaining the purpose and need for action, as well as the location and type of proposed actions, was mailed to over 80 individuals, neighboring landowners, groups and public agencies in June of 2009. The scoping documents were also posted on the Ottawa's website and listed in the *Ottawa Quarterly*, a Forest published document used to inform the general public about proposed projects (see Project File, Tab B). A legal notice was published in the June 6, 2009 edition of the Ironwood, Michigan *Daily Globe*. Project details were also distributed to the local community through a township hall meeting held in Covington, Michigan on June 29, 2009.

Fourteen replies were received as a result of the scoping process. All comments were given careful consideration (Project File, Tab B). Some comments were identified as significant issues with the proposed action, which were used in the development of the alternatives presented in Chapter 2. See the Issue Development section for more information.

External Relations

The Forest Service shares in the United States' legal responsibility and treaty obligations to work with federally-recognized Tribes on a government-to-government basis to protect the Tribes' ceded territory rights on lands administered by the Forest Service. As such, the policies of the Forest Service toward federally recognized tribes

are intended to strengthen relationships and further tribal sovereignty through fulfilling mandated responsibilities.

The Ottawa outlines its policies and responsibilities on tribal relations in a 1999 Memorandum of Understanding, including tribal consultation on proposed Forest projects. In furtherance of this relationship, meetings were held with the representatives of both the Lac Vieux Desert Band of Lake Superior Chippewa and Keweenaw Bay Indian Community to discuss the project proposals, discuss concerns and encourage further input on the project. Scoping packages were also sent to other interested tribes, as well as the Great Lakes Indian Fish and Wildlife Commission (Project File, Tab B).

Several meetings were held with the Michigan Department of Natural Resources and Environment (MDNRE) and the US Department of Interior's Fish and Wildlife Service (FWS) to discuss the project and identify proposed actions. The scoping documentation was sent to local government agencies, including the Board of Commissioners for the affected counties, local township offices, and the MDNRE and the FWS. Notification of this project was sent to other government agencies via the Ottawa Quarterly.

CONTINUING PUBLIC COMMENT OPPORTUNITIES

EA Comment Period

As described in the cover letter for this EA, there are opportunities to comment on the proposed alternatives disclosed in this document. As outlined in 36 CFR 219.6, there is a formal, 30-day comment period associated with this EA. To gain standing to appeal this project, interest or comment must be received during this 30-day comment period.

Stewardship Contracting

Stewardship contracting is an authority granted by the Forest Service by Congress that allows the exchange of goods (timber) for services to accomplish important work that might not otherwise be funded. This authority carries with it a required collaboration effort to allow the Forest Service to work with parties and organizations interested and able to assist in project implementation. Projects may be selected from this EA for implementation under stewardship contracting. See the cover letter for this EA for more information about participating in this process.

ISSUE DEVELOPMENT

The ID Team categorized comments received in scoping responses as either raising a concern or significant issue (the latter as defined by 40 CFR 1500) with the proposed action. All scoping comments and resulting documentation of the issue identification process are located in the Project File (Tab B). These documents are available for review upon request.

Concerns

Concerns have been defined as those comments that can be addressed through implementation of Forest Plan direction, project design criteria, simple clarification of the project's intent or other means (see Project File, Tab B). In addition, some concerns have directly resulted in slight modifications to the proposed action as described in Chapter 2. Public concerns raised that have been determined as not constituting an issue by the Deciding Official are discussed briefly in the Public Involvement section as allowed by NEPA regulations [40 CFR 1500.4(c) and 40 CFR 1502.2(b)]. .

Additional concerns were identified, but not considered significant issues for the project area. However, these concerns were taken into account during the planning process, and are further described. One of the chief concerns identified was management of the North Country National Scenic Trail (NCNST). This concern is addressed in the design criteria to ensure that the management of the trail is consistent with the master plan for the NCNST.

Another area of concern was that vegetation management is not economically feasible for the Baraga Plains project area. In comparison to other timber harvest proposals on the Ottawa, this project's activities would likely result in less economic benefit due to the size of the project area and activities proposed. However, it is important to note that the project is not primarily focused on timber production; but rather on restoration efforts to improve habitat for the Kirtland's warbler as well as other species relying on early successional forest types.

An additional concern was raised about the use of prescribed fire from a safety standpoint. The design criteria for this project area would address this matter as well as the associated prescribed burn plan, which would be developed if an action alternative is selected. Together, the design criteria and burn plan focus on mitigating any adverse effects caused by prescribed fire. The adaptive management strategy adopted for the proposed 520-acre prescribed burn area as outlined in Chapter 2 would allow additional flexibility to use mechanical means to remove vegetation in lieu of or in addition to prescribed fire if conditions warrant its consideration. A final area of concern relates to the timing of harvest and fire, and its effects on the Kirtland's warbler. These timing considerations are also addressed in the design criteria as outlined in Appendix D.

Issues

Issues have been defined as a point of discussion, debate, or dispute that cannot be resolved without creation of alternatives to the proposed action. Commenters and the ID Team have identified the following key issues about the resource management proposals offered in the scoping document. The ID Team, with guidance from the Deciding Official, has utilized these issues in the design of an additional action alternative (Alternative 3) as described in Chapter 2.

A list of issue measurement indicators is included in each of the following issue discussions. These indicators have been developed by the ID Team to serve as a means by which to compare the effects of the different aspects of each issue. Additional measurement indicators may be presented by resource in Chapter 3 to provide a basis for alternative comparison for the identified issues or other resource-specific topics.

Issue #1: Fire Break Creation

No creation of fuel breaks along Forest Roads 2236, 2236D, 2236B and 2240 (Appendix A, Map 3).

Concerns were expressed relative to the proposal for creating and maintaining permanent openings in an area that the BPR project intends to manage as habitat for the federally endangered Kirtland's warbler and other sensitive species dependent upon the early successional jack pine forest. Post treatment, the habitat area within the BPR project area is anticipated to cover 520 acres. The fuel break creation would also create 12 additional acres of permanent opening for use in prescribed fire management. This opening could provide a variety of uses such as potential habitat other than as a fire break. Based upon this input, there is a need to consider whether the existing and/or planned transportation system can provide the needed fire breaks for prescribed fire planning and operations.

Issue Measurement Indicator:

- Acres of habitat available within the project area.

Issue #2: Activities Within Compartment 107

Further field review within the northeast portion of the BPR project area (Compartment 107) has resulted in the ID Team's identification of an area within Compartment 107 , which comprises sensitive soil types, steep slopes, drainage bottoms and stands comprised of mature long-lived conifers (i.e., white pine and hemlock). Given this landscape, the ID Team has taken the opportunity to explore a different management strategy in this area than those actions outlined in the scoping package. This has led to the ID Team's creation of Issue #2. This alternative strategy addresses a need to reduce the overall amount of harvest, change some harvest prescriptions to manage the area for a higher percentage of canopy closure, and further promote a long-lived conifer emphasis as outlined in the Forest Plan for MA 4.1a. These proposed changes subsequently affect the transportation system, in terms of associated roadwork activity for harvest operations and motorized recreational access. Therefore, there is also a need to redesign the transportation system to match the needs of the new management strategy proposed.

Issue Measurement Indicators:

- Acres of timber harvest within Compartment 107;
- Acres of land with proposed change in harvest prescription;
- Number of miles open to motorized access;
- Number of miles of road reconstruction; and
- Number of miles of road maintenance.

PROJECT CONSISTENCY WITH THE FOREST PLAN AND OTHER RELEVANT LAWS

The development of this EA is based on direction contained in the Forest Plan, the National Forest Management Act and the National Environmental Policy Act. This EA is tiered to the Ottawa's Forest Plan, its FEIS and Record of Decision. This EA is tiered to these documents as permitted by NEPA (40 CFR 1502.20).

The Forest Plan has a wide variety of goals and objectives to achieve a balanced use of the Ottawa. The proposed actions were developed to comply with the direction of the Forest Plan. It includes project design criteria to reduce or eliminate negative environmental effects and resolve concerns. The action alternatives discussed in this EA are consistent with the Forest Plan.

Material in the Forest Plan is incorporated into this document by reference as permitted by NEPA. Management direction for MAs 4.1a, 4.2a and 5.2, and for the Ottawa as a whole, has previously been decided in the Forest Plan. Comments received on broad-scale issues of management direction that are beyond the scope of the project will not be addressed in this EA.

CHAPTER 2 – ALTERNATIVES

INTRODUCTION

This chapter includes full descriptions of the alternatives and a brief summary of alternatives that were considered, but eliminated from further analysis. In addition, tabular information is presented to assist in differentiating alternatives on the basis of proposed activities.

Range of Alternatives

Section 102(e) of NEPA states, that all Federal agencies shall, "study, develop, and describe appropriate alternatives to recommend courses of actions in any proposal which involves unresolved conflicts concerning alternative uses of available resources." These unresolved conflicts are the significant issues identified and discussed in Chapter 1 of this EA.

Three alternatives were developed and analyzed in detail. A no action alternative (Alternative 1) was developed to serve as a baseline for alternative comparison. The modified proposed action (Alternative 2) addresses some of the concerns raised as a result of the scoping comment period and includes slight modifications to the original June 2009 proposal, as disclosed in this chapter. One additional action alternative (Alternative 3) has been developed to address the two issues identified during the scoping process that focus on a less intensive management strategy within the project area. This range of alternatives developed has been deemed reasonable based upon the range of public comments received and the direction set by 40 CFR 1505.1(e).

Best Available Information

The information presented in this EA is estimated based upon the best available information. It is important to understand the location and amount of proposed activities implemented may vary from what is described here. One example of approximations included in this analysis is the use of full stand acreages for timber harvest proposals as shown in Appendix B. Implementation of project design criteria, as presented in Appendix D, would often exclude some acres of harvest in areas where resource protection is necessary.

Field surveys by project specialists, as well as the ID Team as a whole, have been crucial in providing current data that have been utilized to prepare affected environment resource evaluations. These evaluations have resulted in the development of the purpose and need of this proposal. Other data collected have been gathered through the use of Forest Service databases, such as GIS, which provides the most current baseline information for use in project design. Some estimated calculations, presented in this chapter, have been devised through skilled interpretations of aerial photos and maps; application of professional judgment in light of observations and evaluation of data; as well as information acquired from review of relevant, scientific literature.

Although field surveys have been completed within the project area, more intensive field reconnaissance is often needed to implement an action on the ground. Variances in the location of features on the landscape, such as soil types, boundaries of riparian features, as well as the extent and density of vegetation in a given area, do occur. Other changes, such as new information may require implementation strategies to be altered. The flexibility provided through approximation allows us to take needed changes into consideration and adapt the manner in which implementation is conducted, including changes to harvest prescription, harvest boundary or road location, while doing the utmost to remain within the scope of the management strategy selected for implementation.

Appendix B contains a list of stands proposed for harvest and other activities. If an action alternative is selected, findings provided by field reconnaissance efforts after the decision is made may warrant additional changes to the activities selected to better reflect actual conditions on the ground. Depending on the degree of change between the estimated area affected by an action disclosed in this EA and the anticipated post-implementation results, additional documentation may be warranted. Direction contained in Forest Service Handbook (FSH) 1909.15, Section 18 allows for the correction, supplementation or revision of environmental documentation and/or the reconsideration of a decision to take action. Simple corrections, such as those to reflect mapping errors and/or changes to the amount and location of activities can be incorporated into the project file without additional environmental analysis if the scope of change does not exceed the anticipated effects disclosed in this analysis.

ALTERNATIVES CONSIDERED, BUT ELIMINATED FROM DETAILED ANALYSIS

The ID Team discussed many options for management utilizing both internal concerns and public comments. The following alternatives to the original proposed action were developed through project planning in ID Team meetings and recommendations brought forth during the scoping period. For reasons explained below, the ID Team has decided not to implement the following alternatives because they do not fully address the purpose and need of the project. Therefore, these alternatives have been eliminated from further analysis and will not be discussed further.

Increased Amount of Aspen Regeneration

Concerns were expressed regarding the opportunity to increase the amount of aspen regeneration created through the BPR project. Based upon comments received, the ID Team did re-evaluate the project's aspen proposal, in terms of existing conditions and purpose and need for the project. Given that the percentage of aspen is within the desired ranges in both MA 4.1a and MA 4.2a at the Forestwide scale (Tables 1 and 2), and each of these MAs has an emphasis to provide long- and short-lived conifers, it has been determined that no changes to the harvest proposal would be considered within this portion of the BPR project area at this time. The ID Team recognizes that maintaining the aspen forest type on the Ottawa is an important objective. Therefore,

both action alternatives have been modified to allow harvest of aspen patches (at least two acres in size) within other forest types to maintain aspen as a component on the landscape where it currently exists (Appendix D).

Change in the Amount of Old Growth Classification Proposed

Requests for reconsideration of the amount of old growth classified were received during the scoping period. Some commenters expressed concern that not enough old growth was proposed and others believed too much old growth was proposed. Review of the BPR project resulted in the identification of 211 acres of the total 9,481 NFS acres (MA 4.2a) that possess the desired characteristics for old growth classification as outlined in the Forest Plan (p. 2-25).

As the old growth percentages are within the desired range at the Forestwide for MAs 4.1a and 4.2a (see Tables 1 and 2), and no other stands were identified as possessing the required characteristics, no further acreage has been proposed. Given that the proposal includes declassification of 133 acres in MA 4.2a which no longer possess old growth characteristics and the declassification of additional acreage would not meet the purpose and need for the project, no additional reductions in old growth acreage have been proposed. The net gain of 78 acres of old growth within the MA 4.2a would not cause the percentage to exceed the desired range outlined in MA 4.2a (FP, p. 3-29).

ALTERNATIVES CONSIDERED

Alternative 1 (No Action)

This alternative was developed in response to NEPA requirements [40 CFR 1502.14(d)] for a No Action alternative. Alternative 1 serves as a baseline for evaluating other alternatives during the effects analysis for proposed actions.

Alternative 1 does not propose any new ground disturbing activities or changes in management strategies within the project area (i.e., old growth classification). Therefore, no timber harvest would occur on NFS lands within the project area. Alternative 1 would not assist to progress the project area toward (or maintain conditions within) the desired conditions as described in the Forest Plan for MAs 4.1a, 4.2a and 5.2 (FP, pp. 3-21 to 3-31; and 3-38 to 3-43). This alternative would not meet the purpose and need discussed in Chapter 1.

The transportation system would not be refined as a result of Alternative 1. Several roads are currently experiencing problems due to rutting, sedimentation, poor drainage or other erosion problems that would not be addressed under this alternative. Current activities such as dispersed and developed recreation use; designated motor vehicle use for passenger vehicles and OHVs; as well as scheduled road maintenance within the project area would continue. The existing land and resource conditions would be unaffected, except through natural occurrences and processes. See Chapter 3 for more

information regarding Alternative 1 per resource. Refer to Appendix A, Map 6 for a depiction of the existing transportation system.

Alternative 2 (Modified Proposed Action)

The ID Team has modified the proposed action disclosed during the scoping effort due to concerns expressed by the public, as well as internally. The modified proposed action, herein referred to as Alternative 2, was developed utilizing information and data gathered from the project area and with direction from the Deciding Official. In developing Alternative 2, the ID Team reviewed the purpose and need for action, and looked for management opportunities within the project area to move existing conditions towards or maintain conditions within the desired conditions as outlined in the Forest Plan. This alternative is intended to specifically address the differences between the current conditions within the project area and the desired conditions for MAs 4.1a, 4.2a and 5.2.

As stated in Chapter 1, the Deciding Official has modified Alternative 2 based upon the need to make necessary changes to the proposed action (e.g., the set of activities disclosed in the June 2009 scoping document). The basis of the modifications includes consideration of comments received through the scoping process; new information resulting from further field review; and the ID Team's recognition of minor errors that were displayed in the scoping document. See the following resource discussions for more information regarding the difference between the June 2009 proposal and Alternative 2 as analyzed in this document. Specifically, these changes are:

- Transportation surveys were completed after scoping;
    - Changes included reducing miles of maintenance on 2287D and 2270J, and increasing maintenance miles of 2291-F1;
    - 2.1 miles more of road decommissioning;
    - 1.2 miles less road reconstruction;
    - 7.4 miles less road maintenance; and
    - These above changes led to a reduction of roads open to OHVs: roads no longer open include Forest Roads 2270-J3, 2287-D, 2291-F1 and F1A, and 2270-J.
- Vegetative treatments changed due to refinements to the GIS layer; and
- A change to proposed OHV access, which is discussed in detail later in this chapter.

To meet the purpose and need for this project, the following activities are proposed. All acreages and other figures are approximate and would likely vary to a minor extent during implementation. See Appendix A, Maps 3, 4, 7, and 10 for a display of the actions proposed in Alternative 2. A summary of calculations (e.g., acreages, mileages), per alternative, are located in the Alternative Comparison section at the end of this chapter (see Table 3).

Enhance Habitat for Wildlife, Plants and Insects

Create an approximately 520-acre block of suitable jack pine habitat for the federally endangered Kirtland's warbler, spruce grouse, black-backed woodpecker and other rare species in MA 4.2a. We may use a variety of methods to simultaneously regenerate 15 stands that are currently in various stages of succession as part of an adaptive management strategy to ensure that objectives are met in this area (see more information on the following page and Appendix G). To accomplish this work, this strategy may include commercial timber harvest, non-commercial timber harvest, prescribed burning, mechanical site preparation and tree planting.

As part of this proposal, some trees would be mechanically removed from the 520-acre area prior to the prescribed burn to reduce fuel loading. Reduction of fuels would benefit the area in several ways, including providing a safer operating environment as removal of some fuels is anticipated to result in a less intense fire response. As part of the fuel reduction, about 20% of the mature/overmature jack pine (8 stands comprising 340 acres) would be removed utilizing the seed tree harvest method. The residual trees would serve as wildlife habitat and offer a future seed source for the area.

Seven of the 15 stands (about 180 acres) are comprised of immature jack pine (e.g., sub-merchantable sized trees). These stands would also be subject to vegetation removal prior to the proposed prescribed burn effort. Fuel reduction activities would include removing (e.g., thinning) some rows of jack pine within these stands, while retaining some rows to be burned. Removing some rows from these dense stands is expected to reduce the intensity of the prescribed fire. The residual trees would provide the seed source to regenerate the stands in the post-fire habitat. A stocking density of about 1,200 trees per acre is required for Kirtland's warbler habitat.

Based on post-treatment conditions and the determination on whether the prescribed fire accomplished the desired objectives, these stands may also be subject to mechanical treatment (see Chapter 3 for more information). Hand planting of jack pine may be required to attain the desired stocking density.

In light of the vegetation removal objectives for this area prior to the prescribed burn, a traditional timber sale would be less economically efficient. The opportunities to perform, and benefit from these pre-burn activities outweigh the costs of operating equipment to remove the vegetation especially given the amount of submerchantable timber available. One option is to remove both merchantable and submerchantable trees via a biomass harvest operation. Design criteria have been proposed to address a biomass operation if it is selected for implementation.

Pre-commercial thinning treatments may also be required to create small (<1/4 acre) openings scattered throughout the dense jack pine thickets. An average of 15 to 25 snags/acre, (mostly in clumps) would be left to benefit black-backed woodpeckers, in those older stands which have trees of larger diameter (>10" diameter at breast height (dbh)).

Adaptive Management

Adaptive management is allowed pursuant to Forest Service Handbook 1909.15, Section 14.1, which provides an implementation tool that incorporates an "implement-monitor-adapt" strategy. This strategy provides flexibility to: (1) account for changes to initial assumptions; (2) adapt to changes in environmental conditions; and (3) allow for a management response based on monitoring information, which may indicate that desired conditions are not being met (See Appendix G).

Pursuant to 36 CFR 220.5(d)(2) and 36 CFR 220.7(b)(2)(iv), the analysis for an adaptive management strategy must include the effects of proposed alternatives, effects of likely adjustments made based on the parameters of the strategy, and the procedures established during implementation to monitor whether an action(s) produces the intended effect.

The ID Team has determined that prescribed fire is the most effective ecological choice to meet the purpose and need for this project. However, incorporation of an adaptive management strategy would allow the Ottawa to use other types of vegetation management to meet objectives if post-fire conditions warrant implementation of additional activities to fulfill habitat objectives. This would greatly depend on the habitat's response to the prescribed fire treatment. Once the prescribed fire effort is complete, immediate seed dispersal is anticipated. If the stocking density of jack pine seedlings occupying the 520-acre block in the post-fire habitat does not meet required densities for the Kirtland's warbler, the area may be subject to: (1) further removal of standing vegetation via additional prescribed fire use or by mechanical means, (2) hand planting of jack pine, and (3) associated site preparation activities.

Figure 3 - A large xeric (dry) opening in the project area.

Maintain openings within the outwash sand plains ecosystem. Both large and small openings would be maintained within the project area through the use of prescribed fire or mechanical treatments (Figure 3 and Appendix A, Map 3). The upper one-third of a 138 acre opening (T49N, R35W, Section 24) was treated in April 2007 and April 2010 by prescribed fire. The lower two-thirds were mechanically treated in October 2007, and treated by prescribed fire in May of 2009. Continued maintenance of this area as an opening would enhance growth of big and little bluestem grasses, poverty oats, hairgrass, and blueberries. Ecologically, maintaining this opening would be best accomplished by periodic prescribed fire, on a four- to five-year rotation. Mechanical treatment would be a less effective substitute since it does not remove the grass litter or stimulate growth of

native grasses and blueberry fruit production; however, mechanical treatment could occur if the use of prescribed fire is not available.

Maintenance of smaller, dry-mesic (moist) permanent openings is proposed within the following stands: Compartment 107, stand 20, and Compartment 110, stand 31 and 42 (refer to Appendix A, Map 3). These are young, red pine-oak stands (about 20 years old), with small open areas that would be enhanced to make one or more small openings ranging from 0.1 to 0.5- acre each.

Reintroduce Prescribed Fire and Treat Hazardous Fuels

Create fuel breaks. Creation of a permanent fuel break would involve the removal of trees and shrubs through mechanical means along Forest Roads 2200, 2236, 2236D, 2236B and 2240 (see Appendix A, Map 3). Removal of all trees and shrubs and periodically mowing to a distance of 33 feet from each side of the road would be applied to FR 2200, FR 2236, FR 2236D, FR 2236B, and FR 2240 to the intersection of FR 2248. At this point, the clearance recommendation would change to 15 feet from the edge of both sides of the road due to a change in forest cover type from primarily pine types in the south to a more northern hardwood forest type. The fuel break would continue northerly along FR 2240 to the northern project boundary. The fuel break would be maintained in the future to allow additional prescribed fire activities in the area without creation of new openings, resulting in a 39 acre permanent opening. In addition, other roads may be utilized as firebreaks which could include pre-fire treatment activities such as mowing and cutting of brush adjacent to roadsides.

Control fuels to manage wildfire spread risk to neighboring communities. Mitigating fuel hazards is an important strategy for managing wildfire risks. This proposal includes fuel reduction projects such as vegetation removal to improve condition class for the protection of specific values and reduces the risk of wildfires to adjacent landowners. The ownership boundary between the Ottawa and the Copper Country State Forest is aligned north-to- south, with predominant fire spread likely to cross this boundary. Compatible, if not complementary, treatments across that boundary would better manage the risk of wildfire occurrences.

Treat Vegetation to Meet Multiple Forest Plan Objectives and Support the Local Community's Economy

Restore the vegetation species composition and structure in MA 4.1a to enhance long-lived conifer and mid-tolerant tree species. The majority of treatment proposed in MA 4.1a (Table 1 and Appendix A, Map 4) is approximately 960 acres of **selection harvest** (Appendix F), along with about 260 acres of thinning and improvement treatments to increase or maintain diversity, emphasizing red and white pine and northern red oak. The remaining treatments are about 610 acres of clearcut harvest to regenerate either aspen or jack pine, along with about 135 acres of **shelterwood harvest** (Appendix F) to emphasize paper birch regeneration. Another 20 acres are proposed as salvage harvest within the jack pine forest type.

Restore the vegetation species composition and structure that existed in the outwash sand plains under natural disturbances in MA 4.2a. In addition to the proposed 520-acre block of jack pine regeneration, there are also 380 acres of over mature jack pine that would be clearcut to regenerate and maintain the jack pine forest type (see Table 2 and Appendix A, Map 4). The remainder of the clearcuts (about 210 acres) in this management area would regenerate aspen. There are 780 acres proposed for thinning treatments in pine and oak stands to maintain or increase species diversity. The remaining treatments proposed include a 24 acre improvement cut to favor long-lived conifers and approximately 50 acres of salvage harvest to remove dead and dying trees from within the jack pine forest type.

Classify Old Growth

Adjust classified old growth to better align with Forest Plan direction. This alternative proposes about 211 acres of additional old growth classification (Appendix A, Map 4). Factors considered included occurrence of existing old growth conditions and grouping old growth stands together to form corridors or larger contiguous areas. Currently classified stands in MA 4.2a possess little, if any, old growth characteristics, and they do not contribute to old growth connectivity or larger core areas, as outlined in the Forest Plan (p. 2-24). Three stands are proposed for declassification (133 acres) that no longer possess old growth characteristics as identified in the Forest Plan (p. 2-25).

There are approximately 211 acres of proposed old growth that are located west of FR 2200 and adjacent to the Sturgeon River Gorge Wilderness Area. These stands are currently undergoing successional change and are developing towards old growth. This additional area would provide an effective block of old growth within the BPR project area. The presently classified 230 acres of old growth in the MA 4.1a portion of the project area meet Forest Plan desired conditions and would remain old growth as part of this proposal. This would result in approximately 441 acres of old growth forest in the BPR area.

Manage Transportation Network

Provide a road system that meets long-term transportation and management needs. See Appendix A, Map 6 for the existing transportation system and Appendix A, Map 7 for proposed new construction, maintained, reconstructed, and decommissioned roads. Map 10 of Appendix A illustrates proposed changes to motorized access designation for future editions of the Ottawa's Motorized Vehicle Use Map (MVUM). All road miles and locations shown are approximate.

There are approximately 88 miles of Forest System and **unauthorized** (Appendix F) roads in the BPR project area. The proposal is to reduce this number to approximately 57 miles. Forest Service roads would have drainage structures installed as deemed appropriate for the site.

New construction of just over 1 mile is needed to connect existing road segments or extend the length of others. There would also be temporary roads built at a minimal standard to reduce ground disturbance. Temporary roads would be built to a minimized road width, specifically located to reduce the amount of cuts and fills and other disturbed areas. Temporary roads are not intended to be a part of the forest transportation system and not necessary for long term resource management. Exact locations of this temporary road construction, if needed, would be determined at the time of sale design. All temporary roads would be decommissioned after completion of harvest (Appendix D). Reconstruction is proposed on 3 miles of road to improve the roads to a standard that meets recreation and harvest access needs. Approximately 44 miles of road require maintenance prior to use.

Decommissioning is proposed for about 35 miles of roads. All roads slated for decommissioning would be evaluated, and appropriate actions would be identified as needed to effectively close the road to all motorized use and return the road to a more natural state. Roads identified for decommissioning on the proposed transportation map would not be available for motorized use in the future. As part of the modifications to Alternative 2, further evaluation of roads identified in the BPR project area for use during harvest operations has been performed (as shown in Appendix 6 of the scoping letter); therefore, the end of Forest Road 2287-D as shown in scoping package would no longer be needed to maintained to access timber stands. The beginning of Forest Road 2287-D and 2287-D1 was renamed 2287-D and is part of this Alternative.

There would be a variety of other road work actions including: gravel surfacing, blading, installing or removing berms or gates, and installing or removing **hardened water crossings** (Appendix F) and/or culverts if they exist.

Improve Recreation Opportunities

Changes to proposed motorized recreational access. Under the proposed road system, there are about 42 miles of road to be managed as closed to highway legal vehicles, but open to ATV access and 33.8 miles of roads open to all motorized uses (e.g., highway legal vehicles and OHVs). Some roads would be capable of supporting OHVs after drainage structures are installed and road reconstruction occurs, whereas others are suitable for OHV access in their current conditions. As part of the modifications to Alternative 2, the ID Team performed a secondary review of those roads proposed for motorized use in the scoping letter. Due to no maintenance being carried out, the following roads will be excluded from the motorized access proposal: Forest Roads 2270-J3, 2287-D, 2291-F1 and F1A, and a portion of 2270-J has been excluded from the OHV access proposal (Project File, Tab C).

Improve access and facilities to the newly acquired tract of land within the Sturgeon River Gorge Wilderness. There would be a variety of work outside the wilderness area in MA 4.2a to improve public access including: removal of approximately 15 to 30 trees to increase the accessibility of the existing parking areas; maintenance of hiking trails; improvement of existing barriers and construction of additional barriers to limit OHV

traffic to the Bear's Den Overlook hiking trail and the Pine Bluff trail (Appendix A, Map 3). Informational signing would be placed in these locations, as well as along the trails and the roads adjacent to the wilderness.

Sturgeon Falls Trail Re-Route. An additional proposed project is reconstruction, construction, and rerouting of the Sturgeon Falls trail within MA 5.2, the Sturgeon River Gorge Wilderness area. The trail is heavily used and presently does not meet USFS trail standards. The trail is too steep in many areas, does not use full bench construction, and does not have the clearing limits that reflect use. Plans would be to add additional switchbacks to improve erosion control to meet agency standards: these additional switchbacks could lengthen the trail up to an additional 0.5 miles. Another project relocates the North Country spur trail located in MA 4.2a in order to facilitate easy access to the Sturgeon River Falls trail (Appendix A, Map 3)

Alternative 3

This alternative was designed to address the issues, while meeting the purpose and need for the proposal described in Chapter 1. Specifically, Alternative 3 includes less vegetation treatment and fewer miles of associated roadwork and subsequent motorized access opportunities. Alternative 3 also offers less opening creation and maintenance as outlined below. All actions proposed under Alternative 2 will be considered under Alternative 3, with exception of the following changes.

Fewer Acres of Vegetation Treatment and Subsequent Actions

Additional field review in Compartment 107 (Appendix A, Map 5) has led to the identification of a **dendritic** (Appendix F) drainage pattern of steep slopes and drainage bottoms. This type of relief and topography is very different from the majority of the flat plains of the rest of the project area. It is important to note that design criteria are incorporated into both Alternatives 2 and 3 to ensure protection of resources, such as sensitive soils. However, as comments were received that requested the Deciding Official consider an alternative with less timber harvest, the ID Team re-evaluated the original timber harvest proposal in Compartment 107 in light of this new information. As a result, the ID Team designed Alternative 3 to include a more moderate harvest proposal.

The following stands in Compartment 107 would not receive a selection harvest prescription: 10, 19, 21, 22, 23, 24, 25, 26, 32, 36, 37, 38, 49, 50, 51, 56, 57, 58, 70, 71, 72, and 73 (see Appendix A, cross-reference Maps 4 and 5). As the transportation system proposed to reach these stands is no longer needed under this alternative, the following changes are also proposed. No change to the planned decommissioning of roads leading from the Forest Roads listed below would be necessary due to the exclusion of vegetation treatment. In addition, it has been determined that the exclusion of the following roadwork activities would not affect the current recreational access in this area; the existing conditions of these roads have been deemed suitable for sustaining OHV traffic.

- No road reconstruction of Forest Road 2291-H2;
- No road maintenance on the entirety of the following Forest Roads: 2291-F1 and its spur F1A; 2270-J3; 2286-A and its spur A1; 2287-B; and 2287-F1;
- No road maintenance on portions of the following Forest Roads: 2270-D, and 2287-F;
- No MVUM motorized access would be allowed on Forest Roads, 2286-A, 2286-A1, 2287-F and 2287-F1 since the road maintenance actions would have been needed in these areas to create road conditions that support OHV use; and
- No MVUM motorized access would be allowed on 2270-J to reduce user conflicts and illegal stream crossing.

To provide a higher percentage of canopy closure, maintain the existing understory vegetation (e.g., advanced tree regeneration), and further promote a long-lived conifer emphasis as outlined in the Forest Plan for MA 4.1a, the following stands within Compartment 107 would receive an commercial thinning harvest (in lieu of clearcut harvest as outlined under Alternative 2): 12, 13, 17, 31, 34, 39, 48, and 64. No changes to the transportation system or resulting public access are needed based on these harvest prescription changes.

Opening Creation and/or Maintenance

No fuel breaks would be created under this alternative as shown on Map 3 of Appendix A. Excluding this action would decrease the acreage of fuel breaks managed within the habitat area that would be available for the Kirtland's warbler and other species dependent on the jack pine ecosystem. Existing roads, along with their cleared right-of-ways, within the project area could serve as fire break lines for prescribed fire operations.

Maintenance of the 138-acre opening would be excluded under Alternative 3. Excluding this action under Alternative 3 would provide an opportunity for a greater length of time for monitoring between treatments to determine if vegetation re-establishment and other desired conditions can be achieved without the use of prescribed fire in a four to five year interval as currently managed. Additional treatment of this area would need to be addressed under a separate project.

Maintenance of smaller, dry-mesic (moist) permanent openings that is proposed in Alternative 2 would also be treated under this Alternative.

ACTIVITIES COMMON TO ALL ACTION ALTERNATIVES

Design Criteria Common to All Action Alternatives

In addition to the proposals discussed, the ID Team provided direction for how implementation of proposed actions would be conducted. These measures, called project design criteria, are developed to address any potential resource concerns that

may result from implementation of the proposed actions (Appendix D). Anticipating the need for these measures during the project planning phase assists the Ottawa with ensuring that the applicable management direction of the Forest Plan is followed for all actions proposed. Estimated measurements in this document would likely vary slightly as a result of these resource protecting design criteria.

Site-Specific Monitoring

Both NFMA and NEPA require that the application of Forest Plan standards be monitored. Implementation of the Forest Plan is monitored on a sample basis to ensure that activities reasonably conform to the management area direction. Monitoring Reports are written to track the Forest's progress of attaining management area objectives. The monitoring framework established for the Forest Plan (pp. 4-5 to 4-21) includes monitoring and evaluation for several resources applicable to this project. Examples include forest management contributions to conserve habitat for sensitive, threatened and endangered species as well as the use of fire as a means of reducing hazardous fuels and restoration of natural processes and functions (Forest Plan, pp. 4-19 to 4-21). Therefore, monitoring associated with this project is focused upon site-specific actions as part of the adaptive management strategy as follows.

1) Within five growing seasons from implementation of the prescribed burn within the 520-acre block, review of habitat conditions would occur to determine if the following objectives have been met:

    - Whether the desired jack pine stocking density was sufficient enough to meet Kirtland's warbler habitat needs was attained.
    - Whether other desired habitat conditions were met (i.e., ≤1/4-acre openings; 15-25 snags/acre).

If monitoring shows that these conditions have not been met, then additional treatments may be implemented, which could include planting and/or removal of vegetation to create openings along with additional site preparation and/or seeding.

The Silviculturist would ensure that harvest prescriptions are in compliance with direction generated in the EA and that stocking in stands harvested with individual selection or clearcut prescriptions are monitored to determine regeneration success (e.g., first, third, and fifth year surveys).

COMPARISON OF ALTERNATIVES

The following tables show how the alternatives compare with each other based on proposed management activities with the project area. The indicators in Table 3 relate directly to the issues identified and discussed in Chapter 1. The remainder of the tables (4-7) illustrate how the alternatives compare in other respects. All data in the following section are approximations and used for comparison of the alternatives.

Table 3 - Comparison of Alternatives Based on Issue Indicators

Issues	***Alternative 1***	***Alternative 2***	***Alternative 3***
Fire Break Creation	No	Yes	No
Management[1] within Compartment 107	No	Yes	No
Acres of Northern Hardwood Selection Harvest	0	956	86
Acres of Aspen Clearcut Harvest	0	750	499
Miles of Road Reconstruction	0	3.1	2.6
Miles of Road Maintenance[2]	0	43.6	38.1
Miles of Roads for All Vehicles[3]	34.3	33.8	33.6
Miles of OHV Access	34.5	42.3	35.7

[1]There would be no hardwood management in Alternative 3.

[2]Road maintenance miles are specific to the actions proposed to provide suitable road conditions for timber harvest; annual road maintenance of higher level roads is outside the scope of the project.

[3]Roads open to all vehicles do not necessarily coincide with miles of OHV access, as OML 3 roads are not open to OHV access.

Table 4 - Comparison of Alternatives Based on Vegetation Treatment (in acres)[1]

Harvest Prescriptions	***Alternative 1***	***Alternative 2***	***Alternative 3***
Jack Pine	0	380	380
Aspen Forest Types	0	750	499
Paper Birch	0	73	73
Total Clearcut Harvest	0	1203	952
Selection Harvest (Northern Hardwoods)	0	956	86
Improvement Cut (Northern Hardwoods)	0	49	49
Shelterwood Harvest (Paper Birch)	0	135	135
Commerical Thinning (Conifer)	0	1010	1158
Sanitation/Salvage (Jack Pine)	0	71	40

[1]These acreages reflect a refinement and improvement in the GIS data; this has resulted in stand lines changing somewhat from the original scoping document, thus causing a difference in acreages between the scoping document and this EA.

Table 5 - Comparison of Alternatives Based on Fuels Management (in acres)

Proposed Activities	***Alternative 1***	***Alternative 2***	***Alternative 3***
Prescribed Fire Use[1]	0	658	520
Jack pine habitat	0	520	520
Opening maintenance for blueberry fruit production, native sand plain plant enhancement and insects	0	138	0

Proposed Activities	*Alternative 1*	*Alternative 2*	*Alternative 3*
Opening created/maintained for fire breaks	0	39[2]	27
Hazardous Fuels Activities Mowing/maintenance of fire lines	0	21	21

[1]*Although the use of prescribed fire is anticipated to result in the most desired outcome, other means of vegetation treatment, such as commercial and non-commercial timber harvest, biomass harvest may be used during site preparation measures and, in some cases, in lieu of prescribed fire based upon the existing or post-burn conditions and opportunities.*

[2]*This opening consists of 39 permanent acres (comprised of approximately 27 acres of road surface and right-of- ways and approximately 12 acres of additional open areas), as disclosed on page 19 of this EA.*

Table 6 - Comparison of Alternatives Based on Transportation System Management (in miles)

Proposed Road/Access Activities	*Alternative 1*	*Alternative 2*	*Alternative 3*
Existing Forest Service Roads	49.7	49.7	49.7
Existing Unauthorized Roads	38.5	38.5	38.5
Construction	0	1.3	1.3
Reconstruction	0	3.1	2.6
Maintenance	0	43.6	38.1
Decommissioning Forest System Roads Unauthorized Roads	 0 0	 3.1 32.2	 3.1 32.2
Roads Managed Closed to All Motorized Access	15.5	26.3	26.5
Roads Managed Open to All Motorized Access	34.3	33.8	33.6
Roads Managed Open to Highway Vehicles Only	10.7	10.7	10.7
Roads Managed to ATVs Only	34.5	42.3	35.7
Road Density by Management Area at Project Area Scale[1] MA 4.1a (desired 3 to 4 mi/mi^2) MA 4.2a (desired 2 ½ to 3 ½ mi/mi^2) Roads Managed as Forest System Roads	 8.0 4.6 49.7	 3.7 4.2 60.1	 3.7 4.2 60.1

[1]*Desired system road densities are outlined in the Forest Plan on pages 3-23 and 3-29.*

Table 7 - Comparison of Alternatives Based on Other Actions

Proposed Road/Access Activities	***Alternative 1***	***Alternative 2***	***Alternative 3***
Existing Old Growth Classification	363	230	230
Proposed Old Growth Classification	0	211	211
Declassified Old Growth Classification	0	133	133
Total Old Growth Classification	363	441[1]	441[1]

[1]*Total old growth acres under Alternative 2 and Alternative 3 are the result of combining current old growth acres and the proposed old growth acres.*

CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the affected environment, which includes the physical, biological and human aspects of the resources within the project area that may be changed through implementation of an action(s) of a proposed alternative. In addition, this chapter presents the existing conditions of these project area resources. This baseline information provides a means to both evaluate the effects of implementing a proposed alternative and to measure the progress toward achieving (or maintaining) the Forest Plan's desired conditions.

The following analyses disclose the direct, indirect and cumulative impacts (effects) of implementing the proposed alternatives (40 CFR 1508.7 and 1508.8). Both direct and indirect effects are changes that would occur to the affected environment if the proposed alternative was implemented. A direct effect occurs at the same time and place where an action is implemented, while an indirect effect occurs at a later time or a distance from the site of implementation. A cumulative effect is defined as an impact on the affected environment that results from the accumulation of impacts from the direct and indirect effects of the proposed action(s) for this proposal in addition to and that overlap with the resulting effects of past, present and reasonably foreseeable future actions. This overlap, or bounds of analysis, is defined both temporally (in time) and spatially (by location) and may vary dependent upon the resource. Effects activities are counted regardless of land ownership or jurisdiction.

In order to understand the contribution of past actions to the cumulative effects analysis for this project, the following analyses use the existing condition as a proxy for the impacts of past actions. Therefore, the existing condition baseline information already reflects the accumulation of effects from prior human actions and natural events within the identified bounds of analysis. Cumulative effects analyses do not attempt to quantify the effects of past human actions through adding up all prior actions on an action-by-action basis. This level of detail would not be useful in predicting the anticipated cumulative effects of the proposed alternatives.

In June 2005, the Council of Environmental Quality issued a memorandum presenting guidance on the extent of analysis required for past actions in cumulative effects analyses in accordance with Section 102 of NEPA. This memorandum states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (CEQ, 2005). The cumulative effects analysis in this EA is also consistent with NEPA Regulations (36 CFR 220.4(f)), which states, "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the

present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects."

The following resource discussions presented are summaries of the specialist reports prepared for this project; this EA is tiered to the specialist reports and all other supporting information in the project file.

WILDLIFE

AFFECTED ENVIRONMENT

Many wildlife resources in the project area are typical of the region. White-tailed deer, black bear, and ruffed grouse can all be found within the project area, and are representative of the common game species hunted. A wide variety of non-game species can also be found in this area, including some Federally-listed species (i.e. Kirtland's warbler, and gray wolf). There are a number of wildlife species uncommon in the western UP, but can be found in greater numbers under certain conditions in the sand plains habitats of the Baraga Plains. These include spruce grouse, black-backed woodpecker, upland sandpiper and some species of grassland sparrows.

The largest portion of the project area is in MA 4.2a, where the emphasis is on maintaining jack pine to provide for species needing this habitat type (e.g. Kirtland's warbler, spruce grouse, black-backed woodpecker, and northern barrens tiger beetle). All of these species with the exception of the Kirtland's warbler are on the Regional Forester Sensitive Species (RFSS). The Kirtland's warbler is a Federally and State endangered species. Additionally, there is an emphasis on providing large openings for species dependent upon large treeless expanses (e.g. upland sandpiper, various sparrows, butterflies and several plant species such as big and little bluestem grasses and blueberries). More information is available in the silviculture and botany sections of Chapter 3 of this report.

Several RFSS in addition to those mentioned above occur in the project area including the northern goshawk, and red-shouldered hawk which are discussed in detail in the Baraga Plains Biological Evaluation (BE), which is available for review upon request. Below is a summary for species that are important in relation to this project.

Forest Plan Direction

Applicable direction of the Forest Plan for wildlife resources at the forest wide scale can be found on pages 2-9 and 2-27 (US Forest Service, 2006). At the management area scale, Forest Plan direction for MA 4.1a and MA 4.2a can be found on pages 3-25 to 26 and 3-30 to 31, respectively.

The 2006 Forest Plan calls for a mix of age classes within the aspen/paper birch vegetation type to support conservation, economic, and social objectives associated with early successional habitats (p. 2-6). The long-term objective is to maintain at least 12,000 acres of 0 to 9 year aspen/paper birch regeneration for ruffed grouse habitat, well-distributed on lands suited for timber production (Forest Plan, p. 2-8). Over time this would ensure provision of all age classes of aspen.

The Forest Plan identifies the goals of managing Kirtland's warbler habitat using ecosystem management principles that mimic/resemble historic conditions and disturbance regimes (pages 3-25 and 3-31). This includes developing habitat by designing and configuring treatment blocks that mimic the regeneration effects of stand replacing wildfires.

EARLY SUCCESSIONAL HABITAT

Early successional species, such as Kirtland's warbler, ruffed grouse, American robin, meadow vole, and eastern garter snake, can be found in lower numbers within the project area, wherever early successional habitats (e.g., young jack pine and aspen, grassy/forb openings) occur. The component of young jack pine (4 to 22 years) suitable for Kirtland's warbler nesting habitat is currently 19 percent of the total jack pine habitat present within the project area. There are currently no contiguous areas of young jack pine that meet Forest-wide objectives of 300 to 550 acres within the project area or within National Forest Service (NFS) lands on the Ottawa. There is a need to increase the acreage of young jack pine and aspen in the project area in order to provide this habitat for species that rely on it.

In addition to jack pine and aspen habitat, non-forested openings are also an important consideration in the project area. There is an opportunity to increase the amount of openings in MA 4.1a with more mesic openings suited to RFSS plants and invertebrates.

Kirtland's Warbler Habitat

The Kirtland's warbler has only recently been documented on the Ottawa. It was first documented on the Ottawa in the summer of 2008 when a young male was discovered singing in the project area. In the spring of 2009, in the same general area, three males and two females were detected, and nesting behavior was demonstrated by the two females. In 2010, three males were confirmed in the project area. Therefore, it is documented that the Ottawa does provide breeding habitat for the Kirtland's warbler, albeit relatively little at the present time, and the best habitat on the Forest is in the Baraga Plains portion of the Forest.

Kirtland's warblers evolved in the jack pine ecosystem where frequent large scale wildfires occurred and created large blocks of young, dense jack pine. They nest almost exclusively at the base of young jack pine trees, and frequently in close proximity to small grassy openings. Ideal stands are six to 22 years old, five to 20 feet tall and

greater than 80 acres in size, with patches >300 acres being consistently used (Huber et al. 2001). High tree density is important, with a stocking density of 1,200 or more trees per acre preferred. Ideal habitat consists of homogenous thickets of small jack pine interspersed with many small openings and ample ground cover (3 to 8 inches high). The northern one-third (MA 4.1a) of the project area is considered unsuitable habitat for the Kirtland's warbler

The breeding population has been steadily increasing the last two decades in the Lakes States area. Since 1989, the population appears to have increased almost every year, exceeding the recovery goal (Byelich et al. 1985) every year since 2001.

Black-Backed Woodpecker Habitat

The Black-backed woodpecker (BBWO) is one of several species that are considered fire specialists. They can be found at very low levels in other habitats, but existing evidence strongly indicates that they select high-severity fire areas (generally, areas with 75 to 80 percent or greater tree mortality) for nesting and foraging (Russell et al. 2007, Hutto 2008, Hutto and Woolf 2009). This species of woodpecker select high-severity patches in areas where pre-fire canopy cover and tree density are moderate to high (Russell et al. 2007). Russell et al. (2007) found that 89 percent of BBWO nests were in areas where pre-fire canopy cover was 40 to100 percent, while only 52 percent of non-nest random locations had 40 to100 percent canopy cover. Within such areas, the BBWO are positively associated with an increasing number and diameter of snags (Russell et al. 2007).

Black-backed woodpeckers need recently-burned forest (Hutto and Hanson, unpublished report, 2009). Occupancy generally peaks 2 to 4 years after fire, and declines steeply thereafter (Murphy and Lehnhausen 1998, Nappi and Drapeau 2009). A decline in occupancy of 50 to 75 percent or more, relative to peak levels, can occur as early as three years after fire in boreal forests (Nappi and Drapeau 2009).

As a result of the 2007 Baraga Bump fire which burned over 1,100 acres (about 300 acres on NF lands within the project area), the BBWO has been identified within the project area.

Spruce Grouse Habitat

The Baraga Plains offers the best habitat for spruce grouse on the Ottawa, although several sightings, including females with broods, have been observed near aspen/fir habitats in other areas of the forest.

Most of the project area can be considered suitable habitat with the exception of northern hardwoods which is generally poor grouse habitat. The project area contains about 3,300 acres of short-lived conifer, 2,250 acres long-lived conifer, and 2,140 acres of aspen/birch which could potentially harbor spruce grouse depending on stand conditions and time of the year.

METHODOLOGY

The data used in this analysis has been compiled from a variety of resources, such as the Michigan Natural Features Inventory, Region 9 Species Viability Evaluation (SVE) Database, the Ottawa's threatened, endangered and sensitive (TES) species Database, personal communications and a broad assemblage of scientific literature. Informal consultation with the US Fish and Wildlife Service has been ongoing and will be completed prior to a decision.

Winter wildlife surveys (mammal tracking), and spring raptor surveys were conducted throughout the project area. Results of these surveys have been incorporated into the BE and/or this EA, as appropriate. More details on survey methodology and survey results are contained within the Project File.

Bounds of Analysis

The geographic bounds of analysis will be the project area unless otherwise stated for specific species. Due to the size of the project area, this area is large enough to be appropriate for analyzing effects to most wildlife resources.

Measurement Indicators

The possible effects of the proposed alternatives on the wildlife resource are discussed quantitatively using the indicators below. These indicators all have a tie back to the purpose and need for the project.

- Acres within the project area managed to provide early-successional habitat types (jack pine, aspen, short-lived conifer stands, and permanent openings and associated species);
- Acres of jack pine within the project area managed through clearcut harvest, to achieve a large contiguous even-aged condition (Kirtland's warbler nesting habitat); and
- Acres within project area in late-successional vegetation types (northern hardwoods, white pine, eastern hemlock, and long-lived conifer stands).

EFFECTS ANALYSIS FOR KIRTLAND'S WARBLER HABITAT

Direct and Indirect Effects

Alternative 1

The southern two-thirds of the project area containing jack pine and some red pine plantations would continue aging providing poor conditions for Kirtland's warbler nesting habitat. The suitable habitat would become unsuitable in about 10 years, if left untreated. Under Alternative 1, Kirtland's warbler habitat would not improve, as there would be no jack pine management.

Direct and Indirect Effects

Alternatives 2 and 3

A 520-acre block consisting of jack pine habitat has been identified for even-aged management to benefit the federally endangered Kirtland's warbler. For ecological reasons, the preferred method of treatment is prescribed fire. Prescribed fire emulates the natural processes that occurred in jack pine ecosystems prior to the advent of fire control. Proper application of prescribed fire is more likely to result in desired regeneration densities and production of native plants than mechanical treatments.

Under both alternatives, the desired method to accomplish the objective of the 520 acre block is through prescribed fire because fire is an important part of the natural ecology of this habitat. Prescribed fire would benefit a host of plants, vertebrates, and invertebrates that have adapted to fire in this ecosystem over the centuries. While some benefits may be attained for Kirtland's warbler using mechanical treatment to treat the 520 acre block, other species of plants, invertebrates, and the black-backed woodpecker would receive little to no benefit. The Forest Plan allows for temporary openings to exceed 40 acres in size within MAs 4.1a and 4.2a to create Kirtland's warbler habitat; however, the maximum opening size should not exceed 550 acres.

Combinations of treatments are proposed, such as commercial timber harvest, non-commercial timber harvest, prescribed burning and mechanical site preparation to attain the stocking density of about 1,200 trees/acre needed for Kirtland's warbler nesting habitat. If the above treatments result in dense jack pine thickets, creation of small (<1/4 acre) openings strategically placed within the dense jack pine thickets may be required. There are design criteria components that specify habitat improvement for the Kirtland's warbler.

Road construction, reconstruction, and maintenance are proposed under both alternatives. Road 2240 which bisects occupied habitat would be maintained. Under Alternative 2, about 39 acres would be maintained as a fire break involving a 15 to 33 foot clearance width along specified roads (Appendix A, Map 3). The permanent firebreak would be maintained on an annual basis as needed and affect mainly jack pine habitat. This would exclude a few acres of occupied Kirtland's warbler habitat. If Alternative 3 were chosen, than the 39 acre permanent fire break would not be created. The road maintenance would still occur in Alternative 3, maintaining approximately 27 acres in roadway. Even though 2240 bisects Kirtland's warbler habitat, there is no evidence that this action would cause any effect on the Kirtland's warbler.

The area currently occupied by Kirtland's warbler is unmerchantable timber, which would not be harvested by conventional timber harvest operations. Timing restrictions would be established, so that any harvest activity near or within occupied habitat would not coincide with the breeding season through post-fledging. The timber harvest proposed outside of the 520 acre block, would not affect Kirtland's warbler habitat

because the resulting jack pine regeneration would not be of desired size to provide optimal habitat.

Under Alternative 2, the 138 acre prescribed burn would continue under a 4 to 5 year rotation to maintain the opening. Under Alternatives 1 and 3, there would be no scheduled prescription burn for the 138 acre opening, and this would likely regenerate to jack pine and create potentially suitable habitat for Kirtland's warbler in the future.

EFFECTS ANALYSIS FOR BLACK-BACKED WOODPECKER HABITAT

Direct and Indirect Effects

Alternative 1

Since no management would occur under this alternative, black-backed woodpecker habitat would be changed only by natural succession and natural disturbance events. Areas currently providing suitable habitat (recent Baraga Bump fire) would continue to decline in suitability. Natural disturbance events such as fire (which is rare due to suppression) or wind storms would create snags at a slow rate, favoring other woodpecker species. Potential impacts to black-backed woodpeckers would be indirect and neutral through natural succession or natural disturbances. The Black-backed woodpecker would decline due to the condition of the snags as a result of the Baraga Bump fire.

Direct and Indirect Effects

Alternatives 2 and 3

Under both action alternatives about 520 acres of jack pine would be treated with snag retention of 15 to 20 snags per acre (6 inches or larger dbh). Under desired conditions, the majority of the 520 acre unit would be burned with prescribed fire leaving all the snags dead and creating ideal BBWO habitat. All the other proposed treatments would have little or no effect on the BBWO resulting in the same effects as Alternative 1.

EFFECTS ANALYSIS FOR SPRUCE GROUSE HABITAT

Direct and Indirect Effects

Alternative 1

Since no active management would occur under this alternative, habitat for spruce grouse would be changed only by natural succession or disturbance events. Most areas currently providing suitable habitat would continue to do so.

Direct and Indirect Effects

Alternatives 2 and 3

The timber harvesting proposed under the action alternatives would generally be favorable for spruce grouse. While harvest operations could make habitat unsuitable for spruce grouse in the next five to ten years, habitat improvements would benefit the spruce grouse in 15 to 20 years by creating dense young stands of vegetation interspersed with openings that support berries, as well as maturing conifers. These habitat improvements include the following:

- Regenerating 820 and 570 acres of aspen forest types for Alternatives 2 and 3, respectively;
- Commercial thinning of about 920 acres of long-lived conifer types;
- Treatment of 520 acres of jack pine as one contiguous even-aged stand; and
- Clearcutting 380 acres of jack pine.

In addition to the 520 acre temporary opening in jack pine which would benefit spruce grouse for the long-term, several existing wildlife openings would be maintained in MA 4.2a and a minor amount (< three acres) would be created in MA 4.1a under both alternatives. These openings are designed to benefit edge-dependent and early successional-dependent species, including spruce grouse.

Under Alternative 3, approximately 250 fewer acres of aspen would be regenerated. In addition, the fire break would not be constructed in this alternative. All other effects including; creation of 520 of acres even-aged jack pine stand, maintenance and creation of upland openings would be the same as discussed in Alternative 2. Given the components of this alternative, there would be fewer quality habitats for spruce grouse.

Cumulative Effects

Bounds of Analysis

The geographic bounds of analysis for the direct, indirect and cumulative effects analyses will be the project area unless otherwise stated for specific species. Due to the size of the project area, this area is large enough to be appropriate for analyzing effects to most wildlife resources.

The temporal bounds of analysis for the project include the late 19th century era of major forest exploitation and market hunting, to approximately 15 years into the future, per the planning cycle for forest plans. This period of time is important because it shows how the major changes to habitat and market hunting of wildlife that occurred during the late 19th century are still affecting wildlife to some extent today. In addition, to this time frame, recent events within the last twenty years have served a primary role in developing the habitat types that exist today for these important species.

Kirtland's Warbler Habitat

The area considered for cumulative effects analysis was the Baraga Plains Land Type Association which encompasses the project area and about 20,000 acres of state and private lands. This approximately 30,000 acre area is primarily jack pine habitat with documented Kirtland's warbler occupation at various locations during the breeding season. There are approximately 20,000 acres (66 percent) of non-FS land in the cumulative effects area, with ownership being divided approximately as follows: < 1 percent small private parcels; 3 percent Michigan Technological University, and 44 percent State of Michigan.

Past Actions

Approximately 23 percent of the National Forest lands in each MA in the project area have received a timber harvest treatment in the last 20 years. About 40 percent of these acres (42 percent MA 4.2a and 39 percent MA 4.1a) were clearcut. About 60 percent received a shelterwood seed cut, sanitation salvage, or commercial thinning in each MA. The clearcuts in MA 4.2a regenerated primarily jack pine and red pine while the majority of clearcuts in MA 4.1a regenerated aspen. Very little of the harvest activity in MA 4.2a produced quality KW nesting habitat due to the 40 acre clear cut restriction in the 1986 Forest Plan. There was little use of prescribed fire and consequently many of these units did not produce the quantity of seedlings per acre required for KW habitat. Hundreds of acres were harvested with salvage harvesting techniques, which also was unsuitable for the Kirtland's warbler due to the 40 acre restriction. These areas would continue maturing as unsuitable habitat under Alternative 1.

Jack pine ecosystems have been declining over the last couple of centuries because the natural element that maintains them (fire) is volatile and difficult to emulate over the large acreages that benefit species such as Kirtland's warbler and the Black-backed woodpecker.

Present Actions

Some of the recent harvesting on non-FS land has been large clearcut and biomass harvesting on state lands consisting of jack pine and Scotch pine plantations. This pattern of activity has been beneficial (due to openings greater than 40 acres) creating potential nesting habitat for KW's and is presumed to continue in the future, and possibly escalate as demand for biomass harvesting grows.

Future Actions

Active management on adjacent FS lands, and non-FS lands adjacent to the project area, has been ongoing in the area, and is expected to continue.

Summary

Alternative 1, if selected, would allow natural succession to occur and would eventually lead to no suitable nesting habitat being available for Kirtland's warbler in the project area. Alternatives 2 and 3 would add a small, positive cumulative effect to Kirtland's warbler recovery as opposed to Alternative 1, and either action alternative would result in a may affect, but not likely to adversely affect determination.

Black-Backed Woodpecker Habitat

The treatment proposal of the 520 acre block of jack pine would range from positive to neutral for the BBWO depending on the percentage of prescribed fire applied to the unit. By treating and burning the whole unit, the effects would be positive for the BBWO. At the other end of the scale, with no prescribed fire, BBWO populations would return to pre-Baraga Bump fire disturbance levels.

Past Actions

As a result of the 2007 Baraga Bump fire, which burned over 1100 acres (about 300 of NF lands within the project area) the BBWO are currently in the project area.

Present Actions

The primary habitat where they were verified was on state lands where large snags of jack pine remained after the fire. As documented above, the invasion of BBWO's in the Baraga Bump peaked within 2 years and showed a decline the 3rd year. One stand supported 3 nests in 2007 increasing to 6 nests in 2008. In 2009, only one active BBWO was verified in the stand (Pers. Comm., Joseph Youngman to Steve Plunkett, 2009).

Future Actions

At present, there are no reasonably foreseeable actions that would create additional suitable habitat for the Black-backed woodpecker. As such, once the immediate effects of the prescribed fire for the 520 acre block had diminished, it would be expected to see the BBWO diminish in numbers from this immediate area.

Spruce Grouse Habitat

Setting back succession through timber harvest is generally positive for grouse species. The activities proposed in Alternatives 2 and 3 would benefit spruce grouse. All grouse utilize early-successional habitat for periods of time in their life cycle for foraging and gathering grit. Alternative 2 would treat more acres and thus would be slightly more favorable for spruce grouse than alternative 3.

Past Actions

The last timber sales harvested in the project area were from the Baraga Jack, and the Plains Rehab Salvage (I-III) projects, which closed during 1999, 2001, 1998, and 1999, respectively. These past projects have created the existing spruce grouse habitat that is presently in the project area.

Present Actions

Other activities, such as recreation (hunting) and road maintenance would continue and the effects on spruce grouse, which are minimal, would not change from the current condition.

Future Actions

Potential impacts on federal lands to the spruce grouse from the action alternatives are positive, and spread over the long-term. The action alternatives should have a positive overall cumulative effect on spruce grouse.

LATE SUCCESSIONAL HABITAT

Late successional species and habitat, such as nesting habitat used by northern goshawk and red-shouldered hawks, and habitat preferred by American marten, can be found in the northern hardwoods and late successional conifer (eastern hemlock and white pine) habitats within the project area.

For this analysis, potential goshawk nesting habitat was identified as mature hardwood, conifer, aspen, and mixed forest, though only a subset of these habitats would actually provide the site conditions necessary for goshawk nesting. Research indicates that goshawks select for habitat conditions such as closed canopy, high basal area, and large tree size when selecting a nest site (Rosenfield et al 1998). In both natural and managed stands, canopy closure, tree density, and tree size can be quite variable. Therefore, it is not possible to identify specifically which of the mature stands in the project area provide truly suitable nesting habitat.

For red-shouldered hawks, compartment 107 in the north end of the project area contains two small streams with wetlands enhanced by beaver. This area is well suited for red-shouldered hawks and confirmed by several responses to call-back recordings during wildlife surveys in the area. The two-thirds of the project area consisting of jack pine habitat is unsuited for red-shouldered hawks.

Forest Raptor Habitat

Northern Goshawk

This largest North American **accipiter** (Appendix F) nests in a wide variety of forest types including deciduous, coniferous, and mixed forests (NatureServe 2005a). On the Ottawa, nest territories are most exclusively found in large stands of northern hardwood forest having relatively closed canopies and open understories. The most common nest trees documented on the Ottawa include maple, yellow birch, aspen, and ash.

Reynolds et al. (1992) defined a nest area as an area of approximately 30 acres in size that is the center of movement and behaviors associated with breeding through fledging in the southwest U.S. A territory may consist of several nests, usually within 1000 feet of previously used nest sites (Crocker-Bedford 1990). On the Ottawa, nest protection areas often encompass 20 to 30 acres protecting two or more nest sites within one contiguous area.

The BP Project Area contains about 1,400 acres of northern hardwood forests, 2,250 acres of long-lived conifer forests, and several hundred acres of mature aspen forests that could be considered potentially suitable nesting habitat for goshawks. In most of this habitat, some trees are large enough to support a goshawk nest and have the closed canopy characteristics of goshawk nesting habitat. While it is unknown exactly what percentage of these acres currently provide suitable nesting habitat for northern goshawks, many acres provide at least some large trees and a relatively open understory.

The entire project area is considered suitable (but not necessarily optimal) foraging habitat, since goshawks are opportunistic predators, and will feed on a variety of avian and mammal prey species in this area (Erdman et al, 1998). There is suitable grouse and snowshoe hare habitat scattered throughout the project area. Aspen, and mixed aspen/birch/fir/spruce forest types, and jack pine stands of various ages exist throughout the project area and could be used by grouse, hare, and other species.

Red-Shouldered Hawk

This large woodland hawk requires mature canopy structure with large, low-branching hardwoods for nesting, and prefers areas with wetland openings nearby (NatureServe 2005b). In the Eastern U.P. of Michigan (Gibson 2003) reported that red-shouldered hawks were associated with large wetland patches and increased total edge of wetland patches. Jacobs and Jacobs (2002) report that water is a critical element of red-shouldered hawk breeding habitat. The majority of nests in Michigan have been found in large (usually > 300 acres), relatively mature deciduous or mixed forest complexes (medium to well stocked pole or saw timber stands) (Michigan Natural Features Inventory 1999).

Canopy closure appears to be a critical nest-site characteristic. Many red-shouldered hawk studies reported closed-canopy as a habitat characteristic and/or recommended maintaining a canopy closure > 70% for the nesting habitat (Jacobs and Jacobs 2002). In the U.P. of Michigan, Christiansen (1998) found red-shouldered hawk nests in stands with dense canopy cover far greater than what was found for red-tailed hawks, a species that often displace or kills red-shouldered hawks.

EFFECTS ANALYSIS FOR FOREST RAPTORS

Direct and Indirect Effects

Alternative 1

Since no management would occur under this alternative, forest raptor habitat would not be actively changed. Most areas currently providing suitable nesting habitat would continue to do so for several decades. Natural succession should not diminish the quality of hardwood nesting habitat or riparian and wetland areas used for foraging. However, some habitats that produce prey species, such as aspen, would likely be lost due to conversion to hardwoods or conifers. This could result in a decline in these species in the long-term. How much of a decline and whether it would affect forest raptors in the project area is uncertain. However, it would be a gradual change, which would allow these raptors the time to select other prey species, and move if necessary.

Direct and Indirect Effects

Alternatives 2 and 3

Both action alternatives include selection harvest and thinning of northern hardwoods that are potentially suitable for nesting habitat by forest raptors. These treatments would remove individual trees of all sizes from the stands to reduce competition and allow for increased growth in remaining trees. Canopy closure would remain over 70 percent after the harvest, and some large-diameter trees would be retained. Where proposed treatments are planned near riparian and wetland areas, design criteria would be implemented that would protect associated terrestrial habitat that might be used by red-shouldered hawk and their prey. Riparian and wetland protection measures would be implemented as part of the Proposed Action. These include measures to keep timber harvesting actions away from wet areas and ensure that a high canopy closure is retained around these wet areas.

Existing active goshawk and red-shouldered territories within the Project Area would be protected using design criteria outlined in Appendix D of the EA. Implementation of these measures would serve to protect active nests and the surrounding area from disturbance during the nesting season. In the event that additional nests are found during implementation of this project, those nests would be afforded the same level of protection as well.

Alternative 1 would be the most favorable due to no disturbance; however it would create no additional prey habitat. Alternative 3 would have less disturbance compared to Alternative 2, while still creating some prey habitat. Alternative 2 would have the most disturbance and create the most prey habitat. Forest raptors require a fairly open understory for hunting. Selection harvest has the potential to reduce habitat in the short-term (5 to 10 years) due to removal of potential nesting trees and allowing for understory and mid-story canopy layers to develop. However, in the long-term (15 to 20 years), the canopy would close and the understory will self thin, thus resulting in overall improvement of habitat for forest hawks.

Under Alternative 3, about 250 fewer acres of aspen would be regenerated, about 870 fewer acres of northern hardwood would be treated by all selection harvest, and 250 acres of long-lived conifers would be thinned over that described for Alternative 2. The primary difference is entry into compartment 107 as described above.

Cumulative Effects

Bounds of Analysis

The geographic bounds of analysis will be the project area unless otherwise stated for specific species. Due to the size of the project area, this area is large enough to be appropriate for analyzing effects to most wildlife resources. The cumulative effects for the American marten were analyzed at the Forest wide level, because MIS are used to help determine the effects of Forest Service management activities at the Forest scale.

The temporal bounds of analysis include the early 1900s, when the area was heavily logged, to 2025, which is the approximate date that the current Forest Plan would cover, and over which future activities are reasonably foreseeable.

Forest Raptors

Past Actions

The Baraga Plains, as well as most of the Ottawa, was heavily altered around the turn of the 20th century through logging. As a result, the suitability of the area to sustain many species was reduced, including forest raptors. In fact, it is likely that forest raptors were extirpated from the area for many decades because of the widespread disturbances to forest land. Erdmann et al. (1998) discuss the re-colonization of the region by goshawks as the second growth forests matured. Evidence exists of roads and skid trails entering areas of compartment 107 in the early 1900s, but few modern day records (since inclusion as NF in the 1930s) exist indicating much activity.

Present Actions

Most of the forests that currently comprise the project area are mid-aged second growth forests that are improving in their habitat quality for forest raptor nesting. However,

compartment 107 has not been altered as extensively as other areas of the forest due to its steeply dissected landscape.

Future Actions

There are no activities planned within the bounds of analysis for this project.

Summary

Potential impacts to forest raptors from this Alternative 1 are indirect, minimal, and spread over the long-term. They should not add to effects of past or expected actions noticeably due to the maturation of forests in the Project Area.

Potential impacts to northern goshawk and red-shouldered hawk habitat from implementing either Alternatives 2 or 3 are gradual, relatively minor in size and scope, and spread over the long-term (15 to 20 years). They should not add to the effects of past or expected future actions, other than to maintain a small amount of certain forest types (Jack pine, aspen and conifer) on the landscape that would be suitable as hawk foraging habitat.

Alternative 2 could effect more hawks during implementation due to additional treatments. Both action alternatives may impact individuals but would not lead to viability concerns or lead to listing under the Endangered Species Act.

EFFECTS TO THREATENED, ENDANGERED, AND SENSITIVE (T/E/S) WILDLIFE SPECIES

The biological evaluation (BE) (Project File, Tab D), which analyzed impacts of each alternative on T/E/S species. The following is a brief summary of the findings in the BE.

Alternative 1

This alternative would have no effects or impacts on any Federally-listed or RFSS animals.

Alternative 2

This alternative is “not likely to adversely affect” gray wolves. In the case of Kirtland’s warbler, this alternative would have beneficial effects by creating a large block (520 acres) of potential nesting habitat. There would no effect for Canada lynx under Alternative 2, because there are no known occurrences in the project area (see the BE, pages 14-18, and 18-22, respectively).

Alternative 3

This alternative would have the same effects as Alternative 2 with the following exceptions. There would be less impact on northern goshawk and red-shouldered hawk due to deferred harvest in compartment 107. Alternative 3 is not expected to cause a trend toward federal listing or loss of viability for any of these species.

Actions under Alternative 3 for the grey wolf and Canada lynx would result in the same determinations as Alternative 2.

HABITAT FRAGMENTATION – ALL ALTERNATIVES

The term fragmentation has been used to describe the effects that timber harvest and road construction have on a landscape. The change in successional stage (from older trees to regenerating trees, as through jack pine and aspen clearcutting) can be considered a desired temporary form of fragmentation. If the amount of change (from older forest to regenerating forest) is large enough so that only scattered patches of older forest remain, with no connecting areas of more mature forest habitats, the effects on species that require such older forest habitats could be detrimental. This type of landscape modification is not proposed for any of the alternatives.

Thompson, et al., (1995) summarized the results of the studies of the impacts of fragmentation due to timber harvest on avian nesting success. Some studies have shown increased nest predation and/or parasitism near openings created by timber harvest, while others have shown no such increase (Thompson, et al., 1995). Wildlife species composition in the project area, including nest predators (e.g., raccoons, blue jays, crows, ravens) is equivalent to natural forested systems in this area. Predation rates by these species should be at near natural levels also.

The activities proposed in the two action alternatives are mostly desired with varying effects on species as previously described in the effects analysis. The resulting fragmentation regardless of size, or permanency would have no detrimental effects on the viability of any known species in the area.

FIRE

AFFECTED ENVIRONMENT

Fire is a natural part of the Great Lakes pine forests. Jack pine, red pine and white pine are dominant species in the variety of habitat types represented (Snyder 1993). Mature jack pine stands located within the proposed project areas on the Kenton and Ontonagon Ranger Districts have been repeatedly attacked by the jack pine budworm and a number of stands within the proposed project area exhibit higher than normal accumulation of woody debris which can increase the potential fire hazard in these stands. Over mature and dead/dying jack pines stands have begun to break up and are creating high loading of surface and ladder fuels which increases the potential to have larger, wildfires as well as fire control problems for wildland firefighters.

Additionally, a number of the jack pine stands located in the project area were previously harvested utilizing a form of the **salvage harvesting method** (Appendix F). Harvesting methods for jack pine timber types will be discussed in the silviculture section of the analysis, any reference herein is for previous treatments and current stand condition discussions. These stands have since begun to deteriorate to a point where dead/dying jack pines stands have also begun to break up and are creating an undesirable loading of surface and ladder fuels.

The project area includes minor acreage in private ownership. Additionally, to the east of the project boundary, the ownership changes to State and private lands, where the Baraga Plains landscape continues. There are some private lands within this geographical setting, which includes the community of Big Lake, located about 3 miles east of the project area.

Forest Plan

Applicable direction of the Forest Plan for fire management can be found on pages 2-11. (2006).

METHODOLOGY

The fuels analysis looked at how close current ecosystem conditions are to historic conditions of the same area with respect to the wildfire return interval and levels of hazardous fuels build-up. The change from the historic condition represents the amount of departure from the natural cycle of fuel build up and fire intensity. The amount of fuels is known as **condition class** (Appendix F), and there are three levels of consideration, with the third level being the highest with respect to fuels build up. This departure from the natural cycle results in changes to one or more of the following components: vegetation characteristics (species composition, structure stages, stand ages, amount of canopy closure, and the natural mosaic pattern); fuel composition; fire frequency, severity, and pattern. In addition, there are other associated disturbances (i.e. insect and disease mortality, and drought). There are no wildland vegetation and fuels conditions of wildfire situations that do not fit within one of these three classes (Hann and Brunnell 2001).

The Baraga Plains in pre-settlement times experienced wildfire intervals much more often than currently exists. These fires were low level fires that for the most part, stayed on the ground. When the central U.P. was settled, wildfire was removed from the landscape, thereby creating an unnatural fuel build-up. This increase in fuel loading, without routine, periodic fires increases the potential of a large, stand replacing wildfire on the Baraga Plains.

In healthy mature jack pine stands, the primary fuels are the lower limbs of trees and the primary carrier of fire being the understory litter layer. This represents low intensity, slow-burning ground fires in which the fuels present a fire hazard only under the most extreme conditions. The total fuel loading is low at 5 tons/acre. The same type of fire

behavior would apply to bug kill affected jack pine stands that have not yet substantially begun to deteriorate or break up (minimal dead-fallen material).

Dead and dying jack pine stands will deteriorate. The surface fuels will change to high hazard fuel types comprised of grasses and shrubs with jack-strawed (tangled) accumulations of large woody materials. At the point of dying and falling apart, it is anticipated that untreated stands could exhibit fuel loads in excess of 35 tons/acres (Schulz 1995), corresponding to a potential for high fire intensity.

Bounds of Analysis

The bounds of analysis are the project area because the anticipated effects of prescribed fire use are expected to be confined within the project boundary.

Measurement Indicators

The measurement indicators for this analysis include the following:

- The amount of change in condition class in conifer types;
- The acres of prescribed fire use; and
- The creation of a fuel break.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

Natural processes would be the only management applied to the Baraga project area under this alternative. Over time if left untreated, the dead and dying jack pine stands would deteriorate, resulting in a condition class of 3. The surface fuels would change to high hazard fuel types comprised of grasses and shrubs with jack-strawed (tangled) accumulations of large woody materials. At the point of break-up, it is anticipated that untreated stands could exhibit fuel loads in excess of 35 tons/acre (Schulz 1995), corresponding to a potential for high fire intensity. If left untreated, fuel loading in these stands would continue to increase.

Increased fuel loads elevate the risk of having uncontrollable crown fires and larger scale more intense ground fires. Uncontrollable and more intense wildfires can destroy homes, threaten the safety of residents, forest visitors, and wildland firefighters. Additionally, uncontrollable wildfires could potentially destroy nearby natural resources and destroy the humus (organic material) in the sandy soils. Alternative 1 would result in relying on fire suppression for ecosystem restoration rather than using more controlled conditions to achieve these restorative results.

Direct and Indirect Effects

Alternative 2

Fire has a variety of effects on soils and water properties depending on the intensity and duration of the burn, fuel type, soil composition, climate, and topographic features. Fire can be destructive or beneficial depending on its application.

When the soil is exposed to lower intensity fires nutrients can be released, seed germination can be stimulated, and competitive vegetative fuel loads can be reduced.

If used safely, prescribed fire is an effective management tool. Fire has been a common means by which jack pine forests were historically rejuvenated. Jack pine is unusually adapted to fire because their pine cones are coated with a resin that melts at 112 degrees F., a temperature normally reached only through fire. Once the resin melts, the cones open and thousands of seeds are released. Fire also decreases competition, reduces leaf litter on the forest floor, prepares a good seed bed for regeneration, and releases nutrients into the soil. Besides the positive influence on jack pine, fire maintains the variety of understory plants, such as grasses and forbs that are also dependent on fire for their survival.

Alternative 2 includes the use of prescribed fire to burn 520 acres to create improved habitat for the Kirtland's warbler. Treating stands by mechanical means alone can be less effective because jack pine is a fire dependent species. However, treating the proposed stands using mechanical fuels reduction methods prior to prescribed burning would minimize the risks associated with the increased hazardous fuel loads and help to create defensible zones. Treating jack pine stands with clearcut harvest or fire would improve fuel loading, thereby reducing the condition class level to 1 (see Project File, Tab D). These defensible zones would greatly add to the safety of the proposed prescribed burn activities and further reduce the risks of having a prescribed burn turn into an uncontrollable wildfire.

In addition to the 520 acre prescribed burn, an additional 138 acre prescribed burn would also occur to further maintain and enhance an existing grassland opening. This prescribed burn would be carried out to improve existing habitat for various species of insects and plants. This opening would continue to have prescribed burning on a four to five year schedule. These species are discussed in the botany and wildlife section of this chapter. Additionally, it is also proposed to create five small openings of grassland habitat of less than an acre in size to create new grassland habitat for a variety of plant, insect, and animal species. The acres of the compartments and stands for these burns are presented in Appendix B.

Development of a Permanent Fuel Break

Alternative 2 proposes to develop a permanent fuel break to aid in future wildland firefighting efforts. One of the first principals of fighting wildland fires is to establish a safe anchor point from which to construct fireline. Often times it is also necessary to

eliminate the fuel in front of the wind driven fire-front in order to slow down or stop the spread of the wildfire. Under Alternative 2, there are 60 acres of planned fuel breaks, of which 39 acres would be maintained as permanent. Those planned fuel breaks could be used to break up the 520 acre burn area into smaller blocks. The specifics of the fire would be detailed in the prescribed burn plan.

The primary fuel break would involve the removal of trees and shrubs through mechanical means along Forest Roads 2236, 2236D, 2236B and 2240 which run approximately north and south on the eastern portion of the proposed project area. The entire clearance width including the road surface would be approximately 80' wide from FR 2200 northerly to the intersection of FR 2248 and FR 2240 at which point, the clearance width would reduce to approximately a 45' width and would continue from this point. The removal of all trees and shrubs and periodically mowing the height of roadside grasses to a distance of 33' from each side of the road should be adhered to.

These activities would begin at FR 2200 running north easterly along FR 2236, turning northerly along FR 2236D, FR 2236B, and FR 2240 until the intersection of FR 2248, at which point the clearance recommendation would change to 15' from the edge of both sides the road. The change in recommended clearance width is due to a change in forest cover type from primarily pine types in the south to a more northern hardwood forest type. The clearance removal would continue northerly along FR 2240. Additional fire lines would be in place utilizing existing roads to include 2237, 2240, 2243, 2243-B, and 2245, in addition to other best management practices to control prescribed burns. An illustration of the fuel breaks and the proposed burn areas are shown on Map 3 of Appendix A.

Maintenance of this permanent fuel break through periodic and/or annual mowing of the roadside vegetation clearance area should assist in slowing the progression of wildland fires off or on to national forest lands in all but the most extreme fire danger periods (severe drought and/or unusually high winds). In addition to creating fuel breaks on national forest lands adjacent to a large area of fire prone vegetation, these open areas would function to add to ephemeral and permanent openings dedicated to the enhancement of habitat for several animal and plant species in the project area.

Direct and Indirect Effects

Alternative 3

The effects of Alternative 3 are the same as Alternative 2, with the exception of the creation of a permanent fuel break, and the 138 acre prescribed burn area would be left untreated for the foreseeable future.

Under Alternative 3, the large fuel break would not be created. A direct effect of not creating this large fuel break would increase the difficulty associated with wildfire containment. Additional fire lines as mentioned under the discussion of Alternative 2 would still be in place. Additional measures may have to be established to ensure safe and efficient operations, such as breaking up the 520 acres into smaller units.

Cumulative Effects

Bounds of Analysis

The analysis boundary for the cumulative effects of fire is the project area. The project area would possess the greatest health and safety risk due to the increasing fuel loading, potentially setting the stage for perhaps a large or severe wildfire. The average fire return interval has been suppressed for over 100 years making the probability of a large destructive wildfire occurring in the near future very likely. For future actions, the length of time considered is a 15 year interval, as this is the anticipated timeline for implementation of the current Forest Plan.

Past Actions

Successful fire suppression strategies over the last 100 years have changed the occurrence of fires in the Great Lakes pine ecosystems. Historically, this landscape was a shifting mosaic of forest and open grasslands, or "barrens," that was primarily maintained by wildfires of varying frequency and intensity. Perhaps more than any other single influence, the timber-cutting operations that occurred between the early 1800's and early 1900's changed the way these forests look today (MDNRE 2010).

Prior to widespread logging activity in the region, red and white pine were often mixed within dry conifer forests. Large-diameter trees that had survived wildfires helped to form a complex forest that varied from young seedlings and saplings to large canopy trees. Due to past logging practices, clearing of the land for settlement, attempts at agricultural production, abandonment of these lands, reforestation by the Civilian Conservation Corps, and effective fire suppression efforts during the past 100 years, the majority of the lands managed by the Ottawa National Forest are no longer within the natural (historical) fire regime. Past logging activities have helped to reduce the condition class to a more desirable level, in those areas that have been logged in the past 20 years, as described in the silviculture section of this report.

Present Actions

As part of implementing the 2007 Decision Memo, one unit resulted in an escaped prescribed burn on the Ottawa National Forest (Baraga Bump Wildfire, May 2007) burned 1,127 acres of forestland, of which only approximately 300 occurred on Federal lands, and threatened the surrounding communities. Because of the continuous forest cover, the Baraga Bump wildfire burned until it reached an area adjacent to the Sturgeon River Gorge where the jack pine forest type changed to that of a more northern hardwood (less fire susceptible) forest type.

Four prescribed burns have occurred recently; all are included in the 138 acre large opening. Specifically, these burns were conducted at the following times April 2007, May 2007, May of 2009, and April 2010. Mechanical treatments occurred in 2007.

Conducting these prescribed burn activities reduced hazardous fuels, and greatly diminishes the potential risk of wildfire affecting lands that are in private and State ownership. A community wildfire protection plan is currently being drafted for Baraga County.

Future Actions

No future actions are planned in the next 15 years.

If Alternatives 1 and 3 were chosen, prescribed burning to maintain the 138 acre opening would be discontinued for the foreseeable future. However, if Alternative 2 is chosen, this opening would be maintained on a four to five year burn rotation, until monitoring deems a change in management is necessary.

If Alternative 2 or 3 were chosen, these lands would convert to a more natural condition class; although several management actions might be required depending on the current condition and the priority for change.

SMOKE ANALYSIS

Smoke from wildland fires has the potential to contribute pollutants to the atmosphere. These pollutants include nitrogen oxide and hydrocarbon emission with respect to ozone formation, as well as carbon monoxide and fine particulate matter. Fine particulate matter is the most important pollutant with respect to its effect on human health as well as reduced visibility.

Due to the fact that air pollution is transported both locally and regionally, and that air quality monitoring is not conducted on the Ottawa National Forest; an area larger than the Project must be used to describe air quality and the effects of emissions from proposed activities. Therefore, the scope of this analysis is broadened to include the adjacent counties, including: Baraga, Iron, Marquette and Houghton Counties in Michigan.

A detailed analysis was completed on the impacts of smoke that would result from the prescribed fire within the project area (see Project File, Tab D). Of the two action alternatives, the effects of smoke would be slightly more for Alternative 2 than for Alternative 3 due to the increased acreage of prescribed fire within the 138 acre opening. However, regardless of which alternative is chosen, the effects of smoke would be negligible. There is a 24 hour time period that smoke has the potential to cause any deleterious effects on human health or visibility. Even so, the analysis revealed that any effects created from the smoke would be minimal and not expected to create an impact on the surrounding environment, or cause a threat to human health and welfare.

As a result of the smoke analysis, a determination was made that there would be no direct and indirect effects from either action alternative, and therefore no cumulative effects. Smoke management would be addressed in the prescribed fire operations plan.

SILVICULTURE

AFFECTED ENVIRONMENT

As stated in Chapter 2, the project area is located within Management Areas (MA) 4.1a (middle to late successional conifer emphasis) and 4.2a (early to mid-successional conifer emphasis). The project area borders MA 5.2 (Sturgeon River Gorge Wilderness) on the western boundary and 8.1 (Designated Sturgeon River Wild and Scenic River Corridor) to the south; however, no management activities are proposed within MAs 5.2 and 8.1. Specific descriptions for the affected environment are presented by forest type later in this section.

Forest Plan

Table 8 shows the number of acres by Forest Type as described by the Forest Plan within the Baraga Project Area in MA 4.1a.

Table 8 - Forest Types in MA 4.1a

Forest Type	Acres	Percentage
Short Lived Conifers	234	6.6
Long lived Conifers	762	21.7
Hardwoods	1,292	36.7
Aspen	1,150	32.7
Openings	81	2.3
Forested	3,438	97.7
Total Acres	3,519	100.0

Table 9 illustrates the number of acres by Forest Type as described by the Forest Plan within MA 4.2a of the project area. Table 10 shows a more specific breakdown of the dominant tree species within a given stand in MAs 4.1a and 4.2a of the project area.

Table 9 - Forest Types in MA 4.2a

Forest Type	Acres	Percentage
Short-Lived Conifers	3,467	57.2
Long-lived Conifers	1,394	23.0
Hardwoods	24	--[1]
Aspen	985	16.7
Openings	186	3.1
Forested	5,870	96.9
Total Acres	6,056	100.0

[1]Hardwoods make up less than 0.02 percent of the forest type in MA 4.2a.

Table 10 - Tree Types in Management Areas 4.1a and 4.2a

Tree Types	4.1a - Acres	4.2a - Acres
Jack Pine	41	3,461
Red Pine	486	1,255
White Pine	177	52
White Pine - Hemlock	17	0
Hemlock	75	0
Balsam fir-Spruce-Aspen-Birch	109	0
Mixed Swamp Conifer	83	0
Hardwoods-Hemlock	189	0
Jack Pine/Oak	0	6
Red Pine/White Pine - Oak	7	87
Northern Red Oak	65	24
Black Ash - Elm - Red Maple	25	0
Hardwoods-Northern Red Oak	0	0
Hardwoods-Yellow Birch	17	0
Sugar Maple	159	0
Hardwoods	837	0
Aspen	655	665
Paper Birch	186	2
Bigtooth Aspen	54	318
Aspen-Birch-White Spruce-Balsam Fir	255	1
Lowland Brush	58	0
Upland Brush	0	13
Open	23	173
Forested	3,438	5,870
Total Acres	3,519	6,056

One of the Forest Plan Goals (p. 2-6) is to “provide for a mix of age classes within the aspen/paper birch vegetation type to support conservation, economic and social objectives associated with early successional habitats”.

With respect to old growth, the majority (85%) of old growth proposed for classification is in jack pine and the following are desired conditions for jack pine old growth as described in Table 2-2; 1-2 supra layers, 100 large trees per acre with minimum diameter of 10 inches and/or 50 basal area, 5 or more snags per acre that are 8 inches or greater, a mid-story layer, a shrub layer and 20 pieces of woody debris per acre greater than 10 inches diameter and 8 feet long.

METHODOLOGY

The following discussion is arranged by forest species type. The references to short-term and long-term are defined as five to ten years, and twenty to thirty years, respectively, unless otherwise noted. Stand exam (forest inventory) was completed for

the project area prior to this analysis. Forest inventory information is stored in a corporate database (FS Veg) and in the project file. Field verification occurred between 2007 and 2009 through field visits and review of aerial photos.

Boundary of Analysis

The bounds of analysis selected for direct and indirect effects analysis are the project area. The changes in vegetation composition are described at the management area scale; however, they are within the bounds of the project area.

Measurement Indicators

The measurement indicators for this analysis include the following:

- Acres of aspen and paper birch regenerated which maintains the forest type and contributes to the Forestwide objective;
- Acres of hardwood forest types moved toward a balanced uneven-aged condition with resulting natural regeneration and structural complexity;
- Acres of long-lived conifers thinned resulting in improved diameter growth;
- Acres of short-lived conifers treated to regenerate or convert to other species;
- Acres of aspen and paper birch;
- Acres of long-lived conifers;
- Acres of short-lived conifers; and
- Acres of northern hardwoods.

ASPEN

Aspen Affected Environment

Aspen is a pioneer or early succession species. Aspen is also short-lived, and highly intolerant of shade and competition. Without disturbance such as wildfire, windthrow, or cutting to regenerate it, aspen would eventually die out and gradually be replaced by more shade-tolerant species including red and white pines, oak, and northern hardwoods. Aspen typically sprouts thousands of suckers per acre by the root system of the parent tree after a disturbance. In general, sucker regeneration is proportional to the degree of cutting, with most suckers arising after a complete clearcut (Perala, 1977) (Burns, 1990).

Even-aged management (Appendix F) is the primary silvicultural system for aspen (USDA Forest Service , 2006 pp. 3-64). Aspen responds well to intensive management and, the clearcutting regeneration method favors the establishment and development of this shade-intolerant species. To obtain desirable natural regeneration of aspen, clearcutting remains the most effective method (USDA Forest Service , 2006 pp. C-4) (Burns, 1990) (Perala, 1977) (Ecology and Mangement of Aspen: A Lake States Perspective, 2001). Leaving even 15 square feet of basal area can reduce future volume up to 40% (USDA Forest Service, 1985).

The Forest Plan (p. 2-16) defines rotation ages of existing aspen as 40 to 90 years of age. Aspen is considered mature at 40 to 59 years of age and over-mature at 60+ years of age. In addition, aspen becomes more susceptible to diseases such as white trunk rot and stem breakage, and over time, loses its merchantability and economic value. Aspen trees of any age can be affected by this rot, but the disease is most common in stands older than 40 years of age (USDA Forest Service, 1978). Perala (1977) does not recommend rotation lengths greater than 60 years on sites with a site index of less than 70, which are typical of most aspen stands in the project area.

Table 11 summarizes the number of existing aspen acres by age class within the project area in MA 4.1a. Almost three quarters of the aspen acres occur in the 60+ category, which means that the aspen in these stands is over-mature and beginning to convert to other forest types. If no action is taken, this trend would continue and the amount of acres would not meet the Forest Plan goal for this management area. Almost 900 acres of the 1150 existing aspen acres in the 60+ age class are on lands suitable for timber production.

Table 11 - Aspen Acres by Age Class in the Project Area in MA 4.1a

Age Class	Acres	Percentage
0-19	146	12.7
20-39	51	4.4
40-59	56	4.9
60+	896	78.0
Total	1150	100.0

Because aspen is not a climax species in the natural succession of forest types, existing aspen stands receiving no treatment would likely give way to white pine, other conifers, or hardwoods (Burns, 1990). Individual or small clumps of aspen may persist, but there would be minimal aspen present in the stands.

Table 12 shows the number of existing aspen acres by age class within the project area in MA 4.2a. Almost one quarter of the aspen acres occur in the 60+ category, which means that the aspen in these stands is over-mature and beginning to convert to other forest types. Almost 225 acres of the 260 existing aspen acres in the 60 year plus age class are on lands suitable for timber production.

Table 12 - Aspen Acres by Age Class in the Project Area in MA 4.2a

Age Class	Acres	Percentage
0-19	139	14.2
20-39	444	45.1
40-59	142	14.4
60+	260	26.4
Total	985	100.0

Effects Analysis for Aspen

Direct and Indirect Effects

Alternative 1

If no action is taken, the over mature aspen would continue over time to convert to other successional species, and the amount of acres in aspen would not meet the Forest Plan goal for this management area. In the short term, this alternative maintains the current amount of aspen; however, over time, it does not contribute to the purpose and need of maintaining a certain percentage of aspen within MAs 4.1a and 4.2a. The aspen components would continue to decline with an increasing mortality rate due to a combination of advanced age and increased susceptibility to damage by disease, insects, and wind. Most stands would give way to white pine, which historically covered much of the area, although some areas would convert to hardwoods. Individual or small clumps of aspen may persist, but the majority of trees in the stand would no longer be an aspen forest type.

Direct and Indirect Effects

Alternative 2

Under Alternative 2, the same conversion of some untreated stands from an aspen forest type to other forest types would occur, but on a much smaller scale than if no treatments were done to regenerate aspen stands. This alternative regenerates aspen/paper birch on a total of 950 acres. Clearcuts on 736 of this 950 acres in aspen forest types would regenerate aspen for future needs of both timber and wildlife.

In cases where **modified clearcuts** (Appendix F) would occur, the majority of the area would be clearcut, but there would be some residual clumps of mid-tolerant species such as northern red oak and white pine left to maintain diversity across the landscape. Aspen clearcuts are designed with irregular edges and variable patch sizes to promote the “blending” of clearcut edges with the surrounding forest to maintain a more natural look to the landscape.

Alternative 2 would also convert 81 acres currently typed as white pine or balsam fir to future aspen or birch stands. Conversely, 171 acres currently typed as aspen would be converted to other forest types. The design of the project would maintain some aspen in these stands where there is enough aspen to regenerate; however the majority of the stand would be another type.

Three stands that are dominated by aspen and paper birch are treated (94 acres) with a shelterwood seed cut to create a seed bed for paper birch and encourage its reproduction. These stands would stay in the aspen forest type group because it includes the paper birch type. The result of the treatment is expected to be a mix of both aspen and paper birch with the latter having more stocking than occurs at this time.

Aspen is a highly visible species in the northern forest landscape. While clearcutting results in temporary openings that affect the visual quality of the landscape, the 950 acres proposed for aspen regeneration in Alternative 2 would allow the aspen type to remain stable for the next 60 years. Alternative 2 continues to move the age class distribution (where rotation age range for aspen equals 40 to 90 years) toward the desired condition as described in the Forest Plan, while addressing forest health conditions. Table 13 shows the aspen acres by forest type as described in the Forest Plan across all alternatives. Table 14 illustrates the aspen acreage changes by 20-year age classes resulting from the implementation of Alternative 2.

Table 13 - Aspen and Paper Birch Forest Type Within the Project Area by Alternative

Management Area	Forest Type	Alternative 1	Alternative 2	Alternative 3
4.1a	Aspen/Paper Birch	1,150	1,123	1,011
4.2a	Aspen/Paper Birch	985	983	982
Total Acres		2,135	2,106	1,993

The 217 acres that are greater than 60 years old in MA 4.1a are not proposed for treatment because these stands are proposed for old growth classification. The remaining stands have been previously classified old growth (22 acres), occur on slopes too steep for logging equipment (55 acres), or have been planted with white pine under another decision (14 Acres).

Table 14 - Aspen Age Class Changes with Alternative 2

Age Class	MA 4.1a Acres	MA 4.1a Percentage	MA 4.2a Acres	MA 4.2a Percentage
0-19	855	75.0	380	38.6
20-39	17	1.5	401	40.7
40-59	34	2.6	69	7.0
60+	217	20.9	133	13.5
Total	1123	100.0	983	100.0

In MA 4.2a, 133 acres over 60 years old are not proposed for treatment due to the majority (98 acres) of those acres having been treated in a previous timber sale (Merlin). This treatment was done to shift the tree species to long-lived conifers (mainly white pine). The remaining 32 acres are adjacent to the Sturgeon River Gorge Wilderness Area and located along Forest Roads 2200 or 2270. These areas contain Bear's Den Overlook and other popular camping spots near the wilderness area. These stands are also proposed for old growth classification.

There would be no commercial treatments in riparian areas in Alternative 2. Clearcutting would not occur at a specified distance from aquatic features according to

riparian design criteria. The future conditions in these areas would be similar to Alternative 1 with natural succession to other forest types.

Residuals in the aspen forest type following clearcutting, mainly oak and red and white pine would provide seed sources for those species, along with maintaining long-term diversity across the landscape. These clearcut stands would regenerate primarily to aspen and result in a temporary open appearance for approximately 8 to 10 years. A healthy, vigorous stand would replace the current declining and dying stands. Residual trees left for diversity would slightly diminish aspen regeneration within the immediate vicinity of the clump but would not affect overall stand regeneration. Even-aged management of aspen also provides suitable habitat for game species such as deer and ruffed grouse.

A majority of the hardwood stands within the project area have an aspen component. Where aspen inclusions occur (typically >2 acres in size), they would be managed for aspen within the hardwood stands as described in the design criteria (Appendix D).

Direct and Indirect Effects

Alternative 3

All the effects under Alternative 3 are the same as Alternative 2, except as discussed below. Under Alternative 3, the same conversion of some untreated stands from an aspen forest type to other forest types would occur, but on a much smaller scale than if no treatments were done to regenerate aspen stands. This alternative would regenerate aspen/paper birch on about 701 acres (249 acres less than Alternative 2). Clearcuts on 573 acres in aspen forest types would regenerate aspen for future needs of both timber and wildlife. Anticipated effects of modified clearcuts are described in Alternative 2.

Alternative 3 also converts 41 acres currently typed as white pine to future aspen or birch stands. Conversely, 181 acres currently typed as aspen would be converted to other forest types. The design of the project would maintain some aspen in these stands where there is enough aspen to regenerate; however, the majority of the stands would be another type.

Three stands that are dominated by aspen and paper birch are treated (127 acres) with a shelterwood seed cut to create a seed bed for paper birch and encourage its reproduction. These stands would stay in the aspen forest type group because they include the paper birch type. The result of the treatment is expected to be a mix of both aspen and paper birch with the latter having more stocking than occurs presently.

While clearcutting results in temporary openings that affect the visual quality of the landscape, the 700 acres proposed for aspen regeneration in Alternative 3 would allow the aspen type to remain stable for the next 60 years. Alternative 3 continues to move the age class distribution (where rotation age range for aspen equals 40 to 90 years)

toward the desired condition as described in the Forest Plan, while addressing forest health conditions. Table 15 illustrates the aspen acreage changes by 20-year age classes resulting from the implementation of Alternative 3.

Table 15 - Aspen Age Class Changes with Alternative 3

Age Class	MA 4.1a Acres	MA 4.1a Percentage	MA 4.2a Acres	MA 4.2a Percentage
0-19	643	63.6	383	39.0
20-39	51	5.0	401	40.8
40-59	7	0.7	69	7.0
60+	311	30.7	129	13.2
Total	1011	100.0	983	100.0

The 255 acres that are greater than 60 years old in MA 4.1a are not proposed for treatment due to the same reasons in Alternative 2 except one stand. That stand is currently a balsam fir and aspen mix, and without treatment, would continue succession to white pine and northern red oak. In MA 4.2a the same acres are not treated for the same reasons as Alternative 2. Alternative 3 maintains aspen on 1,993 acres or 113 less than Alternative 2.

HARDWOODS

Hardwoods Affected Environment

Northern hardwoods are diverse in both species composition and stand characteristics. The successional trend of northern hardwoods is toward sugar maple. The principle hardwood species include sugar maple, white ash, yellow birch, basswood, and red maple, with a mix of aspen, paper birch, northern red oak, ironwood, black cherry, hemlock, white pine, and balsam fir (USDA Forest Service, 1985). This is characteristic of the northern hardwoods on the Ottawa National Forest.

Currently, hardwood stands lack a full range of size and age classes, are at higher than optimum stocking levels recommended for vigorous growth, and contain some trees that are suppressed or showing signs of disease. Over-stocked stands preclude the establishment and growth of seedlings and saplings in the understory. Harvesting can enhance the long-term desired condition of northern hardwoods by managing the vegetation through emphasis on late-successional species.

When managing hardwoods for **uneven-aged management**, (Appendix F) individual tree selection is the recommended silvicultural system because it emphasizes the harvest of individual trees at regular intervals to maintain a given number of trees per acre in several diameter classes. Selection harvests are used to manage species that are shade tolerant such as sugar maple and hemlock and are a regeneration cut. The selection harvest mimics conditions in the forest where one or two large trees die and a gap is created followed by the occurrence of regeneration.

It should be noted that selection harvests can also be used for mid-tolerant species by creating larger canopy gaps; however, regeneration of mid-tolerant species is more successful with the shelterwood method, which is even-aged management (USDA Forest Service , 2006) (USDA Forest Service, 1985).

In MA 4.2a there are currently very few hardwoods present; and due to the very poor soil nutrient regime and very dry soils, it is very unlikely that the 24 acres of northern red oak would ever become dominated by sugar maple. The habitat type of the stand climaxes with northern red oak, red maple and white pine. It is likely this stand is currently very stable in its current state.

Effects Analysis for Hardwoods

Direct and Indirect Effects

Alternative 1

Alternative 1 would not contribute to the purpose and need for improving tree species composition, age-class distribution, and diameter size, or to the overall health and quality of hardwoods. Under Alternative 1, growth rates would decline and eventually stagnate until some type of natural or human-caused disturbance took place to reduce stand densities. There are currently 1,316 acres typed as northern hardwoods in the project area, 1,292 in MA 4.1a and 24 acres in MA 4.2a. The northern hardwood acreage is summarized in Table 16.

Table 16 - Northern Hardwood Forest Type Within the Project Area by Alternatives

Management Area	Forest Type	Alternative 1	Alternative 2	Alternative 3
4.1a	Hardwoods	1,292	1,422	1,503
4.2a	Hardwoods	24	24	24
Total Acres		1,316	1,446	1,527

Without active management in MA 4.1a, the northern hardwood landscape would persist over the long-term, with species such as sugar maple, ironwood, and white pine dominating the landscape due to their shade tolerance and long life spans. Other species such as aspen, paper birch, black cherry, and yellow birch would eventually disappear from the landscape. In the event of a natural disturbance, pioneer species such as aspen, paper birch, black cherry, and jack pine would become present again, but in the long term, would be out-competed by longer lived species such as sugar maple.

Direct and Indirect Effects

Alternative 2

Alternative 2 treats about 70% (911 acres) of the hardwoods with either a commercial thinning or individual tree selection to maintain or increase structural and compositional complexity. This alternative also speeds the conversion of 130 acres of balsam fir and aspen to northern hardwoods. The aspen in these stands would be regenerated, but due to the current condition, the stand would be dominated by hardwoods after treatment. To prove effective over the long term, a selection system must regenerate a new age class to replace the mature trees being harvested and concurrently thin the immature ones with each entry to a stand (Nyland, 1998). Selection cuts would improve long-term growth conditions for the residual timber by removal of mature, diseased and low-quality timber, as well as excess growing stock.

Where available, and when quality and vigor (tree health) allow, mid-tolerant species including northern red oak, white ash, basswood, white pine, yellow birch, and black cherry would generally be favored over sugar and red maples of similar size and quality. This is done to maintain diversity (a long-term mix of vegetation) across the landscape. Sugar maple would be favored over red maple as a residual due to probable higher long-term value and a normally longer life span.

Hemlock mixed in with hardwoods would typically be left as a residual due to a combination of factors including, but not limited to, the following: value as a wildlife species for both thermal cover and snag/den potential; its relatively low timber value; and to promote diversity in the hardwood stands. Some hemlock would be cut where it is growing in clumps. Thinning in these clumps promotes the health and vigor of the remaining trees, while in turn improving their longevity by reducing competition. Hemlock would be cut if it presented hazards such as breakage or other defects.

Direct and Indirect Effects

Alternative 3

Alternative 3 treats about 8% (152 acres) of the hardwoods with either a commercial thinning or individual tree selection to maintain or increase structural and compositional complexity. This alternative also speeds the conversion of 23 acres of aspen to northern hardwoods. The aspen in this stand would be regenerated, but due to the current condition, the stand would be dominated by hardwoods after treatment.

The three stands not directly converted with treatment would convert at a reduced rate over the next 15 to 20 years to northern hardwoods. Treated cuts would improve long-term growth conditions to the residual timber by removal of mature, diseased and low-quality timber, as well as excess growing stock.

This alternative similar to Alternative 1 would not contribute to the purpose and need for improving tree species composition, age-class distribution, and diameter size, or to the overall health and quality of hardwoods in the majority of the project area. Additionally, as with Alternative 1, growth rates would decline and eventually stagnate until some type of natural or human-caused disturbance took place to reduce stand densities. However, the effect would not be as pronounced, as there is some hardwood treatment occurring.

LONG-LIVED CONIFERS

Long-Lived Conifer Affected Environment

The long-lived conifers include red pine, white pine, white spruce, and hemlock. Long-lived conifer is the primary emphasis in MA 4.1a with a Forest Plan goal to manage for 30 to 60% of the management area as this forest type. Historically, white pine was once a major component of the forested landscape on the drier sites across the Ottawa. Extensive logging between 1880 and 1910 harvested much of the white pine throughout the Forest. Imported diseases such as blister rust have caused deformity and mortality in many remaining trees. Due to a shortage of healthy white pine seed sources and natural disturbances since the extensive logging occurred, active vegetation management is now required to help restore and perpetuate the white pine ecosystem.

White pine is intermediate in shade tolerance, and vegetative competition is a major problem. Although white pine would tolerate up to 80 percent shade, tree growth increases as shade is reduced. In competition with light-foliaged species such as paper and yellow birch, white pine would usually gain dominance in the stand. However, against the stronger competition of species such as aspen, northern red oak, and sugar and red maple, white pine would usually fail to gain a place in the upper canopy and would eventually die out. Early white pine growth is slow when shaded by other trees. Seedlings that are well-established after three years show that height growth may be quite rapid without shade by other trees and the trees have a fairly good survival rate (Burns, 1990).

White pine has been regenerated successfully through a variety of methods including clearcutting, shelterwood, and **group selection** (Appendix F). With advanced regeneration, overstory removal is all that is necessary for management. On the Ottawa, the two cut or three cut shelterwood method is typically used. Regeneration and retention of white pine is included in three of the forest wide Goals and Objectives in the Forest Plan. Also, under Forest Plan Guidelines, timber stands should be managed to feature selected inclusions of white pine; typically healthy white pine are retained in all treated stands under all action alternatives. Without active management, the white pine would likely persist as a component of the landscape, but over time, the health and vigor of the stand would deteriorate.

Red pine covers 1,842 acres in the project area, mostly in management area 4.2a (1,342 acres). Red pine has been the most widely planted species in the Lake States

region of North America over the past 70 years (Gilmore, et al., 2006). The red pine cover type has increased more than fivefold to almost 1.9 million acres in the Lake States (Gilmore, et al., 2006). This is true in the Baraga Plains Project Area with almost all of the red pine being established from plantations planted during the Civilian Conservation Corps (CCC) in the late 1930's and early 1940's continuing up until 1997 when the last plantations were established.

There are natural red pine trees in the project area, but they rarely form stands large enough to be mapped. There are only two natural red pine stands (C [compartment] 111-S [stand] 45 and C112-S3) and both were probably "filled in" with nursery grown seedlings when the adjacent areas were planted. Historically the edges of the Baraga Plains were dominated by white and red pine. The GLO land survey notes for T49N R35W dated September 1, 1853 state "The land east of the Valley of This River (Sturgeon River) is timbered with pine, W+Y (White and Yellow) Pine being the most abundant in the north Part while spruce (jack) pine primarily in the southeast".

Logging in the late 1800's removed almost all of the merchantable pine from landscape. The first logging of pine timber on what is now the Ottawa NF commenced in 1880 (USDA, 1938). Thirty years later all pine operations had either cut out or were changed over to hardwood and hemlock operations (USDA, 1938). An inventory conducted in 1947 showed very little red pine in the project area, and the areas were very small (<20 acres). The largest stand (20 acres) is C112-S3 mentioned above typed as a red pine pole stand with moderate stocking. The other stand mentioned above (C111-S45) was typed as an opening in 1947. Most of the other areas typed as red pine are either plantations or poorly stocked trees. Almost all the red pine was cut off the forest by 1910; the Forest Plan (1938) showed only 9 acres of mature red pine.

Many of the red pine plantations on or near the Baraga Plains were of limited success, and already in the 1947 inventory, showed poor to moderate stocking. Some of these stands are planned for clearcuts because they are now typed as jack pine. The red pine would be left in these stands as reserves, but the stand objective is jack pine.

One of the most important ways stand composition and development can be controlled is by periodic commercial thinnings (Gilmore, et al., 2006). Thinning does not usually result in an increase in stand volume at the end of the rotation (Gilmore, et al., 2006). Rather, it will allow individual trees to grow larger, increasing the relative rate of stand growth (Gilmore, et al., 2006). Periodic thinning of young stands is recommended to put the growth on the best trees available, maintain uniform growth rates, and remove diseased and injured trees (Benzie, 1977).

Effects Analysis for Long-Lived Conifers

Direct and Indirect Effects

Alternative 1

Under Alternative 1, white pine would likely persist as a component of the landscape and continue to increase as a component of other forest types. In some areas where white pine is competing with other species, the health and vigor of the stand would begin to deteriorate over time as the stand converts to other forest types. There would be no reduction in white pine blister rust at this time because no diseased trees are proposed to be harvested at this time. However, some trees would succumb to the disease and die. The long lived conifer acreage is summarized in Table 17.

Table 17 – Long-Lived Conifer Within the Project Area by Alternative (Acres)

Management Area	Forest Type	Alternative 1	Alternative 2	Alternative 3
4.1a	Long-lived conifer	762	764	775
4.2a	Long-lived conifer	1,394	1,542	1,542
Total Acres		2,156	2,306	2,317

Direct and Indirect Effects

Alternative 2

Alternative 2 would maintain the current white pine component across the project area in MA 4.1a. It would increase the health and vigor of white pine individuals by reducing competition with other species and reduce the amount of white pine blister rust by removing infected trees.

This alternative converts two stands in MA 4.1a that already have a white pine component into a white pine forest type from big toothed aspen and paper birch. Although it would be expected that both paper birch and aspen continue to be a component in the stands they would be dominated by white pine in the future. Alternative 2 would also convert one stand that is currently white pine to a paper birch - white pine mix, with paper birch expected to be the dominant forest type after treatment. The white pine forest type would increase in MA 4.2a by approximately 150 acres with this alternative. In MA 4.2a there are five jack pine stands that would be treated to increase the white pine component, and one paper birch stand that would be dominated by white pine after treatment.

Direct and Indirect Effects

Alternative 3

Alternative 3 would increase the current white pine component across the project area in MA 4.1a. Similar to Alternative 2, Alternative 3 would increase the health and vigor of white pine individuals by reducing competition with other species and reduce the amount of white pine blister rust by removing infected trees.

This alternative would convert three aspen stands that already have a large component of white pine in them to white pine along with one paper birch stand. While it is expected that aspen and paper birch would still be a component in the future stands, white pine would become the dominant species after treatment. However, as outlined in the Forest Plan, the emphasis in this management area is focused on providing long-lived conifer habitat.

In MA 4.1a the same white pine stand proposed to be converted to paper birch in Alternative 2 would be treated in this alternative to become dominated by paper birch, while white pine would be left as a component in the future stand.

In MA 4.2a the same stands would be converted to white pine with the same effects as Alternative 2.

SHORT - LIVED CONIFERS

Short-Lived Conifer Affected Environment

The short-lived conifers include jack pine, balsam fir, and lowland conifers such as northern white cedar and tamarack. Those acreages are summarized in Table 18. Short-lived conifer is the primary emphasis in MA 4.2a and a Forest Plan goal is to manage for 50 to 60% of the management area as this forest type. Jack pine occurs primarily on outwash sands in the project area. This MA is dominated by jack pine with minor inclusion of red maple, red and white pine, northern red oak and some balsam fir. In the transition areas adjoining the outwash sands, jack pine becomes mixed with other species such as aspen, paper birch, and sugar maple. In these transition areas, the stand started out mainly as jack pine, and over time, other species have succeeded into the stand so that it has almost transitioned to another forest type such as the white pine mentioned above.

Table 18 – Short-Lived Conifer Within the Project Area by Alternativ (Acres)

Management Area	Forest Type	Alternative 1	Alternative 2	Alternative 3
4.1a	Short-Lived Conifer	234	129	148
4.2a	Short-Lived Conifer	3,467	3,337	3,477
Total Acres		3,701	3,466	3,625

Jack pine is very intolerant of shade from overstory trees and does not propagate well under an established over story. Jack pine is considered a short-lived species that mature and die at less than 100 years of age. These short lived species need disturbance to be maintained on the landscape.

Jack pine has developed seeds in the cones that are very resistant to heat, and the cones remain high in the crowns attached to living branches for 25 years (Wright, 1982). Cones are generally serotinous over much of the jack pine range; many of these closed cones persist on the tree for years resulting in large accumulations of seed in unopened cones (Benzie, 1977). Jack pine typically colonizes burns and bare mineral soil areas (Benzie, 1977). Optimum conditions for jack pine seedling establishment and survival are provided by mineral soil and burned seedbeds where competition from other vegetation is not severe (Burns, 1990).

The majority of MA 4.2a in the Baraga Plains project area falls on deep, dry, sandy soils. Successional changes are relatively fast on all but these soils types, where changes are often so slow that jack pine is sometimes considered the **edaphic** (see Appendix F) climax (Benzie, 1977). In the transition zone between MA 4.2a and MA 4.1a, north of the Baraga Plains, jack pine would quickly succeed to white pine and hardwoods in the absence of a major disturbance.

Effects Analysis for Short-Lived Conifers

Direct and Indirect Effects

Alternative 1

Successional changes would continue to occur on all places except the Baraga Plains because of its poor soils, where jack pine would continue to function as the edaphic climax species. However, red maple, balsam fir, northern red oak would continue to become established in the understory.

Although no immediate conversion of jack pine to other species would occur under Alternative 1, there would be approximately 160 acres that would convert in the short-term to red pine.

Alternative 1 does not treat any of the 84 acres of swamp conifer or the 109 acres of balsam fir, and they would continue to stay in that forest type for now.

Except for the conversion of the red pine stands, the existing age classes would stay as they are now, and over time, the over 60 year age class would convert to other forest types as mentioned above. There would be no new 0 to 10 year old stands of jack pine created in this alternative. The existing age class per management area for jack pine is summarized in Table 19.

Table 19 - Existing Jack Pine Age Classes in the Project Area

Age Class	MA 4.1a Acres	MA 4.1a Percentage	MA 4.2a Acres	MA 4.2a Percentage
0-19	0	0.0	818	23.6
20-39	0	0.0	1,126	32.5
40-59	0	0.0	769	22.2
60+	41	100.0	753	21.7
Total	41	100.0	3,466	100.0

Direct and Indirect Effects

Alternative 2

Alternative 2 proposes to clearcut 330 acres of over mature jack pine which is currently showing a lot of individual tree mortality in the stands. These areas would be harvested and the design criteria proposed would ensure that the slash would be managed to expose mineral soil and scatter the cones. This could be done during the harvest operations or after with anchor chains pulled over the site to break up the slash and expose mineral soil. Clearcutting is the recommended silvicultural system for harvesting mature trees where a new stand would be established by planting improved seedlings, direct seeding, or scattering serotinous cones from high quality trees (Benzie, 1977).

In addition to the clearcuts, approximately 340 acres of mature to over mature and approximately 180 acres of immature jack pine would be treated with a seed tree harvest to create a large area of approximately 520 acres of continuous young jack pine for Kirkland Warbler habitat. Of the 340 acres of mature jack pine, only about 20 percent would be removed by the seed tree harvest method. The residual, mature trees would serve as wildlife habitat and a future seed source. Of the immature jack pine, some rows would be removed to break up dense stands and reduce fuel loads.

After the seed tree cut is done on the 520 acres, the area would be burned to create a suitable jack pine seed bed. The seed tree system is recommended as a possible alternative for stands that have 10 well-distributed, desirable quality seed trees per acre with an abundant supply of serotinous cones (Benzie, 1977). Prescribed burning is recommended to consume the slash, kill the competition, prepare favorable seedbeds, and open the serotinous cones on the seed trees to seed the area (Benzie, 1977).

It is important to burn the slash soon after harvesting to minimize the risk of losing seed trees by windthrow before the cones are opened by the fire and the seeds dispersed (Benzie, 1977). Jack pine slash requires about a month of warm, dry weather to cure adequately for effective burning (Benzie, 1977). If weather conditions following seed dispersal are unfavorable for seedling establishment, planting may be required as the seed trees would have been killed by the fire (Benzie, 1977).

With the proposed treatment, the amount of jack pine in the 0 to 19 age class would increase by 840 acres, mainly by reducing the number of acres in the mature size classes shown in Table 20.

Table 20 - Jack Pine Age Distribution After Implementation of Alternative 2

Age Class	MA 4.1a Acres	MA 4.1a Percentage	MA 4.2a Acres	MA 4.2a Percentage
0-19	41	100.0	1,613	46.5
20-39	0	0.0	1,002	28.9
40-59	0	0.0	497	14.3
60+	0	0.0	196	5.7
Total	41	100.0	3,467	100.0

The conversion of jack pine to red pine could also happen in this alternative on 142 acres, except this alternative would harvest the dead and dying jack pine and thin the red pine trees resulting in a stocked red pine site. In areas where there is currently a heavy jack pine component, all the trees would be removed through a clearcut, and jack pine should regenerate, however it would not be the dominant forest type.

There are also 24 acres of balsam fir that would be converted to hardwoods using this alternative. Another 81 acres of balsam fir would be converted to an aspen and balsam fir mix using this alternative. The stand has a large component of over mature aspen which would sprout and dominate after treatment.

Direct and Indirect Effects

Alternative 3

Alternative 3 treats the same acres as Alternative 2; the only difference is that the 138 acre permanent opening would not be treated in the future. This may increase the amount of jack pine in the project area and decrease the amount of open areas. While increasing the amount of jack pine, this alternative would help to keep the short-lived conifer over 50% (see Table 21), and it would reduce the amount of openings to less than 1%.

Table 21 - Jack Pine Age Distribution After Implementation of Alternative 3

Age Class	MA 4.1a Acres	MA 4.1a Percentage	MA 4.2a Acres	MA 4.2a Percentage
0-19	41	100.0	1,753	50.8
20-39	0	0.0	1,002	29.1
40-59	0	0.0	497	14.4
60+	0	0.0	196	5.7
Total	41	100.0	3,448	100.0

Similar to Alternative 2, the conversion of jack pine to red pine would also happen using this alternative on 142 acres.

Another 81 acres of balsam fir would be converted to hardwoods (converted to aspen/balsam fir in alternative 2) with this alternative. Similar to Alternative 1, the red pine conversion would happen naturally without intervention; however unlike Alternative 1, this alternative would also thin out the hardwoods.

OPENINGS

The 138 acre opening would no longer be scheduled for prescribed burning, with the exception of Alternative 2. Alternative 2 would continue the prescribed burn scheduled on a four to five year burn rotation or mechanical treatment. Alternatives 1 and 3 would allow the 138 acre opening to fill back in with trees, over time. Table 22 displays the acres of openings within each MA.

Table 22 - Openings Within the Project Area

Management Area	Forest Type	Alternative 1	Alternative 2	Alternative 3
4.1a	Openings	81	81	81
4.2a	Openings	31	169	31
Total Acres		112	250	112

PAPER BIRCH

Paper Birch Affected Environment

Paper birch is commonly found in association with aspen and northern hardwoods. It is extremely shade intolerant and becomes established typically from seed following clearcutting or other disturbances. Paper birch can also be regenerated through stump sprouting following cutting or disturbance. Even-aged management with regeneration through clearcutting or the two-aged shelterwood system remains the preferred silvicultural system for paper birch. Scarification or exposure of mineral soil is also critical for successful regeneration of paper birch.

Paper birch is considered a short-lived species, with trees typically reaching full maturity by 60 years of age. Top die-back or other forms of deterioration often occur by age 70, if not sooner (Peterson et al, 1997). Mortality is heavy throughout the life of a paper birch stand, mainly due to its shallow root system and its susceptibility to insect and disease (Burns, 1990).

There are currently 188 acres of paper birch and paper birch-aspen stands within the project area, with some additional inclusions in other stands. Most of the current stands were regenerated in the early 1900s. The paper birch in the project area, as well as the majority of the paper birch on the rest of the Ottawa and in much of the Lake States, is

well past maturity and declining rapidly. In most cases, the paper birch is high risk and is being replaced through natural succession by oak, red and white pines, or a variety of hardwoods.

Paper birch is an important species across the landscape. Two of the major concerns with the loss of paper birch habitat are a decrease in diversity across the landscape and a decline in the gathering of special forest products by local Native American tribes. For these two reasons, as well as to remain within the guidelines of the Forest Plan, it is important to regenerate paper birch and maintain its presence across the landscape.

Because paper birch is not a climax species in the natural succession of forest types, existing paper birch stands receiving no treatment would likely give way to white pine, other conifers, or hardwoods (Burns, 1990).

Effects Analysis for Paper Birch

Direct and Indirect Effects

Alternative 1

Alternative 1 would continue the present trend in paper birch, with stands naturally converting to other forest types. It would also virtually eliminate any potential for ground site preparations from skidding operations, landing construction, or roadwork that could provide some areas for natural regeneration of paper birch. One stand of 23 acres that was regenerated in the early 1990's with the Merlin timber sale would continue to mature and remain paper birch for the next 40 to 50 years. Individual or small clumps of birch may persist, but there would be minimal birch present in the stands in the absence of natural disturbance or management.

Direct and Indirect Effects

Alternative 2

Under Alternative 2, the same conversion of some untreated stands from a paper birch forest type to other forest types would occur. There are currently 22 acres of paper birch forest type under Alternative 2 that would not be treated due to old growth classification, and another 16 acres that would not be treated due to the poor condition of the paper birch in the stand currently. One paper birch stand would be regenerated with a shelterwood seed cut (18 acres) and two others (73 acres) with a clearcut. Although aspen would most likely be the dominant forest type after the clearcuts, some paper birch would remain in the stand matrix. Two more stands (32 acres) are treated with either salvage or selection where the paper birch has already died out of the overstory; however, if healthy paper birch is present during treatment it would be left for a seed source. There would be some natural regeneration of paper birch in areas cleared for roads, landings, or other openings where the surface was disturbed, but the

overall amount of birch that would be regenerated is probably going to continue to be small with only 180 acres maintained in MA 4.1a.

Direct and Indirect Effects

Alternative 3

Alternative 3 proposes to regenerate the same stands as Alternative 2, except one stand where selection harvest was proposed would have no treatment (or disturbance) in that stand and no paper birch would be regenerated. The long term effect on the acres of paper birch stands is essentially the same between the two action alternatives.

Summary of Alternatives

Due to natural succession under all alternatives, the existing paper birch and aspen-paper birch stands that are not treated, would convert to other forest types over time. Alternative 2 would be similar to Alternative 3 in that a small amount of paper birch would be regenerated.

Table 23 displays the number of acres in the aspen and paper birch forest type across alternatives. In the short term, Alternative 3 maintains the most aspen and paper birch. However, over time, most of these acres would convert to other forest types and the aspen paper birch component would be lost through natural succession. Both Alternatives 2 and 3 regenerate the same 18 acre paper birch stand, and all alternatives maintain the 23 acre stand treated previously. Both Alternatives 2 and 3 maintain an aspen and paper birch component across the landscape for the next 40 to 60 years.

Table 23 - Paper Birch Within the Project Area by Alternative (Acres)

Management Area	Forest Type	Alternative 1	Alternative 2	Alternative 3
4.1a	Paper Birch	186	180	193
4.2a	Paper Birch	0	0	0
Total Acres		186	180	193

Cumulative Effects

This section describes how the types of harvest are consistent with the 2006 Forest Plan. This consistency ensures a sustainable level of harvest outputs. This discussion describes past, present, and reasonably foreseeable future harvest activity trends and how the Baraga Plains Restoration Project alternatives contribute to those trends.

Boundary of Analysis

This analysis is bounded by two different geographic scales: forest wide and within the project area. The analysis area used for the cumulative effects, include MAs 4.1a and 4.2a within the project area, since that is the level the Forest Plan uses as goals. For

this analysis, the 20-year period considered for the recent past discussion is defined from the years 1990 through 2010. The 20-year period considered for the reasonable foreseeable future is defined from the years 2011 through 2031.

Methodology

For cumulative effects analysis, harvest types are summarized into 2 categories: partial cuts and regeneration cuts. Partial cuts include the following silvicultural activities: selection, improvement cut, commercial thinning, preparation cut/shelterwood, salvage/sanitation, and salvage/thinning. Following implementation of these cut activities; the treated stands would still maintain a "forested appearance" within acceptable stocking limits for the particular forest type.

Regeneration cuts include the following silvicultural activities: clearcut (with or without residuals), seed cut/shelterwood, and overstory removal/sanitation. Following implementation of these cut activities; the treated stands would appear "open" or temporarily "non-forested" as the stands being anew.

For this analysis, an entry cycle for harvest is defined as a 20-year period. This cycle can range from 10 to 20 years depending on the forest type and the condition of the stand (USDA Forest Service , 2006). For efficiency of scheduling harvest treatments to implement silvicultural objectives (tied to stand recovery from previous harvest and growth rates), a 15-year entry cycle is a good average to determine silvicultural needs for a forested area. Currently the Ottawa is harvesting approximately 50% of the net growth, mortality is about equal to harvest, and the long-term sustained yield capacity is approximately 2.4 times the current level of harvest (USDA Forest Service, 2005).

Past Actions

The vegetation treatments described for Alternatives 2 and 3 build on past treatments that occurred in the project area. Past treatments in the project area in MA 4.1a and 4.2a included clearcutting to regenerate over-mature aspen and jack pine stands, the majority of the treatments (65%); and small amounts of shelterwood cuts; intermediate cuts (thinning); and sanitation salvage harvest (primarily in MA 4.2a).

For the recent past entry cycle (1990-2010) there have been 298 acres of clearcuts in MA 4.1a and 581 acres of clearcuts in MA 4.2a. These clearcuts are reflected in the age classes in Tables 14, 15, 20, and 21 above in the 0-20 age class in the aspen and jack pine. There is a slight lag in the age class for regeneration and which is reflected in the 818 acres of 0-20 year old jack pine which is in some harvest from the late 1980's

There have been 765 acres of salvage harvest in MA 4.2a since 1990 to address the high risk/salvage situation and balance harvest treatments, and to also address spatial arrangement of these thinned stands in relation to the clearcuts happening in other sales (USDA Forest Service, 1997). The Forest Plan (1986) at the time restricted the size of temporary openings to 40 acres or less and adjacent stands had to be managed

to reduce the damage by jack pine budworm. The 313 acres of shelterwood in MA 4.1a were mainly to regenerate white pine and a minor amount of paper birch. The 25 acres of shelterwood in MA 4.2a was to maintain the current stand distribution of red, white, and jack pine on the site (USDA Forest Service, 1997). The Baraga Jack Salvage Vegetative Management Projects EA (Decision Notice and Finding of No Significat Impact Plains Rehab Salvage #1, 1997) states that there are already numerous inclusions of established jack pine regeneration in parts of these stands. Where regeneration is already in place, removal of the mature overstory jack pine should take place (USDA Forest Service, 1997).

The 121 acres of thinning in MA 4.1a are all treatments in red pine stands which are proposed for thinning again this entry. The 23 acres in MA 4.2a is a jack pine stand which was thinned due to the size constraints on temporary openings in the 1986 Forest Plan. This site is now part of the proposed large opening in alternatives 2 and 3.

The treatments proposed in this entry are consistent with treatments done in the past with clearcuts being proposed in mature and over mature aspen and jack pine. One large clearcut being proposed would be to create large temporary openings which historically occurred on the Baraga Plains (see jack pine discussion). This was addressed in the decision signed for the Plains Rehab Salvage #1, Plains Rehab Salvage #2, and Baraga Jack Salvage Vegetative Management Projects (Decision Notice and Finding of No Significat Impact Plains Rehab Salvage #1, 1997), which stated “the selected alternative provides opportunities to create an additional early age class in a large continuous block by clearcutting the jack pine stands which would be thinned this entry …in the future”.

Present Actions

There are currently no active timber sales within the project area; the last sale that was completed within the project area was Drifter in 2001 in MA 4.2a.

Future Actions

There is nothing within the reasonably foreseeable future that would affect the vegetative composition other than wildfire.

Management Area Forest Wide

Past Actions

In Management Area 4.1a there have been recent timber sale planning in seven areas, Camp 7, Deadstream McLellan, Jack Pine Budworm, Plantation Lakes, Prospector, Rousseau East, and Three Corners. Some of these planning areas are completely finished such as Plantation Lakes and some are just being started, with the first sales to begin next year. See project record for a list of 190 recorded timber sales in MA 4.1a.

In MA 4.2a there have been recent timber sale planning activities in Plantation Lakes. This planning area has been completely implemented, with the last sale activity in 2005 on the Boneyard timber sale. There have been at least 22 sales in the management area (see project record).

Present Actions

Currently there are over 2,000 acres of red and white pine and these stands need to be thinned every 15 to 20 years to maintain health and vigor of the trees and reduce the likelihood of insect and disease outbreaks. With less than 1,000 acres of treatment, it would be expected that many stands are in need of thinning in this management area.

Future Actions

It is expected in the future that management would continue to focus on the long-lived conifer component of the management area with many intermediate harvests planned in plantations of red pine planted in the 1930's. This 138,200 acre management area currently has over 24,000 acres of red pine and less than 10,000 acres of thinning over the last 40 years, so it would be expected that there would continue to be commercial thinning done on these stands. Red pine should be thinned every 15 to 20 years on sites typical of this management area.

It is expected that the forest would start another planning area in MA 4.1a to the west of the current project area. This area is in the vicinity of Pori Junction, which was originally part of Rousseau East, and is currently in the early stages of development. Activities like those proposed in this project in the management area would be expected to be similar to this project due to the Forest Plan emphasis on long-lived conifer.

Clearcuts would also be a part of MA 4.1a to regenerate both jack pine and aspen. This management area currently has approximately 33,000 acres of aspen and over 8,000 acres of jack pine. With only approximately 11,000 acres regenerated over the last 40 years it would be expected that the Forest would continue to look at opportunities to regenerate these forest types with clearcuts. With the large amount of aspen/paper birch in the 70-year age class and older (currently about 45,000 acres) the amount of aspen/paper birch in the 0-9 year age class could potentially increase over the next decade if the Forest can access these stands, complete the site-specific analysis processes, and sell the resultant timber sales (USDA – Forest Service, 2009, pg. 23). As stands are regenerated it is likely that the amount of sanitation and salvage harvest would decrease, but it would still be expected that they occur from time to time as insects and disease occur.

Shelterwood treatments would continue to regenerate paper birch and white pine, but these do not represent a large part in the management area at this time. As development of white pine trees that are resistant to blister rust occurs, white pine may start to become a larger part of this management area.

Selection harvest would continue to occur in the management area where there are hardwoods. Currently there are slightly over 20,000 acres of northern hardwoods and recommended entry is every 10 years (USDA Forest Service, 1985). It would be expected that harvest levels may increase in the coming years.

It is expected in the future that management in MA 4.2a would continue to focus on the short-lived conifer component of the management area. This 12,900 acre management area currently has over 3,500 acres of jack pine along with just over 1,000 acres of aspen. With over 3,000 acres jack pine regenerated over the last 40 years, it would be expected that the forest continue to look for opportunities to regenerate over mature jack pine and aspen. As stands are regenerated it is likely that the amount of sanitation and salvage harvest would decrease, but it would still be expected that they occur from time to time as insects and disease occur.

Intermediate treatments would also be expected to occur in long-lived conifers as most of this type is plantation established in the 1930s and 40s. Selection harvest would continue to occur infrequently in the management area where there are hardwoods. Currently there are slightly over 1,000 acres of northern hardwoods and recommended entry is every 10 years (USDA Forest Service, 1985). It would be expected that harvest levels may increase slightly in the coming years. There may be more thinning in the hardwoods due to the site quality not allowing uneven-age management. Other harvest activities would also be expected to continue. These are things such as road clearing which occurs on almost every timber sale, but would only total a few acres each year.

Given the past, present, and future actions in combination with the effects of either action alternative, it is anticipated that there would be positive cumulative effects.

OLD GROWTH

Old Growth Affected Environment

Old growth can mean many things to many people but for this analysis old growth conditions are those described in Table 2-2 of the 2006 Forest Plan. Other desired conditions include consideration of connecting landscape features such as steep slopes, riparian corridors, and providing effective blocks for old growth dependent species.

Old growth stands provide a late-successional component to wildlife habitat. Many species use, at least in part, some components of late-successional stands. The large tree component can be important to cavity nesting or foraging species. Large trees provide nesting habitat for large birds including eagles and goshawks.

When creating proposals for old growth classification the ID team looked for areas that had some of the characteristics already, or had the potential to achieve the features described in Table 2-2 of the Forest Plan. The majority of stands in the Baraga Plains area do not currently contain all the features described in Table 2-2. Table 24 displays

the current percent of old growth at the MA scale for the desired and existing conditions both at the forest wide level and at the project level.

Per the 2006 Forest Plan direction, any old growth areas formally classified through this NEPA process would not be actively managed. The area affected by old growth classification and declassification would be the stands themselves and the area immediately adjacent to the stands. Old growth can affect adjacent stands by being sources for insects and disease to build up and move to adjacent healthy stands. Old growth can also provide habitat for species that may spend part of the time in old growth stands and require other habitat such as openings. The existing and proposed old growth percentages are presented in Table 24. It is important to note that the Forest Plan directs that old growth percentages should be analyzed at the Forestwide scale. Project area percentages are included below for reference purposes.

Table 24 – Existing and Proposed Old Growth Percentages for the Project Area and Forestwide

Existing Condition					Alternatives 2 and 3		
MA	**Forest-wide Desired Condition**	**Forest-wide Existing % OG**	**Project-wide % OG**	**Project - wide acres of OG**	**Proposed acres of OG**	**Resulting % OG in Project area**	**Resulting % OG at MA level**
4.1a	4%-7%	7.0	6.8	230	230	6.0	7.0
4.2a	1%-3%	2.2	2.2	133	211	3.5	2.8

Effects Analysis for Old Growth

Direct and Indirect Effects

Alternative 1

No changes in old growth would occur under this alternative. The project area would continue to contribute to the old growth in MA 4.1a and 4.2a. Stands may continue to develop and contain old growth characteristics without any action. Old growth stands in 4.2a continue to be isolated as a block of 137 acres.

Direct and Indirect Effects

Alternative 2 and 3

In MA 4.1a the old growth allocation is the same as Alternative 1. In MA 4.2a, three stands currently classified as old growth are removed from old growth. Two of the stands are currently typed as jack pine and one is red pine. One of the unclassified

stands is only 12 years old and does not contain any old growth characteristics. The other two stands are failed plantations that are just over 50 years old and are proposed to be treated in these alternatives. The jack pine stand would be regenerated to jack pine and the red pine stand would be thinned and maintained as a red pine stand. These three stands are isolated on the Baraga Plains and currently form a block of 137 acres.

In MA 4.2a a long narrow strip of jack pine, (totaling 211 acres) with some minor components of aspen and red and white pine, is classified as old growth along FR 2200 and next to the Sturgeon Gorge Wilderness Area. This follows the guidelines in the Forest Plan to provide for connectivity, improve visual quality, and allows recreation use other than at developed sites along the wilderness boundary. With the relocation of the old growth, the jack pine strip would now contribute to a block of over 15,000 acres.

Note the current acres of old growth in MA 4.1a is about 230 acres. This change from scoping was due to an error in the dataset from editing of stands. The proposed action does not change the old growth in MA 4.1a.

Cumulative Effects

On the Ottawa, most timber that was of good quality and easily accessible was clearcut at the turn-of-the-20th-century. As a result, very little old growth is present on the Ottawa today, with the exception of the McCormick, Sylvania and Sturgeon River Gorge Wildernesses (USDA Forest Service, 2006). One of the largest tracts of old growth in the Midwest occurs in the 60,000-acre Porcupine Mountains Wilderness State Park, which adjoins the Ottawa on the northwest boundary (USDA Forest Service, 2006). Many private lands have recently been harvested very heavily, and it would take several decades to return to a mature forest status (USDA Forest Service, 2006). Some private lands have not been harvested in years, and are slowly progressing towards old growth (USDA Forest Service, 2006). Old growth classifications should take into account old growth and mature forests on adjacent ownerships where old growth retention is assured to make larger more effective blocks of old growth (USDA Forest Service, 2006).

Both management areas are at or within the maximum amount of old growth allowed in the Forest Plan so most changes would be changes of stands. This would be expected to allow better stands classified as they come up in project planning.

Since a large portion of the old growth in the western Upper Peninsula would be located in state and federal wilderness and in wild and scenic river corridors, there would be little difference among the alternatives in the amount of old growth (USDA Forest Service, 2006). As forests mature over the next several decades, the number of acres of forest with old growth conditions would increase substantially (USDA Forest Service, 2006).

TRANSPORTATION – ACCESS MANAGEMENT

The desired condition is to provide a transportation system that responds to safe public access needs while meeting other resource needs. The Deciding Official's selection of the following actions discussed may include the amount, type and site-specific location of road closures, decommissioning, obliteration, construction (including temporary construction), reconstruction, maintenance and design criteria developed for the project's transportation resource (see Chapter 2).

Calculations presented in this discussion include the mileage of designated motorized access road routes established by the 2010 Motor Vehicle Use Map. This map is discussed in more depth in the Recreation section.

AFFECTED ENVIRONMENT

The project area is regularly used for recreational purposes, especially during hunting seasons. Many roads currently used by passenger vehicles are also used by **OHVs**, including **ATVs** (Appendix F). All road activities proposed were evaluated to find a balance between the benefits of providing safe access on Forest lands, and the costs of road-associated effects on resources. Documentation of this analysis is located in the Project File (Tab D).

Forest Roads 2200, 2240, 2245 and 2270 are collector roads (maintained at an **OML** (Appendix F) 3) within the project area and receive scheduled road maintenance consisting of spot graveling, and blading at least once and sometimes twice each summer. All other existing open and closed system roads have a native surface material, and are maintained at a lower standard.

There are approximately 88 miles of roads on NFS land in the project area, some of which originated from past harvest operations and recreation access in and around the area. Of these 88 miles, there are about 11 miles of road physically open (i.e., no berm or gate) that are available for passenger vehicle use and 16 miles of physically closed road (i.e., bermed, gated or grown-in with vegetation that are not available for use on the MVUM). Due to the xeric conditions within the project area, the majority of the system roads is dry, flat and has a sandy soil composition. The Project File contains the transportation management objectives and maintenance level for each system road (Tab D).

Of the 88 miles of roads within the project area, about 39 miles are categorized as unauthorized roads, which are not managed as part of the Forest's system road network. These road segments are features that have been created and used for past management activities or have been created through other uses (i.e., recreation, user-made trails). These roads have been deemed inappropriate in the past for adding to the system road network primarily because they have not been maintained according to appropriate road standards.

The Forest Plan's road density objective for MA 4.1a is 3 to 4 miles of system road per square mile (mi/mi^2) of Federal land (pp. 3-23). The current total road density within the MA 4.1a portion of the project area is 8.0 mi/mi^2. The Forest Plan's road density objective for MA 4.2a is 2.5 to 3.5 mi/mi^2 (pp. 3-29), whereas the current total road density within this portion of the project area is 4.6 mi/mi^2. It is important to note that the existing road densities within each MA do include unauthorized road miles, which artificially increases the total road density. Excluding these unauthorized roads, the road density for each MA would be 2.7 mi/mi^2 and 3.7 mi/mi^2 for MAs 4.1a and 4.2a, respectively.

Forest Plan Direction

Applicable direction of the Forest Plan for the transportation resource can be found on pages 2-12, 2-37, 3-23 and 3-29 (2006). Based upon the desired conditions outlined in the Forest Plan, the purpose of the project's transportation proposals is to reduce overall road density while providing a road system to sustain administrative uses, and correct site-specific locations of soil and water resource damage caused by roads (see Chapter 1).

METHODOLOGY

Transportation system planning involves deciding what form of road network is needed within a project area for both current and long-term needs. The design of the transportation system needs to incorporate access to the area for multiple-purpose use (e.g., timber harvest, recreation management, reaching private land parcels), while also including provisions for administrative access (i.e., fire suppression efforts). To decrease the total road density within each MA, the ID Team evaluated how best to manage or dispose of the unauthorized road features and re-evaluated the system roads to determine if any changes were needed.

To produce the information provided for the existing condition, data has been collected from District records and by conducting field surveys. Information was gathered from transportation plans, road inventories, and past timber sale area maps. A field inventory of existing roads and travelways was conducted in each compartment within the project boundary that lacked complete information or required validation of the existing transportation system. A summary of existing road conditions is located in the Project File (Tab D).

In concert with Forest Plan direction, the ID Team used the Roads Analysis Process (RAP) to assess and plan management for the existing transportation system within the project area. Roads analysis is an integrated ecological, social and economic approach to transportation planning (USDA Forest Service, 1999). The process assisted the ID Team to identify benefits, problems and risks associated with management of the project area's current transportation system. Effects related to roads are generally addressed as impacts to other resources such as recreation, fire, wildlife and soils. To help support the analysis of these other resources, the effects described here will focus

on providing information on road development needs, vehicle access, and road density estimates. The effects analysis for proposed changes to the MVUM is discussed under the Recreation section.

Bounds of Analysis

The bounds of analysis for the project's transportation system are the project area. This area was selected because the most immediate (within 5-7 years) direct and indirect effects from the transportation actions would occur where management is proposed to take place and are not expected to extend outside of the project area. The location of the management activities proposed can be found on maps in Appendix A, Maps 4, 5, 7, and 8. Refer to Tables 3 and 6 of Chapter 2 for the following discussion of alternatives with respect to transportation management.

Measurement Indicators

The possible effects of the proposed alternatives on the transportation resource are discussed quantitatively using the indicators below:

- Total Forest System road density by MA at the project scale;
- Miles of Forest System road managed within the project area;
- Miles of road closure;
- Miles of road construction;
- Miles of road reconstruction;
- Miles of road maintenance; and
- Miles of road decommissioning.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

This alternative has no effect on the project area's existing road density, which would remain at 8.0 mi/mi^2 for MA 4.1a and 4.6 mi/mi^2 for MA 4.2a. It is also important to note these figures display the conditions at the project level and that the MA-wide road density would remain within the desired conditions. Conditions discussed in the affected environment discussion would continue under this alternative. Specifically, Forest Roads designated open or closed to motorized use would remain unchanged. The amount of system road managed under Alternative 1 would remain at 49.7 miles, of which 15.5 miles is currently managed closed to motorized uses.

No road construction, reconstruction, decommissioning or additional road closures would occur, except on collector roads (OML 3). Under Alternative 1, unauthorized roads would remain in their current condition. These roads are not currently designated for motorized use on the MVUM and therefore any motorized use on these roads would

be considered cross-country, which is prohibited by the Forest Plan (p. 2-15). Some of these roads are clearly visible and may appear drivable; not addressing these roads may increase the risk that illegal use would occur. Other unauthorized roads are partially or fully overgrown with vegetation and are difficult to locate and without management these roads would continue to be re-vegetated (Project File, Tab D).

Since no ground disturbing actions would be implemented as part of this alternative, no direct or indirect effects to the transportation system are anticipated. See Appendix A, Map 6 for a display of the existing transportation system.

Direct and Indirect Effects

Alternative 2

This alternative is tied to meeting the purpose and need for this project. Only those roads needed to implement the vegetation treatments listed for this alternative and to provide access for other resource needs were considered in the development of the road network for this alternative. The refinements to the transportation system at ther project level under this alternative would ultimately increase the system road density in MA 4.1a from the current 2.7 mi/mi^2 to 3.7 mi/mi^2. For MA 4.2a, changes to the transportation system would increase the system road density from 3.7 mi/mi^2 to 4.2 mi/mi^2. For the project area as a whole, these refinements include decommissioning of all 32.2 miles of unauthorized roads, decommissioning of 3.1 miles of system road, and the addition of 1.3 miles of system road through new road construction.

Through the transportation planning process, the number of miles of system road proposed to be managed into the future under Alternative 2 has increased by about 10.7 miles. This change is primarily due to the change in management strategy for some unauthorized roads (e.g., some roads are proposed to be added to the system road network and some would be decommissioned).

Approximately 27 miles of system road would remain closed after implementation of this alternative, which is a reduction of about 10 miles from the existing condition. Several berms and or gates would need to be installed as described in design criteria (see Appendix D). These structures would be placed after accommodations for vehicles performing timber management operations are no longer necessary. Due to the existing conditions as described in the vegetation section, placement of some berms may include other measures to effectively restrict unauthorized motorized access. In addition to management of unauthorized roads, implementation of the Travel Management Rule through the proposed MVUM (Appendix A, Map 10) further refines the transportation system based on the capability of roads to sustain motorized use (see the Recreation section for more information). Barring illegal access is important in many areas, including those roads used as fire lines as described in the Fire discussion.

Implementing this alternative would require approximately 44 miles of maintenance, 3 miles of reconstruction and about 1.3 miles of new construction to facilitate timber

harvest. Some temporary construction may be needed as determined necessary by the transportation engineer during timber sale operations. These temporary roads would be built at a minimal standard to reduce ground disturbance. Exact locations of this temporary road construction, if needed, would be determined at the time of sale design. All temporary roads would be decommissioned post-harvest as outlined in design criteria (see Appendix D).

As shown on Appendix A, Map 3, Forest Roads 2236, 2236-B, 2240 and 2243-B would be used as the primary fire break. Additional activities would occur in the right-of-way for these four roads as outlined in the fire discussion, in order to provide the defensible space desired for the 520-acre burn area. Several other roads would be used for internal breaks within the 520-acre burn area as well as the 138-acre burn area. All of these internal fuel breaks would be maintained as part of the harvest proposal (see the Fire discussion for more information).

Direct and Indirect Effects

Alternative 3

All of the effects to the transportation system and resulting access would remain the same as Alternative 2, except for the following actions. The access management strategy for this alternative would decrease the amount of road work proposed commensurate with the reduced timber harvest acreage within Compartment 107 (see Chapter 2 for more information). The exclusion of 0.4 miles of road reconstruction and 5.5 miles of road maintenance prevents the Forest from opening these roads to OHV access (see the Recreation section, discussed later in this chapter).

Alternative 3 does not include construction of the fuel break using Forest Roads 2236, 2236-D, 2240 or 2243-B. However, the maintenance is still required for these roads under the transportation proposal to facilitate harvest as shown on Maps 4 and 5 of Appendix A.

Summary

In summary, both action alternatives would provide refinements to the transportation system, including an increase in system road density. The difference in effects between these alternatives is minimal as only about 6 miles of road would not be subject to treatment (e.g., 5.5 miles of maintenance and 0.4 miles of reconstruction) under Alternative 3.

Cumulative Effects

Bounds of Analysis

For this analysis, the project area was chosen to address cumulative effects because this is the scale at which the data was collected and the transportation plan was

prepared; and, every project looks specifically at developing the minimum and most efficient transportation system feasible. The temporal bounds of the cumulative effects analysis are from the time frame when the Ottawa began administering lands and managing the transportation network on the Forest through the anticipated, next two decades of Forest Plan implementation. This time frame is appropriate since it reflects how past and present management practices on the Ottawa assist to shape the project area's transportation system.

Past Actions

An extensive road system has developed since the 1930s within the project area. This transportation system was developed for purposes of harvesting timber, providing access to private lands, and creating opportunities for recreational access. Most roads were built to a low design standard, and have started to grow over naturally with vegetation. Other roads have been developed and maintained over the years (e.g., collector roads) and serve as the primary road network accessing portions of the project area and private in-holdings.

Present Actions

The existing network of system roads for this project consists of collector and local roads. There are no transportation actions presently taking place outside the proposed actions of this project, except for routine maintenance on collector roads. Under either action alternative, the existing roads would be either decommissioned or maintained and added on the road system. Those roads maintained as a part of the transportation system would be either open or closed to passenger vehicles as described in the direct and indirect effects section.

According to the Travel Management Rule, the Ottawa published a MVUM designating what type of access is allowable for each applicable road segment. This map was released in April 2010 and was used as a baseline for recommending changes to access (where and what type) through the Baraga Plains Restoration Project.

Future Actions

The long-term access management strategy for this area would be to continue to use the existing network of roads with limited construction and reconstruction occurring. Any future activity would be analyzed through the NEPA process. The MVUM will be updated and published on the Forest each year. There are no known additional state, county, or township roadway improvement projects anticipated in the reasonably foreseeable future, other than routine maintenance as described.

Summary

Alternative 1

Since there would be no direct or indirect effects as a result of implementing this project, there are no cumulative effects anticipated under Alternative 1.

Alternatives 2 and 3

The potential effects of implementing this project, when combined with other past, present, and reasonably foreseeable future activities would result in positive, minor, cumulative effects to the transportation network. This is due to the refinements of the transportation system over time. As each project is implemented, the transportation system is refined through decommissioning those roads not needed, as well as new construction, reconstruction, and maintenance. Future forest management needs would benefit from having a transportation system with fewer site-specific refinements. Future transportation activities would be analyzed through the NEPA process as applicable.

SAND PLAIN PLANT COMMUNITIES

INTRODUCTION

This section focuses specifically on the sand plain plant communities within the project area. One purpose of the Baraga project is to improve habitat for plants (and some animals) that rely on sand plain openings (see Chapter 2). The Baraga project area includes some native herbs and shrubs associated with open, dry, sandy, fire-prone sites.

AFFECTED ENVIRONMENT

The Baraga project area is predominantly dry northern forest, with northern hardwoods dominating on the north end. The dry pine types in general are mostly limited to the east side of the Forest, however, the plant communities common on the Forest and adjacent private lands and are not limited to the project area.

Representative members of the sand plain plant community are illustrated in Table 25, and include species such big bluestem, little bluestem, wavy hairgrass, bearberry, sand cherry, velvet leaf blueberry and low sweet blueberry.

Forest Plan Direction

Direction for native plant management, including sensitive plant species, is located on page 2-8 of the Forest Plan.

Table 25 – Target Sand Plains Native Plants in the Baraga Project Area

Common Name	Habitat	Fire Relationship	Comments
Big bluestem	Tall grass (~3-6+ feet)	Spring burns stimulate growth. After about 5 yrs, litter builds up and slows growth, ready for another burn. Summer burns are detrimental. (Uchytil 1988)	Important sand plain community member; wildlife food and cover, bird nest sites (Uchytil 1988).
Little bluestem Little bluestem (continued)	Mid height grass (~1.5-3 ft)	Spring or fall fire stimulates growth; summer burns are detrimental . In some xeric sites fire does not stimulate growth. (Steinberg 2002)	Important sand plain community member; food and cover for birds (Steinberg 2002).
Wavy hairgrass	Mid height grass (~1-3 ft)	Shallow rhizomes/bud bank. Light fire (consuming only litter) stimulates growth and seed production. Fires burning deeper into soil can eliminate hairgrass. (Schimmel and Granstrom 1996)	Important sand plain community member.
Bearberry	Low trailing shrub	Result depends on season and intensity of burn. Fire may stimulate growth or cause decrease; more studies found decrease. (Crane 1991)	Wildlife value-fruits, leaves. Used as tobacco and medicinally. (Crane 1991)
Sand cherry	Low, much-branched shrub (~3-6+ ft)	Variable: some fires reduce cover, some stimulate growth. Deeper rhizomes can survive hot fire but shallow rhizomes cannot. Low intensity spring burn most likely to stimulate growth. Frequent, repeated fires likely to reduce sand cherry cover. (Taylor 2006)	High wildlife value-fruits, cover. Major flush in fruit production followed Baraga Bump fire in area.

Common Name	Habitat	Fire Relationship	Comments
Velvetleaf blueberry	Low shrub (~1-2 ft)	Stimulated by (non-severe) fire; growth rapid in first two yrs. Spring or fall burns effective. 4 to 5 year burn interval recommended for berry production. More frequent fire is detrimental to *V. myrtilloides* although it stimulates *V. angustifolium.* (Tirmenstein 1990)	Berry picker interest; host plant for Henry's elfin butterfly; wildlife value (fruits).
Low sweet blueberry	Low shrub (~1-2 ft)	Stimulated by (non-severe) fire; fruit production increases in second year after fire. Spring burns most effective. 4 to 5 year interval or fewer benefits *V. angustifolium.* Summer fires are detrimental. (Tirmenstein 1991)	Berry picker interest; host plant for Henry's elfin butterfly; wildlife value (fruits).

METHODOLOGY

The direct, indirect and cumulative analyses for these two categories of native plants are discussed separately. This discussion is limited to effects on these target sand plain plant communities from the treatments to the large 138 acre opening. Other project activities such as timber harvest and road maintenance are expected to have little effect on these plants. Other plants associated with sand plain openings are expected to respond similarly. Other native plants (not tied to sand plain openings) are not discussed, and are expected to persist in the project area although there may be shifts in abundance and distribution with the proposed treatments, natural succession, and ongoing uses in the project area.

Bounds of Analysis

The direct and indirect effects analysis for target native plants and all listed plant species was conducted at the treatment stand scale because that is where these impacts would occur.

Measurement Indicators

- Acres of opening maintained to support sand plain plant communities.

EFFECTS ANALYSIS FOR NATIVE SAND PLAIN PLANT COMMUNITIES

Direct and Indirect Effects

Alternative 1

Under this alternative, burning the entirety of the approximately 138-acre opening on the northeast side of the intersection of FR 2240 and FR 2245 would be discontinued as previously authorized under the 2007 Decision Memo.

Over time, without additional burns, this area is expected to pass through natural succession into a savannah setting with scattered pines and oaks. The canopy would become more closed and there would be a dwindling of fire-adapted understory plants. The extent of the target grasses is expected to diminish, and fruit production on the shrubs decrease. Over a longer time, the extent of the shrubs may also decrease as overstory shade increases.

Ongoing recreation uses would continue, as would road use and maintenance. These activities are not expected to affect the sand plain plants. A wildfire could occur in this area and burn more acres than scheduled for the prescribed burn. Depending on the situation, fire suppression tactics could be applied or not. If not, such a fire could kill larger areas of trees and create larger openings. Such a scenario would benefit the target plants until tree regeneration becomes tall enough to shade much of the ground flora as the spring burn is expected to do.

Direct and Indirect Effects

Alternative 2

Under this alternative, the 138 acre opening would also be subject to prescribed burning on a four to five year burn cycle. This burn cycle is expected to keep the large opening free of most trees, and dominated by grasses with scattered shrubs. The springtime prescribed fires would burn litter and above-ground plant parts, and kill small regenerating jack pines and some of the larger existing trees, making the site more open. The burn intensity is expected to be low, with occasional hot spots, such as around existing pine stumps. Habitat conditions may also be improved through the use of mechanical treatment in lieu of fire as previously utilized. Few impacts to soil are expected. Big bluestem, little bluestem, hairgrass, low sweet and velvet-leaf blueberries, and sand cherry are expected to respond favorably following the fires, with increased growth and increased fruit production. Bearberry is expected to persist and probably increase since the fire intensity would be low, but it may show some decrease.

This burn schedule is perhaps more frequent than the typical natural occurrence, but it allows active management for particular plants and berry production. Permanent openings in MA 4.2a should be burned several times in succession until regeneration of trees is prohibitive. Once that condition is reached, the opening should exist as a savannah for several decades and require less burn intervals or be allowed to evolve

back to jack pine forest. Thus, this alternative favors the sand plain plants, insects and other animals (such as upland sandpiper, grassland sparrows, and harrier) that need a large xeric opening. This is the only location on the Ottawa currently managed for sand plain communities.

Direct and Indirect Effects

Alternative 3

Under this alternative, the spring 2010 burn was completed; however, no other burns would be scheduled in the future as discussed in Alternative 1. Therefore, the effects for this Alternative would be the same as for Alternative 1.

Cumulative Effects

Bounds of Analysis

The analysis area for cumulative effects is the dry, sandy, outwash landtype associations of the Ottawa (LTAs 14, 15 and 17). This area was selected because this is where sand plain-associated plants are most likely to occur or be dominant and where fire was likely an historic disturbance agent. The chronological bounds of analysis start around the 1900s, when fires on the droughty landscapes began to be suppressed. The bounds extend through the present and into the reasonably foreseeable future, about 15 years ahead, which has been deemed a reasonable future timeframe, as this is the planning period associated with the Forest Plan.

Past Actions

Fire suppression resulted in the decline of some fire-adapted species and changed plant community composition, which in turn, affected wildlife communities and berry picking opportunities. Prescribed fire had not been used as a tool for restoration to much extent on the Forest until recently.

Present Actions

Recognition of changes in the fire-adapted communities has resulted in greater interest in restoration projects in the dry LTAs. New management direction was placed in the 2006 Forest Plan to use prescribed fire as a restoration tool under suitable circumstances and to seek opportunities to maintain and create large openings (>10 acres) on sites mapped as xeric ecological land type phases, where fire was historically part of the disturbance regime. The large opening was treated with prescribed fire and mechanical treatments to remove most of the pine and oak canopy, in the last three years.

Future Actions

Prescribed fire may become periodically used as a restoration tool on the Ottawa. Similar projects may occur elsewhere in the Baraga Plains, including on adjacent state lands, although projects are expected to be designed more for the Federally-listed Kirtland's warbler and jack pine-associated species than sand plain-associated species. Future climate change may bring a warmer, drier climate to the area, which could favor open plains and more frequent wildfire.

The repeated prescribed burns have favored sand plain plants and animals and maintained a large, early successional area. Without future prescribed burning on the 138 acre opening (with the exception of Alternative 2, which would continue to allow for prescribed burning), there would be no beneficial effect or added habitat from the 138 acre opening, since this is the only large open area actively managed for sand plain species

RARE PLANTS

INTRODUCTION

A biological evaluation (BE) was prepared, which analyzes potential effects to rare plants in the Baraga Project. The BE is included in the project file.

AFFECTED ENVIRONMENT

The Baraga project area is predominantly dry northern forest, with northern hardwoods dominating on the north end. Open land includes roadsides and trails. The dry pine types in general are mostly limited to the east side of the Forest, however, all of the above-identified communities are common on the Forest and adjacent private lands and are not limited to the project area.

The plant community types indicate that suitable habitat is present for some of the Sensitive plants documented or suspected to occur on the Ottawa National Forest. Suitable habitat is lacking for 22 species that require lakes; major river corridors; bogs and fens; large rocks, bluffs, and cliffs; clay soils, and habitat near Lake Superior. Because these habitats are lacking in the project area, all the proposed alternatives will therefore have no effect on these species.

Forest Plan Direction

Direction for native plant management, including sensitive plant species, is located on pages 2-3, 2-8 and 2-27 of the Forest Plan.

METHODOLOGY

Field surveys were conducted under contract in proposed treatment stands in the project area during spring (2009), summer (2009), and fall (2008) blooming seasons.

Survey results, which include habitat descriptions and observed species lists, are in the project file. No Sensitive plants have been recorded in this area. No habitat for federally listed threatened or endangered plants is believed to occur in the Baraga project area or on the Ottawa. No federally listed or proposed, threatened or endangered plants were observed in the field surveys. Element occurrence records from Michigan Natural Features Inventory, which show known occurrences of State-listed plants, were checked for the project area (MNFI 2010). There are no known State threatened or endangered, or federally listed species (including Regional Forester's Sensitives) documented in the project area.

Measurement Indicators

- Acres of vegetation management that may impact rare plant species.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

Alternative 1 is not expected to result in more than minor effects on any rare plants or their habitats since there would be no ground disturbance, and natural successional processes would not result in complete habitat loss. For the action alternatives, some habitats such as conifer swamps; open wetlands, lakes, ponds, streams, and riparian areas; and open areas would receive few if any impacts from proposed activities. Therefore, plants associated with these habitats received a "no impact" (NI) determination in the BE, and as illustrated in Table 26 (Project File, Tab D).

Direct and Indirect Effects

Alternative 2

Effects from proposed timber harvests are likely in mesic northern forest and dry northern forest types. Adverse effects include changes in light regime, soil characteristics, and microclimate, and introduction of competitors, among others. In hardwoods, most of the proposed activity is selection harvest, which somewhat resembles **natural gap phase dynamics** (Appendix F), and retains some suitable habitat for rare plants. Proposed clearcuts for aspen and jack pine regeneration could render habitat unavailable by resetting succession and creating dense stands with little or no understory plant communities. Thinning in pine stands could have short-term negative habitat effects during logging activities in the next 5 to 7 years, but would provide habitat long term for rare plants to colonize after the harvest disturbance effects settle.

Due to these potential effects, plants associated with these habitats received a MII determination: "may impact individuals of a species but not likely to cause a trend to federal listing or a loss of viability". These species are listed in Table 26 below.

Direct and Indirect Effects

Alternative 3

Alternative 3 would have similar effects on rare plant habitat as Alternative 2, except for the mesic northern hardwoods habitat. With the proposed lesser amount of timber harvest, Alternative 3 has lowered likelihood of effect, although the type of effects and consequences are the same as for Alternative. 2. Because there is still potential for effects, while there is lowered risk, the determinations are the same as for Alternative 2, as shown in the table below. See the BE for more information.

Table 26 – Excerpt of Biological Evaluation Determinations for Rare Plants[1]

Common Name	Scientific Name	Alternative 1	Alternative 2	Alternative 3
Western Moonwort	*Botrychium hesperium*	NI	MII	MII
Mingan's Moonwort	*Botrychium minganense*	NI	MII	MII
Goblin Fern	*Botrychium mormo*	NI	MII	MII
Blunt-lobed Grapefern	*Botrychium oneidense*	NI	MII	MII
Pale Moonwort	*Botrychium pallidum*	NI	MII	MII
Ternate Grapefern	*Botrychium rugulosum*	NI	MII	MII
Large Toothwort	*Cardamine maxima*	NI	MII	MII
Fairy Bells	*Disporum hookeri*	NI	MII	MII
White Trout-lily	*Erythronium albidum*	NI	MII	MII
Butternut	*Juglans cinerea*	NI	MII	MII
Canadian rice grass	*Oryzopsis canadensis*	NI	MII	MII
American Ginseng	*Panax quinquefolius*	NI	MII	MII
Broad Beech Fern	*Phegopteris hexagonoptera*	NI	MII	MII
Giant Pinedrops	*Pterospora andromedea*	NI	MII	MII
New York Fern	*Thelypteris noveboracensis*	NI	MII	MII
Heart-leaved Foam-flower	*Tiarella cordifolia*	NI	MII	MII
Black-foam lichen	*Anzia colpodes*	NI	MII	MII
Moss species	*Orthotrichum ohioense*	NI	MII	MII
Moss species	*Pylaisiadelpha tenuirostris*	NI	MII	MII

[1]*Relative to sensitive species, biological evaluations must arrive at a finding of effects on each species' population viability (see Project File). For the plants listed in this table NI = no*

impact, and MII = May impact individuals of a species but not likely to cause a trend to federal listing or a loss of viability.

Cumulative Effects

Bounds of Analysis

The analysis area for cumulative effects is the Ottawa National Forest since habitat for most of the plants occurs across the Forest and the plants are so sparse and widely scattered. Impacts to populations anywhere on the Forest could decrease species viability across the Forest, so this larger scale is needed for analysis. The timeframe for cumulative effects to rare plants is the early 1900s, when the industrial logging era changed the Ottawa landscape and had major impacts on plant populations and habitat. The bounds extend through the present and into the reasonably foreseeable future, about 15 years ahead, which has been deemed a reasonable future timeframe as it is the planning period associated with the Forest Plan.

Past, Present, and Future Actions

Thirteen different past, present, and reasonably foreseeable future actions were identified that may be placing some rare plant species at risk on the Ottawa National Forest. They are discussed in the *Biological Evaluation of the ONF Revised Land and Resource Management Plan for Vascular Plants and Lichens* (US Forest Service Ottawa NF 2006). Seven of the thirteen past, present, or reasonably foreseeable future actions may be acting forest wide, but do not seem to be specifically affecting Sensitive plants within the Baraga project area. These actions include land management on non-federal land; land development; exotic earthworms; forest pests and disease; effects from animals; gathering of sensitive plants; and toxins and pollutants. The remaining six actions are discussed in the BE: vegetation management by ONF; recreation; non-native invasive plants; fire suppression; natural succession; and climate change. Discussion in the BE concludes that no cumulative effects to rare plants are expected from the latter five actions.

The clearest set of past, present, and future actions that may cumulatively affect the viability of sensitive plants/habitat within the project area is vegetation management by the Ottawa National Forest. Due to the use of RFSS status as a protective tool, and the large percentage of the Forest, which is not managed for timber harvest, cumulative effects from timber harvest on existing rare plant populations are generally not substantial. Effects from timber harvest on potential rare plant habitat, in terms of foreclosing colonization opportunities, are more frequent and can result in cumulative impact. Treatments in the Baraga project would contribute a small cumulative effect to this decrease in habitat potential for some listed plants. While timber harvest continues to periodically remove some areas from the suitable habitat pool, there is ample habitat available on the Forest as a whole, for colonization and expansion, since none of these rare plants needs a huge area (unlike some large mammals). Thus there is a cumulative effect from timber harvest on rare plant habitat, but that is not the limiting

factor keeping these plants rare as described in the list of factors incorporated into the cumulative effects discussion in an excerpt from the BE, as described above.

NON-NATIVE INVASIVE PLANTS

INTRODUCTION

Forest Service Manual 2081.03 directs that whenever any ground-disturbing activity is proposed, the Forest Service must determine the risks of introducing or spreading noxious weeds associated with the proposed activities. For projects having moderate to high risk of introducing or spreading noxious weeds, the project decision document must identify noxious weed control measures that will be undertaken during project implementation.

AFFECTED ENVIRONMENT

Within the project area, weeds (native and non-native) are most abundant in regularly disturbed areas, such as along roads and OHV trails. One infestation of spotted knapweed was previously recorded in the Ottawa NNIP database for this project area, along FR 2236 in Compartment 19, between stands 32 and 37. In addition, infestations of marsh thistle, orange hawkweed, reed canary grass, spotted knapweed and white sweet clover were recorded during surveys conducted in 2008 and 2009 for this project; in proposed treatment stands (see Project File).

Other NNIPs may occur in areas not surveyed within the project area; however, there are likely to be additional infestations of the species noted. Low priority species such as oxeye daisy, St. Johnswort, bird's-foot trefoil, orchard grass, Queen Anne's lace, and tansy also occurred in some stands and roadsides.

Forest Plan Direction

Direction for non-native invasive plant (NNIP) management is located on pages 2-4, 2-12 and 2-13 of the Forest Plan.

METHODOLOGY

Analysis and discussion included below is based on review of field survey results; aerial photographs; topographic maps; Ottawa cover type mapping; ecological land type phase mapping; Forest geographic information system data; Forest non-native invasive plant data; Ottawa Forest Plan direction; agency manual and handbook direction; and relevant available scientific literature (Appendix E). Degree of invasiveness and other life cycle information is not fully documented for all non-native invasive plants in the North Woods; analysis is based on available information and professional judgment.

Bounds of Analysis

The direct and indirect effect analyses for invasive plants were conducted at the project area scale, because this is where these impacts would occur.

Measurement Indicators

Measurement indicators serve as tools to quantify the effects and to offer a basis for comparing the effects of management practices. The acres of timber harvest; road construction, reconstruction, and maintenance; roads open to OHVs; and the extent of the proposed fire lines/fire breaks have been chosen as indicators for the direct/indirect effects to NNIP because these proposed actions could introduce and spread weed species within the project area. These indicators are presented in Table 27.

Table 27 – Measurement Indicators for NNIPs

Indicator	Unit (all approximate)	Alternative 1	Alternative 2	Alternative 3
Timber harvest and/or the operations associated with the prescribed burn (520 acres)	Acres	0	3,888	2,919
Road construction	Miles	0	1.3	1.3
Road reconstruction	Miles	0	3.05	2.62
Road maintenance	Miles	0	43.62	38.08
Roads/trails open to OHVs but not highway legal vehicles	Miles	34.48	43.86	40.85
Fire lines within the large jack pine treatment block/Fire break along selected roads	Acres	0	60.8/12	60.8/0

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

No project activity would occur under Alternative 1. Management direction in the Forest Plan would be followed, including treating priority NNIP infestations with a focus on areas and species with high potential for establishment and spread or for serious environmental effects. No prevention actions or weed treatments are currently scheduled for the Baraga project area since there are few high priority infestations. The high priority marsh thistle has become widespread on much of the Ottawa; control is generally deferred until more effective methods are developed, except for smaller, high value areas such as Sylvania Wilderness. Marsh thistle is likely to continue to spread in disturbed areas, such as along streams where water action exposes new ground to colonization.

Existing roadside infestations such as spotted knapweed and orange hawkweed are expected to persist and may slowly spread, into disturbed areas where the existing native plant community does not repel these invaders. If the infestations become very large, they could become treatment sites at a later date, separate from this project. Other NNIP could establish in the project area, spread by wind, animals, or human activities. Since there would be no project activities disturbing ground under Alternative 1, there is low potential for invasive plant spread other than along disturbed road corridors and OHV trails, and marsh thistle along stream corridors where ground is disturbed.

Direct and Indirect Effects

Alternative 2

Generally, the proposed actions would not directly affect invasive plants within the project area since there are few infestations other than along roads. No infestations would be specifically treated as part of the Baraga Restoration Project. Marsh thistle along the creeks and wetlands would not be affected by timber harvest, since these riparian and wet areas are buffered from harvest activity (see Appendix D). Decommissioned roads would not inhibit treatments of infestations in the future.

Several of the proposed actions may indirectly affect the introduction or spread of weeds within the project area. Timber harvest may increase weed presence due to soil disturbance and introductions from uncleaned equipment. However, most priority weeds on the Ottawa are largely restricted to disturbed sites such as roadsides and do not persist within forested habitats. Logging machinery is expected to come from relatively local sources, which are unlikely to pick up weed seeds that do not already occur on the Ottawa. In addition, the Forest Service has a contract provision (BT 6.35) to provide for cleaning of off-road equipment as outlined in the design criteria (Appendix D).

The type of timber harvest can affect opportunities for invasive plant establishment. Selection harvest, improvement cuts, sanitation cuts, and thinning would not open the canopy more than by a few percent, so that shaded conditions remain, restricting many sun-loving weeds. Clearcuts result in a more drastic change in plant community, creating open conditions favoring invasive plants, although these weeds are expected to be out-competed by dense aspen or jack pine regeneration. Shelterwood harvest may open the canopy enough for a temporary increase in weeds. Establishment of weeds following harvest actions is most likely in skid trails and landings, where the intact vegetation and soils are disturbed and amount of light increased (Buckley et al. 2002; Zenner and Berger 2008).

Proposed road construction, reconstruction, and maintenance are expected to affect roadside weeds. The shoulders of newly constructed roads would likely support weeds in areas where they are currently absent. Road reconstruction and maintenance could introduce some new weeds, and the ground disturbance could cause a temporary increase in weeds along the road shoulders. These effects are expected to be minor, as the project area's roadsides already support frequent, scattered weeds. There is low risk of a highly invasive plant being introduced during road work given the design criterion for road work equipment to be free of seeds and debris, which might hold seeds. Disturbed earth along roads would also be at risk from NNIP seeds brought in on visitor's vehicles.

Road decommissioning would allow native vegetation to replace existing roadside weeds over time, as shade increases. Alternative 2 contains over 35 miles of decommissioned road.

Alternative 2 would give a 23% increase over Alternative 1 in miles of road open to OHVs. Use of OHVs contributes to the spread of non-native invasive plants by moving seeds from place to place when they are caught on the undercarriage, tires, and other vehicle parts (Rooney 2005, Rew and Pollnac 2010). Also, OHV use keeps the trails in an open disturbed state which is highly conducive to NNIP establishment.

Opening maintenance is designed to keep a few areas open for selected native species, including perhaps some rare plants and insects if stock can be obtained and introductions can be completed. Thus it is critical that non-native invasive plants are kept out of these areas. Maintaining a strong native plant community, limiting soil disturbance, and using clean equipment are the best prevention techniques available.

Prescribed fire promotes some invasive plants and suppresses others; the fire itself is not expected to result in particular changes in abundance or spatial distribution of weeds. Fire should stimulate some native plant growth and tree regeneration (jack pine units) which would help repel weeds. Fire fighter equipment, vehicles and gear can spread invasive seeds; a design criterion calls for cleaning these items prior to entry to the project area. Fire lines are proposed, in order to facilitate controlled burns, including the 60 acres of fuel break proposed for the 520-acre block as well as the set of roads to be used as general fire breaks. The prescribed fire lines are disturbed soil with high

light levels that can become weed-infested, like some old logging roads in the Baraga Plains, which are currently spotted knapweed alleys. Also, the intent is for these fire lines to become densely vegetated with jack pine, whether by natural regeneration induced by the prescribed fire, or by planting if needed later. Since the fire lines may need to remain open for more than one year, if the entire burn cannot be accomplished at once, there may be a time period before jack pine seedlings dominate, in which NNIP can become established. In order to lower the infestation potential, there is a design criterion for seeding these lines that are cleared to the soil level with a low native herb. Seeding is likely not needed for much of the fire break proposed along selected roads, since the idea is to mow these areas to about a 10 inch height, restricting trees to slow fire, but retaining vegetation such as grasses, which could repel invading plants.

The proposed trail work has some potential for spread of invasive plants. This threat is minimized by the use of clean equipment, retention of most shade and native plant communities, and seeding disturbed ground with an approved mix designed to quickly colonize and repel invasive species.

Designating 441 acres of old growth is an administrative action; limiting vegetation management within these stands in the future would likely result in fewer weeds than found in actively managed stands. Declassified stands (about 133 acres) could be subject to timber harvest effects as described previously.

Direct and Indirect Effects

Alternative 3

As for Alternative 2, direct effects on NNIP are not expected, but indirect effects are likely. Timber harvest could have similar effects to Alternative 2, but to a lesser extent, since Alternative 3 would have about 75% of the harvest/burn treatments that are proposed under Alternative 2. Again, design criteria would help to limit new infestations, and establishment of weeds is most likely in skid trails and landings.

Indirect effects of road work are expected to be similar under Alternative 3 to effects under Alternative 2, but somewhat reduced, since the same road mileage is proposed for construction. Reconstruction and maintenance for Alternative 3 would be about 13 percent less of the mileage than for Alternative 2. Disturbed sites would continue to be havens for NNIP. Alternative 3 would give about a 3 percent increase over Alternative 1 in miles of road open to OHVs, with associated effects on spreading NNIP by ATV use.

Opening maintenance would have similar effects as those described for Alternative 2. However, the large opening (e.g., 138-acre block) would not be burned, as it would for one more time under Alternative 2, so the potential for NNIP introduction by fire fighters and equipment is less. The large fuel break also would not be completed under this alternative, again lowering potential for NNIP (although it is low in Alternative 2 since vegetation to about 10 inches height would remain). Fire lines and potential for NNIP is the same as described for Alternative 2.

All other activities under Alternative 3 are equivalent to Alternative 2 and therefore the anticipated effects of NNIP introduction/spread would be expected to be the same.

Cumulative Effects

Bounds of Analysis

The analysis area for cumulative effects is the western Upper Peninsula of Michigan and northern Wisconsin along the Michigan border, and the Lake Superior coast. This area was chosen because it is the area most likely to be a source of invasives for the Ottawa, or to receive invasive species from the Ottawa. The chronological bounds of analysis start in the late 1990s when NNIP began to be a concern to land managers and extend through the present and into the reasonably foreseeable future, about 15 years ahead, which is the anticipated implementation period associated with the current Forest Plan.

Past Actions

Past land use actions that contributed to the spread of NNIP include seeding for erosion control (deliberate introductions and accidental inclusions in seed mixes); road and trail construction/ maintenance activities using NNIP-contaminated fill and mulch materials; residential plantings of NNIP on and near the Forest; recreation including OHV use, boating, hiking when propagules are moved from one site to another; timber harvest activities that moved propagules and created favorable settings for infestations; road and trail use. Natural vectors operating in the past and contributing to the spread of NNIP include wildlife, wind, and water. There was very little awareness of invasive species as an important issue; this was probably the main factor in the introduction and spread of invasive species because little, if anything, was done to prevent them. Timber harvest occurred in the past in the project area, as did road construction. The area has received heavy OHV use.

Present Actions

Some introductions of invasive species continue. Many of the past actions that spread invasive species continue. There is more awareness of the invasive species problem, both in the agency and by the general public. Many actions by state, federal, tribal, county, other governmental agencies and private organizations have focused on learning more about and stopping the introduction and spread of invaders. Efforts include public education; equipment cleaning; mechanical, biological and chemical controls; seed mixes, mulch, and fill that do not contain invasives; and new legislation to prevent introductions.

In August of 2010, the Ottawa acquired 900 acres of land on the east side of Prickett Lake. This acquisition will protect those acres from further development. This acquisition reduces the potential of new invasives becoming established in that area. Due to the

proximity of Prickett Lake to the project area, this acquisition would reduce the threat of invasives from that particular area.
Previous harvests occurred in the project area such as clearcuts, thinning, and shelterwood treatments from 1981 to 2001. These harvests may have introduced some NNIP since prevention measures were not standard at that time.

Some treatment actions have occurred on the Forest to slow the spread of NNIP. These include manual, mechanical, chemical and biological control treatments for high priority species. Treatment actions have occurred off-Forest as well, on nearby lands. For example, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) have a program for raising and releasing purple loosestrife biocontrol beetles in the area and has conducted herbicide treatments on NNIP.

The Forest has taken prevention actions and conducted NNIP surveys. In 2009, weed treatments occurred on over 900 acres. Timber sale contracts now include language directing cleaning of off-road equipment to slow the spread of NNIP. The Forest has worked with over 20 partner groups to establish the Western Upper Peninsula Cooperative Weed and Pest Management Area, to better treat infestations across boundaries. The Forest has prepared programmatic environmental effects analysis to allow more streamlined treatment of NNIP sites. Other groups such as GLIFWC, Sigurd Olson Environmental Institute and the Master Gardeners of the area also conduct NNIP prevention and education programs.

As outlined in the Fire discussion, the Baraga Bump wildfire occurred in 2007. Many fire lines that were used during suppression effort for the wildfire were pre-existing roads that were infested with knapweed and other weeds prior to the Baraga Bump fire. These infestations persisted after the fire (see Project File). During a field review of dozer lines used (field surveys conducted 7/11 and 8/18/2008); extensive new weed infestations were not observed.

Future Actions

Continued introductions of invasive plants are expected, as is continuance of activities that spread them. Across the Forest, there are numerous ground disturbing activities planned, such as timber harvests, road construction, and gravel pit use. These activities can create favorable conditions for the establishment of NNIP, but projects are increasingly incorporating design features to lower the risks of NNIP spread. Ongoing activities above the project scale also can spread NNIP, both natural processes and human-assisted (for example, OHV riding). Many recreational activities can spread invasives and prevention depends on increasing awareness and actions taken by Forest visitors. Non-native invasive plant treatment by the Forest is likely to increase, particularly now that the programmatic analysis is completed, allowing more rapid response to infestations.

In the project area, there is lowered potential to establish new weed species due to cleaning of equipment, seeding to establish ground cover, and other design criteria.

However, some new infestations are possible particularly on roadsides and fire lines from windblown seed or seed brought in on equipment that does not have to be cleaned or seed picked up in the project area following cleaning. Thus there may be small cumulative effects of a few new medium or low priority weed infestations contributing to weed abundance on the Forest. At the analysis area scale, this would be barely discernible.

All the direct and indirect effects of the Baraga Restoration Project are consistent with the actions considered in the Forest Plan EIS. There is nothing unique to the project area or proposal that would add to the cumulative impacts already disclosed in the Forest Plan EIS (pages 3-86 to 3-97).

RECREATION: SCENERY MANAGEMENT

INTRODUCTION

Managing scenery for recreational purposes is an important element of the Ottawa's Forest Management Plan. Scenery is important an important component for people visiting and living on or near the Ottawa. There are many elements to scenery and these include features such as rivers, topography, canopy cover, and geology. Scenery is a vital element to sightseeing, camping, hiking, and wildlife viewing. In addition, many of the forest's visitors take scenic drives as a form of recreation.

There are two important elements of scenery management that are a part of this EA. Those elements include variety class and visual quality objectives (VQO's). Variety class identifies the scenic quality of the surroundings and is composed of three different categories which are described in detail in the Forest Plan on pages G-1 and G-2. Visual quality objectives describe how much alteration to the existing landscape is permitted for a given area and are comprised of five different components, which are described in detail in the Forest Plan, pages G-2 and G-3.

AFFECTED ENVIRONMENT

Visual Quality Objectives are used to plan for the management of National Forest lands within the context of projects that affect visual quality and public perception. The VQO's vary depending upon the amount of visual variety in a landscape (variety class), and the level of use (sensitivity level) along travel routes, use areas and water bodies. In the Baraga Restoration Project area VQO's fall into three of the five general categories. The categories include Retention, Partial Retention, and Modification. A map illustrating the VQO boundaries within the project area is located in Tab D of the project file.

Retention objectives are found mostly along the North Country National Scenic Trail (NCNST), the southern portion of 2200 and part of 2270. The middle section 2200 is in the category Partial Retention. The Modification designation is the predominate category for most of the project area, including both east and north areas of the project area.

Forest Plan Direction

Scenery is an important natural resource of the Ottawa National Forest. Natural features including vegetation, water, landforms, and geology largely influence the scenery. High quality scenery enhances people's lives and benefits communities and society. Sightseeing and driving for pleasure are among the nation's leading recreational activities, and demand for them will continue, both on the Ottawa and nationally.

The 2006 Forest Plan uses the established VQOs and visual management that involves classifying the variety class of landscapes (considers such things as landforms, vegetation, lakes, and streams), the distance zone, and determining sensitivity levels (considers travel routes, use areas, and water bodies). By combining the variety class, distance zone, and sensitivity level, the VQO for areas of land can be assigned. Visual quality objectives provide objectives and measurable standards. They are used to describe the degree of alteration that may occur to the visual resource on lands within the Ottawa's management areas. Ottawa management activities such as timber harvest, recreation projects, or roadwork are required to meet specific standards associated with each VQO.

METHODOLOGY

In evaluating the VQO's for the project area, the heightened priority was given to areas that had the highest sensitivity. These areas included the NCNST, FR 2200, FR 2270, as well as the snowmobile trail. This evaluation was conducted either through driving or hiking the aforementioned roads and trails to look for distinct vegetation, landscape, and topographical features. Visual quality objective guidelines are described according to the Visual Management System (US Forest Service, 1974).

Bounds of Analysis

The area of analysis for the direct and indirect effects to the VQOs is limited to the project area. This bound of analysis was determined due to the project design and scope of the project, and because this is where the potential direct and indirect effects can be measured.

Measurement Indicators

- Number of vortices groups (islands of reserved trees) that cross or are adjacent to the NCNST in the 520 acre prescribed burn area.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

Under this alternative, no vegetative management activities would occur. There would be no immediate impact to the overall visual appearance of the project area. However, changes in the landscape that occur naturally over time would change the current visual appearance to one in which dead and dying trees would be more prominent.

Alternative 1 would continue to meet the VQO's of Retention, Partial Retention, and Modification in MAs 4.1a and 4.2a.

Direct and Indirect Effects

Alternatives 2 and 3

Alternatives 2 and 3 would change the landscape character of the area by thinning out the forest, or creating temporary openings (clearcuts).

All treatments proposed in these action alternatives would meet the VQOs when design criteria are applied. Implementation of design criteria along FR 2200 and FR 2270 would maintain the VQO objectives of partial retention and modification. Design criteria also include that clearcuts within the project area would include an edge effect ratio that produces an uneven perimeter which would mimic natural stand disturbance, and benefit wildlife values, as well as decrease the visual present of human activity.

Proposed vegetative management would help maintain healthy, well-stocked stands of timber throughout the project area. The result of proposed vegetative treatment would be accelerated growth of residual trees, and conditions that would allow trees to attain a larger diameter in a shorter period of time as compared to Alternative 1. Large diameter trees in a forested environment are generally considered visually preferred. Proposed treatments would also allow an increase in the variety of stand age distribution, which would be beneficial in providing a variety of visual characteristics to the landscape.

Alternatives 2 and 3 would result in a landscape that would experience disruptions of existing scenic integrity beginning with harvesting activities and persisting until slash and other evidence of harvest activity is reduced. Some Partial Retention VQO areas would shift to Modification during the next five years, but would meet Partial Retention objectives within the next 15 years.

If Alternatives 2 or 3 were chosen, there would be a few clearcuts to the north of the 520 acre prescribed burn area; these clearcuts would provide for scenic variety to the NCNST. The prescribed 520 acre burn area, specifically along the (NCNST) would have

the highest sensitivity, but the most common variety class. To maintain the VQO's, design criteria would be implemented to create vortices (NCTA, 2003).

Vortices

Because of evidence from two previous jack pine wildfires in Michigan, the existence of vortices has been documented. This effect is the result of a crown fire and is attributed to a mechanism called horizontal roll vortex (HRV) which contributes to the spread on many crown fires. Vortices are usually long strips, although sometimes concentric, of unburned, but scorched conifer crowns. These vortices are often parallel to each other and can converge or diverge depending on their location in the fire. (Haines, 1982)

The distance between parallel vortices range from approximately 145 to 2720 feet, and their width of individual vortices range from less than 32 to over 640 feet. (Haines, 1982)

The design criteria would include the placement of vortices within the prescribed burn areas that dissect the trail to up break the landscape into foreground and background as to mimic natural fire.

Cumulative Effects

Bounds of Analysis

The area of analysis for the direct and indirect effects to the visual quality objective is limited to the project area. This bound of analysis was determined due to the project design and scope of the project, and because this is where the potential direct and indirect effects can be measured. The temporal bounds of analysis include the past 15 years, as this is the timeframe when past timber sales have impacted the scenery and the visual diversity, resulting from the growth of new vegetation within the project area. The temporal bounds also include the next 15 years as this is the time for new vegetation from the proposed project to reestablish, creating new visual diversity.

The analysis area for cumulative effects of the proposed management activities is the Baraga Restoration Project, including the portion of the analysis area along the NCT, which views the project area. All proposed activities are consistent with the visual quality objectives found in the project area when the design criteria are applied.

Past Actions

The past actions that have affected the project area for scenery management include recent past timber sales in the project area. These timber sales included the Baraga Jack, the Plains Rehab Salvage (I-III), and the Drifter projects, which closed during 1999, 2001, 1998, 1999, and 1997, respectively. In 2007, a decision memo was signed, allowing for the prescribed burn of an approximately 138 acre opening for habitat improvements.

Present Actions

Recently, there have been prescribed burns, mechanical treatments in lieu of fire and one and one wildfire that have affected the scenery of the Baraga Project Area. These prescribed fires occurred on the 138 acre opening in 2007, 2009, and 2010. Additionally, the Baraga Bump wildfire occurred in the spring of 2007, and its effects are still noticeable.

Future Actions

In the future, regardless of which alternative is chosen, the 2007 Decision Memo which authorized the prescribed burns for the 138 acre opening would discontinue, thus affecting the visual dimensions of the landscape. However, if Alternative 2 were chosen, prescribed burning for the 138 acre opening would still be scheduled, which would have an impact on the visual appearance of the area.

There is nothing planned at present for the next 15 years within the project area, aside from the project described in this EA. In comparing the proposed alternatives with the past, present and reasonably foreseeable future actions, the overall cumulative effects are expected to continue with a slight improving trend for visual quality.

RECREATION

INTRODUCTION

Recreation on National Forests offers a multitude of options for enjoying the outdoors. Opportunities range from more passive activities such as bird watching, wildlife viewing, and photography to more active activities such as camping, hiking, biking, horseback riding, hunting, fishing, and riding OHVs. Research has shown that people choose a specific setting for each of these activities to gain certain benefits. For example, hiking in a large undeveloped setting with difficult access and few facilities offers a sense of solitude, challenge, and self-reliance. In contrast, hiking in a setting with easy access and highly developed facilities offers more comfort, security, and social opportunities.

The Baraga Restoration Project lies in an area of the Ottawa National Forest that provides a spectrum of recreational opportunities. This spectrum includes hiking the North Country Scenic Trail (NCNST) and the Sturgeon River Gorge (SRG) Wilderness. Additionally, the project area has a variety of motorized activities, including snowmobile trail number 8/15. A main connector route for the snowmobile trail network, provides an alternative route to the Keweenaw via Baraga, MI. There are also dispersed recreation activities, such as driving for pleasure, dispersed camping, hunting, berry picking, and mushroom gathering. It is an area used for fall deer hunting, with dispersed camping sites located across the project area.

AFFECTED ENVIRONMENT

This project area lies between the SRG Wilderness to the west, and the Baraga State Forest to the east, which provide two distinctly different types of recreation. The project area is located in management areas (MA) 4.1a, 4.2a, and 5.2. Both MAs 4.1a, and 4.2a are classified as **roaded natural (RN)** (Appendix F) and MA 5.2 is the Sturgeon River Gorge Wilderness and classified as a **semi-primitive non-motorized (SPNM)** (Appendix F) area. For this project, some prescribed trail enhancements would be completed in MA 5.2. The NCNST traverses the area from the southeast to the northwest.

Forest Plan Direction

Information related to recreation opportunities comes from existing GIS information about Recreation Opportunity Spectrum (ROS). The ROS objectives are identified in the Forest Plan for management areas 4.1a, 4.2a, and 5.2. The management priorities for these areas are identified on pp. 3-21 to 26, 3-27 to 31, and 3-38 to 43, respectively.

The *Recreation Opportunity Spectrum* (ROS) is a framework for understanding the relationships and interactions between these recreation settings and benefits. The key to providing these benefits is the setting and how it is managed. "Setting indicators" such as access, remoteness, naturalness, facilities, social encounters, visitor impacts, and the visitors themselves influence the benefits people gain from recreation. Appendix B of the Forest Plan describes the different types of the Recreation Opportunity Spectrum (pp. B-1 to 5).

METHODOLOGY

Field inventory of the road system was accomplished by the engineering specialist on the ID team, and served as background information for this report. In addition, field visits were held with the ID team to review particular areas (various entries in the project file).

This report addresses motorized trail opportunities, including snowmobile trail #8/15 which dissect the project area. The addition or subtraction of OHV trails in the project area was considered as part of this analysis. Effects are described in the sections to follow.

The National Recreation Use Monitoring survey (NVUM) was completed in FY 2007 and described the amount and type of participants for a variety of uses on the Ottawa National Forest (USDA Forest Service, 2008). The top seven activities engaged by visitors to the Ottawa National Forest occur in the project area. They are viewing natural features (60%), viewing wildlife (48%), hiking (51%), relaxing (48%) and snowmobiling (29%), hunting (7%), and OHV use (1%).

Bounds of Analysis

The area of analysis for the direct and indirect effects is limited to the project area. This is because the immediate direct and indirect changes to recreation would occur within the confines of the project area for the management activities proposed. Recreation opportunities are not an issue that created an alternative; therefore, the discussion here is to disclose effects to the resource. However, a concern was rasied regarding a few roads orgininally proposed for motorized access designation on the MVUM, which did assist the ID Team in the development of Alternative 3 (see the Motorized Access analysis later in this section).

Measurement Indicators

- Acres of timber harvested, which would create and/or maintain wildlife species habitat, and therefore support hunting and/or wildlife viewing opportunities;
- Miles of roads open to public use;
- Level of development of facilities such as trailheads, trails, and overlooks to ensure alignment with MA objectives;
- Miles of hiking trail improvements and trailhead parking improvements;
- Number of parking facility enhancements;
- Miles of recreational trails and roads for OHV access; and
- Access to dispersed camping sites.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

This alternative would perpetuate the existing condition for recreation activities for the next 15 years. Alternative 1 would result in no harvest or restoration activity, and would reduce habitat for game species such as deer and ruffed grouse, as these species prefer early successional forest habitat. As a result, the recreational opportunity associated with hunting would decline. Maintenance of habitat supporting wildlife and bird watching opportunities, especially for fire dependent species, and for niche species such as the Kirtland's warbler, would diminish as the 520 acre proposed burn would not occur. As another consequence, the transportation system would not improve, leaving the unauthorized roads still available for use, and not increasing OHV access.

Direct and Indirect Effects

Alternatives 2 and 3

If Alternative 2 or 3 were chosen, hunting opportunities would increase because the post-harvest conditions would maintain and/or regenerate forest types that support game species. These resulting conditions would also benefit those recreationists

seeking, bird watching opportunities as would the post-fire habitat within the 520 acre burn block. The acres of timber harvest are greater for Alternative 2 than for Alternative 3, which could benefit recreational opportunities for hunting of early-successional game species. Alternative 3 would no longer have a prescribed 138 acre burn, and this would diminish activities such as berry picking, as blueberries are a fire dependent species.

Both alternatives would improve upon the transportation system, closing unauthorized roads and allowing additional opportunities for OHV use. Although the road system currently in place provides a roaded natural setting, Alternatives 2 and 3 would improve upon this with an overall reduction in the total number of roads on the landscape, which would improve the natural appearing environment as viewed from roads or trails.

Cumulative Effects

Bounds of Analysis

The area of analysis for the direct and indirect effects is limited to the project area, except for the visual quality objective. This is because the immediate direct and indirect changes to recreation would occur within the confines of the project area for the management activities proposed. The temporal bounds of analysis include the previous 15 years as that is the time the last recreational improvements were completed, as well as 15 years into the future, as that corresponds with the anticipated planning cycle for the Forest Plan.

Past Actions

Past activities that have occurred in the project area include the 2007 Decision Memo that authorized various prescribed burns (Appendix A, Map 3) on the Baraga Plains. These burns have created a visual diversity on the landscape associated with the effects of fire. Additionally, these prescribed burns have enhanced the bird viewing opportunities, especially for fire dependent species such as the black-backed woodpecker. Other positive effects of those fires also included improved blue-berry picking opportunities. Within the past 15 years, there have been improvements to the SRG wilderness area, including signage, and parking lot enhancements.

Present Actions

In May of 2010, a prescribed fire was conducted on Baraga Plains as a part of the 2007 decision memo. This has helped to enhance recreational opportunities that center around blue-berry picking, as well as bird watching and other wildlife viewing opportunities for those species that are fire dependent.

Future Actions

If Alternatives 1 or 3 were chosen, the prescribed burn on the 138 acre opening would no longer be continued in the future. This would ultimately result in diminished recreational opportunities that focus on hobbies such as berry picking, as blue berries are a fire dependent species. From this standpoint, Alternative 2 would be the preferred alternative for recreational opportunities.

HIKING, MOTORIZED ACCESS, DISPERSED ACTIVITIES, AND WILDERNESS OPPORTUNITIES

This section will analyze the specific effects on Hiking, Motorized Access, Dispersed Activities, and Wilderness Opportunities within the project area.

AFFECTED ENVIRONMENT

Hiking and Wilderness

There are no existing Forest Service, cross-country ski trails, or horse trails within the project area. As such, the following discussion is focused on hiking opportunities.

The NCNST traverses from southeast to northwest across the project area for a length of 9.7 miles. The trail is a nationally recognized trail and has both local hiking interest, as well as being a part of the 4,000-mile national trail system used by hikers. One concern raised by the public is the affect of the 520 acre burn area on the NCNST. However, visual diversity, such as what the prescribed burn would create, is not counter to the management objectives of the NCNST (National Park Service, 1982).

The NCNST has a spur to the parking area associated with the Sturgeon River Falls, located on the Sturgeon River in the heart of the SRG Wilderness. In addition to this parking area, the trail has three additional parking areas for trail access, and the east portal sign is located at the project boundary with the Baraga State Forest.

In addition to the NCNST, the project area also contains the trail systems into the east side of the SRG Wilderness. This system includes Pine Bluff, Bear's Den Overlook, and the Sturgeon Falls trails. The Pine Bluff trail is a short section of trail (0.81 miles) into the SRG Wilderness that terminates at the gorge rim. The trail is in good condition with some erosion that needs to be repaired. Bear's Den Overlook trail consists of two trails; they include the accessible section to the overlook into the SRG Wilderness, as well as a return trail through the woods back to the parking area. This portion of the project area is outside the wilderness boundary.

The Sturgeon Falls trail was acquired from WE Energies in 2008. This trail is heavily used during the early fishing season, and the fall color season. The trail was located on WE Energy property, and was constructed without thought to grade or ease to which users can negotiate the switchbacks. Only a small portion of the SRG Wilderness would be directly impacted by the associated activities proposed in the Baraga

Restoration Project. These areas will be localized to the facilities on the gorge rim, and the trail associated with the Sturgeon Falls.

Some of the trailheads and other improvements associated with the SRG Wilderness, lie outside the wilderness area, and are included in the list of associated project work in conjunction with the Baraga Restoration Project.

Motorized Access

There are approximately 35 miles of roads and trails currently open to OHV use. Additionally, approximately 8.7 miles of snowmobile trails traverse across the project area. The snowmobile route follows FR 2200, FR 2236, and FR 2270. Forest Road 2236 is also open for OHV use in the summer.

The Baraga Plains has a moderate amount of use, both legal and illegal. Many roads within the project area should be removed from the MVUM, because of lack of use and from a resource protection standpoint. However, these roads would not be decommissioned, and would be available for future forest management activities.

Presently many unauthorized roads appear on the landscape in the project area. These unauthorized access routes need to be closed in such a way as to discourage their use by all motorized equipment. It should be noted that motorized access on unauthorized roads is not allowed per the Travel Management Rule. The transportation system field reviews along with the Roads Analysis Process (RAP) and evaluating the project area's road network for proposed updates to the MVUM, have all been used to determine how unauthorized road segments should be addressed (USDA Forest Service, 1999).

There are two snowmobile trails that traverse the project area. Snowmobile trail number 8/15 travels through the project area from the lower portion, and then heads in an easterly direction out of the project area onto the Baraga Plains Road, connecting Sidnaw to Baraga. Trail number 109 continues north from the intersection of FR 2200 and FR 2236, where trail number 8/15 goes east, and travels along the Sturgeon River Gorge Wilderness area connecting finally to Alston, and then on to the Bill Nichols Trail (#3). These trail segments are very important to maintain a manageable flow of snowmobiles from the two major east-west grades, as well as north to the Bill Nichols trail and the Keweenaw Peninsula. Without this route, the only other sensible way north would be on trail number 3, where it leaves trail number 8; however, this would increase traffic congestion on that route. Not only is this route important to ease congestion across the system, it also has some of the very best views in the western Upper Peninsula. The trail number 109 route is adjacent to the Sturgeon River Gorge Wilderness, and provides outstanding views of the Gorge from Bears Den Overlook, as well as from the trail, which is on FR 2200 through the project area.

There are many opportunities within the project area for OHV use, because of numerous OML 1 and 2 roads within the project area. Most of these OML 1 and 2 roads allow the OHV user to travel easily into the interior of the project area. The

majority of this area is in the southern section of the project area, which predominately consists of flat, sandy soils. The northern end of the project area tends to be more dendritic in nature. In addition, the MDNRE Baraga Plains Trail in located just east of the project area, and provide over 27 miles of riding trails for OHV's. The combination of these different types of infrastructure provides opportunities for both recreational and dispersed riding.

With this spectrum of riding opportunities, most of the OHV activity is directly related to the fall hunting seasons. Most of this use seems to be from dispersed campsite locations within the project on OML 1 or 2 roads to a location near a blind or tree stand site. This use is consistent with the dispersed recreational opportunities for this area.

Dispersed Activities

Dispersed camping occurs in the project area. Camping is common during the fall hunting season, with some hunters using private camps, or other accommodations. Dispersed camping occurs primarily throughout the project area during hunting season for grouse, bear, and deer. More specifically, the greatest recreation opportunity occurs along the main travel routes, such as FR 2200 and FR 2270. These main access roads in the project area have lower maintenance level roads intersecting them, which provide a widened area for a dispersed camping site.

Levels of developed recreation within the project area are low, with only developed trailheads for Wilderness or the NCNST. These developed areas include parking areas, and a few hardened dispersed sites for undeveloped camping. There are no developed campgrounds within the project area.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

This alternative would perpetuate the existing condition for all of these recreation activities. If Alternative 1 were chosen, opportunities to close unauthorized roads would not take place, and improvements to the existing OHV system of roads would not happen. Additionally, Alternative 1 would not provide for improvements to the existing trail system adjacent to the SRG, as well as to enhance disbursed camping activities.

Direct and Indirect Effects

Alternatives 2 and 3

If Alternatives 2 or 3 were selected, there would be noticeable visual effects when the stands are harvested; however, within 15 years, the vegetative condition would provide

for a naturally appearing landscape that would be consistent within the roaded natural setting and the management objectives of the NCNST.

Should Alternatives 2 or 3 be chosen, there are various trail enhancements that would occur. The Pine Bluff Trail would receive brushing and erosion control measures to repair minor erosion issues along the trail.

The Bear's Den Overlook trail needs several improvements such as protecting the accessible trail from motorized use, and increasing the stability of the trail and overlook to protect both the resource base and visitors to the area. Specifically, the improvements needed include hardening of the trail surface, and stabilization of the overlook area, including the rim. Additional work would be needed to restrict motorized traffic into the overlook area. This could be accomplished by improving the barrier at the parking area, signing the trail as non-motorized, and monitoring the use at the overlook. In addition to the traffic barrier at the parking area, work is needed to harden this area, and provide information signs for visitors. This area will not be open to motorized equipment other then snowmobiles during the winter. This portion of the project area is outside the wilderness boundary.

The Sturgeon Falls trail would be constructed to meet Forest Service trail standards, as well as to protect the resource base, and keep user safety at the forefront; the trail would also be lengthened by 0.5 miles. Work is needed on the trail, as well as the parking area associated with it. Because of the use the trail receives, additional parking is recommended at the trailhead, as well as informational signing to direct hikers. From this parking area, a spur trail from the NCNST enters from the southeast corner. The trail is user made, since the official spur enters onto FR 2270 north of the parking entrance. Additional improvements would be to reroute the spur from the NCNST to direct hikers to the parking area, without traveling on FR 2270. This change would occur after the selection harvest is completed in the stand adjacent to the parking area.

The list of projects includes the improvement of the Pine Bluff Trailhead located at the corner or FR 2200 and FR 2240, improvement of the Bear's Den overlook area. These improvements were mentioned in the previous section. Also included in these improvements are enhancements to the parking lot to provide a safer facility for the hikers, clear access to the NCNST from the Sturgeon Falls parking area, and placement of a vault toilet, at the parking area for those hiking into the wilderness, as well as those hiking the NCNST. A trail redesign and reconstruction from the parking area to Sturgeon Falls, and the trail from the parking area to the NCNST is also recommended.

Motorized access would be enhanced through the choice of one of these alternatives by providing for new OHV routes. With either action alternative, road decommissioning and reallocation of access would occur, thus providing for more OHV recreational opportunities that the current condition (Table 6). Changes in access would occur if an action alternative is selected; however, refinements to OHV access would occur as roads were deemed suitable for access post harvest. In order to assist the public,

design criteria no. 60 would provide informational signage for up to one year after the change occurs.

If Alternative 3 were chosen, there would fewer OHV routes available when compared to Alternative 2. Further field review of the proposed MVUM designations determined that there are some roads where lack of use has resulted in trails becoming revegetated and are no longer passable (see Figure 4). Maintenance of these trails would not be performed under Alternative 3. For a more detailed discussion on specific road changes, refer back to the previous discussion on transportation in this chapter.

Figure 4 – Example of a road recommended for removal from the MVUM because of non-use and revegetation.

For a more detailed discussion on specific road changes, refer back to the previous discussion on transportation in this chapter.

Dispersed camping opportunities could be negatively impacted during harvest activities due to potential displacement and closing of certain areas. However, it would be

expected that after harvest is completed in an area, dispersed camping would resume. With the choice of Alternatives 2 or 3, wilderness use for a brief time could be impacted during trail reconstruction activities and parking improvements. However, both of these alternatives would ultimately lead to a more safe and enhanced experience adjacent to or within the wilderness area. Any improvements within the SRG would be consistent with the direction provided for wilderness management. When implementing the design criteria in Appendix D, this will ensure that the SRG is minimally impacted.

Cumulative Effects

Bounds of Analysis

The area of analysis for the direct and indirect effects is confined to the project area in addition to those areas that extend into the SRG. This is because the immediate direct and indirect changes to recreation would occur within the confines of the project area as well as small portions of the SRG for the management activities proposed. The temporal bounds of analysis include the previous 15 years as that is the time the last recreational improvements were completed, as well as 15 years into the future, as that corresponds with the anticipated planning cycle of the forest plan.

Past and Present Actions

Past and present actions in the project area have not had an impact on motorized access, dispersed camping or wilderness related activities. However, prescribed burning on the 138 acre opening has affected visual appearances, and provided for a more diverse visual background for hiking activities. As a result of previous timber sales in the past 15 years, logging roads were created. These roads have allowed for more disbursed camping sites within the project area, in addition to providing more opportunity for OHV recreation, as some of these logging roads were left open for use.

The Ottawa first published the MVUM in 2007. This has resulted in making the network of roads within the project area more understandable and easy to use. The Ottawa has also been working to improve signage for open roads on the forest. This activity is nearing completion, and is expected to reduce the use of unauthorized roads in the project area and to improve the OHV experience by making the MVUM more understandable and clear.

Future Actions

With respect to hiking, dispersed camping, and wilderness activities, there are no future cumulative impacts in the foreseeable future. However, with respect to motorized access, the MVUM is always being refined and in a state of flux. These changes could affect the motorized access in the project area in the future. It would be expected these changes would ultimately have a positive impact on motorized activities within the area.

AQUATICS

INTRODUCTION

The Baraga Plains Project Area can be characterized as dry to droughty. The southern end of the project area is very dry and flat. The northern end of the area is less dry with a few areas of moist, rich soil and corresponding forest cover. There is very little running water in the project area and all of the creeks are headwaters, therefore they are quite small, and probably dry many years unless maintained by beaver impoundments or high amounts of precipitation. There are also a few ponds (63 acres), mostly beaver impoundments associated with Unnamed Creek 1 in the northwestern corner of the project area (Figure 5). All of the creeks and ponds are located in the northern half of portion of the project area. Wetlands, and poorly drained soils, occupy a very small portion of the area, approximately 1%, mostly in the northwest corner of the project area.

AFFECTED ENVIRONMENT

The analysis area for the aquatics direct and indirect effects, including those associated with water and riparian habitat is the hydrologic system within the project area. There are no designated Wild and Scenic rivers in the project area. The Baraga Plains Restoration Project lies within the Prickett Lake-Sturgeon River (HUC 0402010401) and Sturgeon River (HUC 0402010402) 5th level watersheds. Within the project area these watersheds are divided into three 6th level subwatersheds (Figure 4). The Prickett Lake-Sturgeon River (6th), and Black Creek-Sturgeon River subwatersheds lie within the Prickett Lake-Sturgeon River watershed (5th). Clear Creek-Sturgeon Creek subwatershed lies within the Sturgeon River watershed.

The percentage of the project area occupied by each subwatershed is shown in Table 28. To help assess potential cumulative effects, the percentage of each subwatershed occurring in the project area is also shown in Table 28.

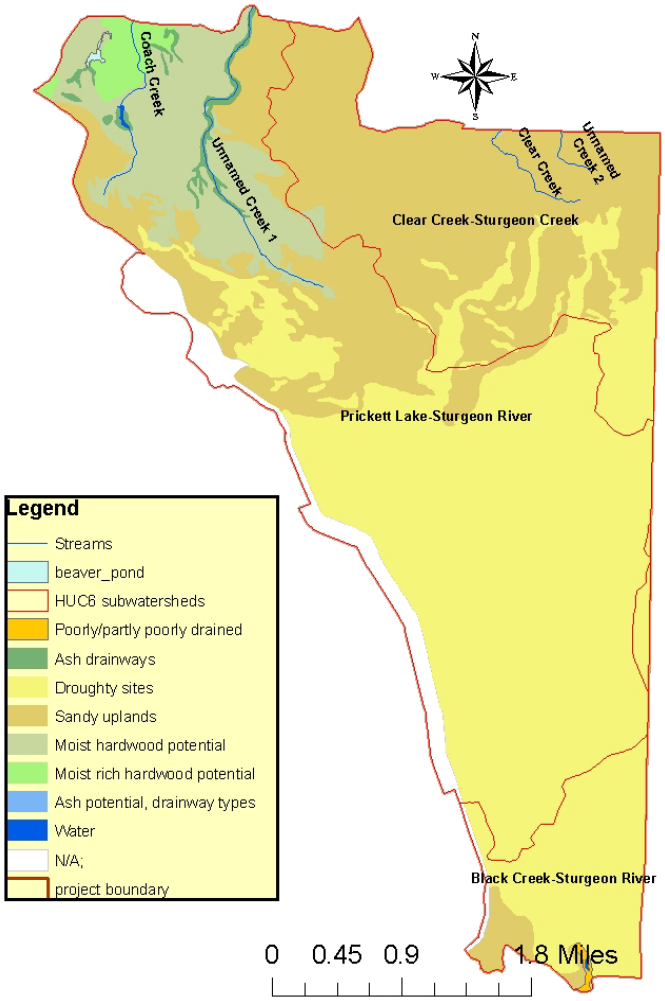
Table 28 – Proportions of Subwatersheds in the Project Area

Subwatershed	Percent of Project Area Occupied by Subwatershed	Percent of subwatershed within project area NFS land	Percent of Subwatershed in Project Area
Black Creek-Sturgeon River	10	100	5
Clear Creek-Sturgeon Creek	26	100	10
Prickett Lake-Sturgeon River	64	99	21

There are approximately six miles of streams within the project area, all with generally perennial flow (Figure 5). All six miles flow through National Forest System lands. There

are approximately 57 acres of permanent standing water within the project area, mostly beaver ponds. There are approximately 108 acres of ELTP defined wetlands in the project area.

Figure 5 - Ponds, Streams, Wetlands, and Moisture Conditions in the Project Area by HUC6 Subwatershed.



Black Creek-Sturgeon River Subwatershed

Streams, Ponds, and Wetlands Within the Project Area

There are no aquatic features in the Black Creek-Sturgeon River subwatershed within the project area. There are approximately 11 acres of poorly drained soil in this subwatershed within the project area.

Road and Aquatic Interactions

There are no road influenced erosion occurrences identified in this subwatershed

Clear Creek-Sturgeon Creek Subwatershed

Streams, Ponds, and Wetlands Within the Project Area

There are approximately 1.4 miles of perennial streams in this subwatershed, including the headwaters of Clear Creek (~0.9 miles). Clear Creek is cold, sand bottomed, groundwater fed stream. It is also an excellent brook trout stream. Other fish species found in this creek are northern redbelly dace, mottled sculpin, and blacknose dace. The only other stream is a short segment (~ 0.5 miles) of a perennial tributary of Clear Creek (henceforth called Unnamed Creek 2). There is one acre of standing water in this subwatershed that is beaver impoundments on Clear Creek. There are no wetlands in this subwatershed within the project area.

Road and Aquatic Interactions

Numerous roads, both FR and unauthorized, pass through steep landscapes, are poorly shaped for water dispersal and have localized erosion.

Prickett Lake-Sturgeon River Subwatershed

Streams, Ponds, and Wetlands Within the Project Area

There are two perennial creeks in this subwatershed, Coach Creek (~ 1.5 miles) and an unnamed creek (~ 2.6 miles), which will be referred to as Unnamed Creek 1, both tributaries of Prickett Lake. There are 62 acres of standing water, all of which are beaver ponds associated with the creeks. There are 96 acres of wetlands in this subwatershed, which are mostly ash drainways associated with the creeks.

Road and Aquatic Interactions

The unauthorized road 0510790[1], which intersects with FR 2200, runs for approximately one mile adjacent to Unnamed Creek 1. It crosses the creek one or more times, posing a sediment risk, and restricts lateral channel migration due to its proximity. Unauthorized road 0510652 crosses Unnamed Creek 1 at the northern edge of the project area. Beaver have taken over the old road, which is presently impassable.

Unauthorized road 0510728 crosses Coach Creek near the stream's headwaters where flow becomes intermittent and has very little flow when it exists. The road is not being

[1] *Unauthorized roads have a different numbering system and they are described more fully in Tab D of the Project File. A map of these unauthorized roads is also located in Tab D of the Project File as well.*

driven on and is covered with trees. The crossing appears to have consisted of an old log culvert or similar structure. There is little impact to the stream from the crossing remnants.

Forest Road (FR) 2270-J crosses Coach Creek and an appropriate crossing structure is not present resulting in vehicles traveling directly within the stream channel. The western approach to the stream is long and steep with some wet areas and minor rutting and sediment is directly routed to the stream. The eastern approach is not as steep and there is less sediment contribution. The valley bottom in which the stream travels is a wetland and beaver had been active downstream from the crossing in past years. The road is currently identified in the motor vehicle use map (MVUM) as open to all vehicles. However, because there is no crossing structure, this use violates State Law for off-highway vehicles (OHVs) and contributes sediment directly into the stream.

Unauthorized road 0510715 crosses Coach Creek about 1/3 mile downstream from FR 2270-J and is a sediment source for the stream. Several roads pass through wetlands resulting in adverse wetland impacts (FR 2291-H1, and unauthorized roads 0510743, 0510744, 0510724).

Numerous roads, both FR and unauthorized, pass through steep landscapes, are poorly shaped for water dispersal and have localized erosion.

Two subwatersheds within the project area have the potential to influence the Sturgeon River through its tributary stream network. They are the Prickett Lake-Sturgeon River and Clear Creek-Sturgeon Creek subwatersheds, as described above.

Forest Plan Direction

The applicable direction of the Forest Plan for water resources can be found on pages 2-7, and 2-16 (2006).

METHODOLOGY

The analysis and inventory utilized Ottawa National Forest GIS information, topographic maps, stand maps, aerial photos, field review, fisheries survey data, and a review of relevant scientific literature (see Literature Cited section). The analysis also utilized Ottawa National Forest Ecological Classification & Inventory (EC&I), Ecological Land Type Phases (ELTP) data, as well as field review. The aquatics section road totals include all roads that are open to vehicles along with any road passable by an OHV; this would continue to potentially affect hydrologic function.

Bounds of Analysis

The analysis area for the riparian direct and indirect effects is the riparian ecotones within the project area since this is the area where riparian structure and function

occurs. Ecotones are areas of transition between two different ecological communities, in this case, dry upland and bodies of water.

Measurement Indicators

The following is a list of the units of measure to assess the aquatic condition for each watershed:

- Total miles of road;
- Miles of road open to passenger vehicles;
- Number of road/stream crossings;
- Road density (mi/mi^2);
- Miles of road within 100 feet of a stream; and
- Miles of road through wetlands.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

No new ground disturbing activities would occur under Alternative 1, although some road maintenance would occur. Existing activities would continue and there would be no changes from the existing state of the aquatic and riparian resources. Roads would remain in their present state. Without any active management, it is expected that over the long term, stream conditions would improve as sediment sources heal, trees die and fall into the streams, and riparian areas mature.

The miles of road would remain the same, as would the miles of open road, the number of stream crossings, and the road miles through steep slopes. This would maintain the opportunity for sediment to be routed into area streams and excessive erosion associated with roads in steep landscapes. The risk to aquatic resources would be very dependent on where in the project area the roads are. The southern half of the project area has no aquatic resources or steep slopes so road use would pose no risk of sedimentation or excessive erosion. The northern half is where all the aquatic resources and steep slopes are located and if roads in this area are unused, or lightly used, they will over time re-vegetate, which will reduce their ability to carry sediment and erode. If the roads see heavy use they will remain un-vegetated and will maintain the potential to efficiently route sediment to streams. Because the soil in the north half is richer, re-vegetation of roads would occur much faster than in the south.

Under this alternative, there would be no change in the measurement indicators of the aquatic condition (see Table 28). Also, unauthorized roads 0510790 and 0510652 would remain and would continue to pose sediment risk and act as a restrictor on channel migration of Unnamed Creek 1. Unauthorized road 0510715 would continue to

contribute sediment to Coach Creek. Wetlands would continue to be impacted by roads 2291-H1, 0510743, 0510744, and 0510724.

Direct and Indirect Effects

Alternative 2

Managing riparian forests with design criteria presented in Appendix D, would result in riparian ecotones that would continue to retain their ecological function. Numerous riparian functional characteristics would be maintained. Aquatic and terrestrial large woody debris would be present. Steams would be sufficiently shaded to maintain cold-water temperatures where shaded environment currently exists. Stream sediment levels would not increase. Wildlife habitat and travel corridors would be maintained. Fish and macroinvertebrate habitat quality would be maintained. No commercial timber harvest and equipment operation would occur immediately adjacent to streams, lakes, ponds, and wetlands. Therefore, sediment levels on site and further downstream would not increase as a result of these activities.

Specific actions have been incorporated into the design of the Baraga Plains Restoration Project to further protect water resources. Some of these actions are soils related and are based on site specific ELTPs, and others are associated with Michigan's BMP compliance. By protecting the soil resources, water resources, including aquatic organism habitat, are also protected when activities associated with timber harvest occur near water. These specific actions are listed on Chapter 2, Activities Common to All Action Alternatives, of this document. The Soils effects section of the EA discusses actions that would protect soil resources. These actions indirectly protect water resources by reducing erosion and consequently sedimentation risks.

The transportation concerns that affect the aquatic resource include the total miles of road within the project area, the miles of road open to passenger vehicles, the number of road/stream crossings, the miles of road within 100 feet of a stream, the miles of road through wetlands, and the total road density. In addition, roads located on steep slopes have concerns for erosion, which adversely impacts surface and subsurface water flow paths as well as soil resources (see the soil resources specialist report). All these are measures of the potential for adverse affects on aquatic communities by such things as sediment delivery along road surfaces, and the interception and re-routing of surface run-off that has the potential to alter the timing and magnitude of high flows in streams. Roads can also serve as a route for the spread of invasive species, such as rusty crayfish and zebra mussels, which can be transported, often unwittingly, by anglers going from site to site.

Under this alternative, there would be a decrease in most road related measures of aquatic condition (see Table 28). There would be a 35% reduction in total road miles, 39% reduction in open roads, 93% reduction in stream crossings, 35% reduction in road density, a 96% reduction in roads within 100ft. of streams, and a 92% reduction of roads

passing through wetlands (Figure 5). This constitutes a substantial reduction in the potential for sediment to be intercepted and routed to aquatic features. In addition, road miles through steep slopes are substantially reduced, from 6.4 miles in Alternative 1 to 0.7 miles in Alternative 2.
Specifically, unauthorized roads 0510790 and 0510652 would be decommissioned, which would eliminate all of the Unnamed Creek 1 stream crossings within the project area, thereby eliminating future sediment risks.

Unauthorized road 0510728 and 0510715 would be decommissioned and FR 2270-J decommissioned through the Coach Creek crossing and wetland area. Current OHV use of FR 2270-J across the creek is prohibited. This has resulted in eliminating all Coach Creek crossings within the project area; thereby reduing sediment sources as the routes become vegetated and stabilize through vegetative growth.

Some roads passing through wetlands would be decommissioned (FR 2291-H1, 0510744, 0510724) which would reduce wetland sedimentation. Unauthorized road 0510743 would be reconstructed, managed as a system road, and renamed FR 2291-H2. This route is needed for management, has about 0.03 miles within a wetland and has less wetland impact than FR 2291-H1 or 0510744, located nearby.

Numerous roads passing through steep slopes would be decommissioned resulting in reduced erosion as these roads become vegetated and stabilized.

Direct and Indirect Effects

Alternative 3

Actions under this alternative would be essentially the same as Alternative 2 with the following exceptions:

- Twenty-two stands proposed for selection harvest in compartment 107 would be dropped; and
- The total miles of forest system roads would remain the same, but would have less maintenance and reconstruction activity. There would be approximately 0.5 miles less reconstruction and 5.5 miles less maintenance proposed.

The measurement indicators for aquatic condition are presented in Table 29.

Comparison of Alternatives and Conclusions

Activities proposed under Alternatives 2 and 3 would benefit the aquatic features and organisms in the project area by reducing sedimentation at road crossings. Alternative 1 would have fewer beneficial effects because the existing sediment sources would remain. The differences in road-based measures of aquatic risk are shown in Figure 6

and summarized in Table 29. All measures improve under Alternatives 2 and 3 which are essentially the same except for how much reconstruction/maintenance is performed.

FR 2291 would be utilized as an access route for hauling timber out of a portion of compartment 107 within the Prickett Lake subwatershed. Beaver often plug the large culvert at the Unnamed Creek 1 stream crossing resulting in impounded water over-topping and eroding the road as the water works to reunite with the downstream channel. This route has experienced various improvements in the past and provides important timber access throughout the area, both within and outside of the project area. This route would undergo improvements with selection of either Alternative 2 or 3.

The improvements from both alternatives would have a positive impact on the natural resource base and improve overall water quality by reducing sediment and associated contaminants into the water resource.

Figure 6 – Comparison of Alternatives

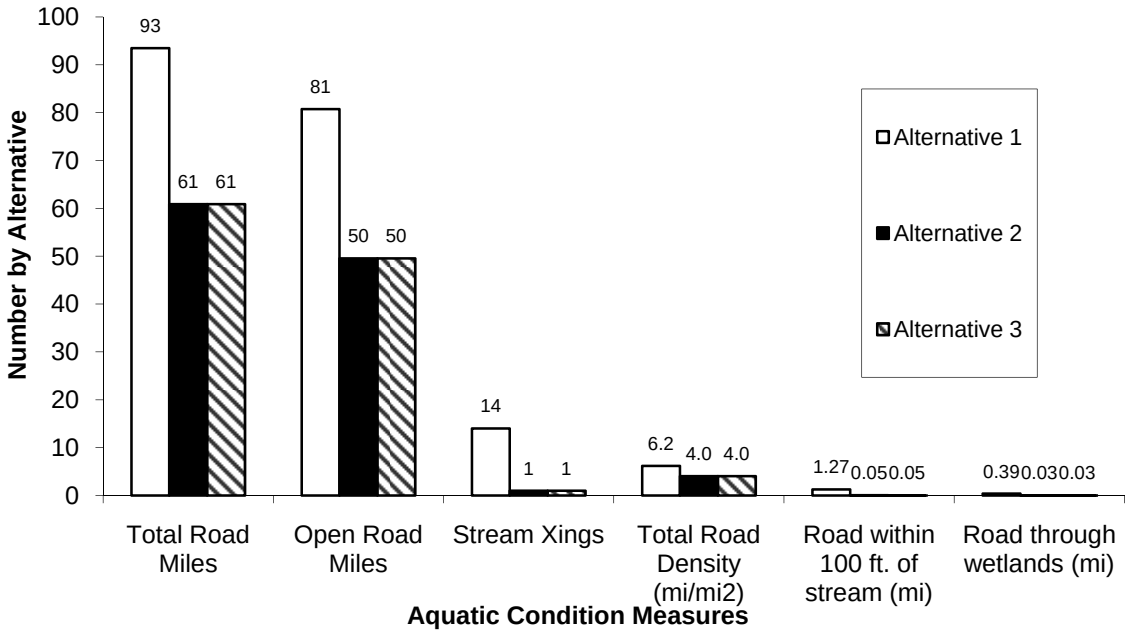


Table 29 – Comparison of Measurement Indicators Across Alternatives by Subwatershed

Aquatic Condition Measures	Alternative 1			Alternative 2		
	Black Creek	Clear Creek	Prickett Lake	Black Creek	Clear Creek	Prickett Lake
Total Miles of Road	8	23	63	6	15	40

Aquatic Condition Measures	Alternative 1			Alternative 2		
	Black Creek	Clear Creek	Prickett Lake	Black Creek	Clear Creek	Prickett Lake
Miles of Road Open to Passenger Vehicles	6	21	54	4	13	32
Number of Road/Stream Crossings	0	0	14	0	0	1
Road Density (mi/mi^2)	5.4	5.8	6.5	4.4	3.7	4.1
Road Within 100ft. of Stream	0	0	1.3	0	0	0.05
Miles of Road Within Steep Slopes	0	0.2	6.2	0	0.1	0.6

Cumulative Effects

Bounds of Analysis

The cumulative effects analysis area for water and riparian resources is the Black Creek-Sturgeon River, Clear Creek-Sturgeon Creek, and the Prickett Lake-Sturgeon River HUC 6 subwatersheds (Figure 7). The subwatershed scale was chosen because smaller watersheds are more sensitive to localized, high-intensity, storm events as well as land-use practices that affect run-off (Black 2004, page 2). Going to a larger HUC scale, such as the watershed (HUC 5), would be too large because any effects would be "diluted" within such a large area. This analysis covers the period from the late 1800's through the 1930's when the Ottawa National Forest was established. This is the period of the majority of the large scale land clearing and settlement and when most of the main impacts to the aquatic environment occurred. This analysis also covers a period from approximately 2009-2019. This is the period over which timber sales associated with the project would occur and the effects of clearcutting would overlap in time.

Past Actions

Past impacts to water resources and aquatic organism habitat are those associated with timber harvest, mining, utility corridors, and road and railroad construction.

Railroads were constructed during the early logging era to transport logs and were subsequently abandoned. The construction of railroad grades resulted in some sedimentation that negatively impacted streams and wetlands. The natural hydrology of wetlands was disrupted by railroad grades passing through them. Some of these

railroad grades continue in use as roads and trails and continue to interfere with natural wetland flow regimes.

The early logging era resulted in massive clearcut acreage. Drastically reduced tree stocking would have caused a temporary increase in the groundwater level due to reduced evapotranspiration rates and altered snow accumulation regimes. Channel flow regimes would have been altered as a result because snow-melt would have occurred faster in clearcuts than in forests. These altered flow regimes would have contributed to bank and channel erosion.

Figure 7 - Aquatic Cumulative Effects Area for the Baraga Plains Restoration Project. The Shaded Area is the Project Area.

The early logging era also resulted in loss of riparian vegetation. This occurred as a result of clearcutting trees up to the edge of streams, lakes, and wetlands. These actions would have greatly reduced in-stream large woody debris (LWD) recruitment as well as large wood on the ground in riparian areas. Loss of riparian trees would have

resulted in increased stream temperatures due to loss of shade. This would make the habitat unsuitable for fish such as trout that require cold water.

Turn of the 20th century logging and road building was far less sensitive to environmental concerns than today. Water resource protection has been increased since National Forest management began in the mid 1930's. Since implementation of the 1986 Forest Plan, and continuing with the 2006 revision (pages 2-26, 27, 31, 32), standards and guidelines for the protection of soil and water resources have been followed. The reforestation of the land since the turn of the 20th century logging era, as well as the development and implementation of water resource protection standards and guidelines, has allowed for an improving trend in condition as these ecosystem elements recover.

Present Actions

Current activities influencing water resources and macroinvertebrates and fish habitats, include soil erosion resulting in stream sedimentation, timber harvest and associated road activities, old mines, open and closed roads, campgrounds, picnic areas, dispersed camping, recreational trails, OHV use, and utility corridors.

In August, 2010, a land acquisition of about 900 acres on the east side of Prickett Lake would also help to protect the Prickett Lake-Sturgeon River subwatershed. This land acquisition ensures that those acres are nondeveloped and remain in a forested condition. This would protect water quality by limiting erosion potential in that region.

About (52%) of the cumulative effects area is National Forest System land (Table 30). Federal ownership varies considerably amongst the subwatersheds. Prickett Lake has the most (86%), whereas Black Creek has the least (13%). The Copper Country State Forest is a large component of both the Black Creek and Clear Creek subwatersheds (5295 acres (28%) and 7817 acres respectively (31%)).

Table 30 - Ownership Within Aquatics Cumulative Effects Area

HUC 6 Subwatershed	Total Acres	NFS Acres	Non-FS Acres	Percent NFS
Black Creek-Sturgeon River	19169	2467	16702	13
Clear Creek-Sturgeon Creek	24926	10396	14530	42
Prickett Lake-Sturgeon River	29259	26106	3154	89
Total	**73354**	**38969**	**34386**	**53**

Current harvest activities on NFS lands follow Forest Plan standards and guidelines. Michigan's BMPs (MI-DNR 1994) are also utilized. These BMPs are designed to minimize impacts to water quality, and audits have been conducted to improve implementation success (MI-DNR 1997). Research indicates that BMPs are generally

effective at reducing negative impacts to water quality, such as sediment, increased light levels, and nutrient flux, associated with timber harvest and site preparation (Aust and Blinn 2004; Vowell 2001, pp.243-244; Schuler and Briggs 2000, pp. 127-131; Wynn et al. 2000, p. 932, 935; Keim and Schoenholtz 1999, pp. 207-208; Arthur et al. 1998, pp. 492-493; Kochenderfer et al. 1997, p. 217; Adams et al. 1995, pp. 174-176).

Open Area Analysis

The open area analysis examines the relationship between non-forested areas and changes in the timing, magnitude, and duration of water run-off from snow melt and rain events. The open area analysis was performed on Alternative 2 because it proposes the largest amount of clearcutting. Since all of the subwatersheds would be far below the threshold of 60% open area, no major hydrologic effects would be expected due to clearcutting under Alternative 2 (Table 31).

Table 31 – Open Area Analysis by Subwatershed for Alternative 2

HUC 6 Subwatershed	Total Subwatershed Acres	Sum of Open Acres	Percent of Subwatershed Open
Black Creek-Sturgeon River	19169	4886	25
Clear Creek-Sturgeon Creek	24926	3573	14
Prickett Lake-Sturgeon River	29259	2403	8

Future Actions

Future activities that could influence water resources, macroinvertebrates, and fish habitats, include campgrounds, picnic areas, old mines, dispersed camping, recreational trails, OHV use, hunting and fishing, and utility corridors. These activities could create soil erosion that would impact water quality as a result of sedimentation.

Potential future influences to water resources and aquatic organisms would also be associated with timber harvest and road construction (federal, state, county and private). The ONF treats less than 1.5 percent of the Forest annually through timber sale activity (USDA-Forest Service 2004). The Baraga project area, or the HUC6 subswatersheds it would occur in, does not overlap with any other ongoing, or recent past, Forest Service timber project areas. However, the project area abuts the Copper Country State Forest where clearcut logging has occurred in the recent past and is expected to occur in the foreseeable future. Recent trends in Vegetative Management Plans have resulted in fewer total and open roads and fewer stream crossings (see above). This has resulted in a decreased risk to aquatic resources from sediment.

Summary of Cumulative Effects

There would be a small continuing input of sediment under all alternatives from existing sediment sources (e.g. road/stream crossings). Little additional sediment would be contributed to streams from activities proposed under either of the action alternatives. Both of the action alternatives would result in fewer miles of open road, miles of road through wetlands, and a lower road density, therefore decreasing the amount of sediment entering aquatic features over time. Overall, because there would be a decrease in sediment sources over time, and clearcutting would not detrimentally affect the timing and magnitude of run-off, no substantial hydrological cumulative effects would be expected as a result of these proposed actions.

SOILS

AFFECTED ENVIRONMENT

The Ecological Classification System (ECS) for the Ottawa National Forest was used as a basis for analyzing this project in the context of ecosystem management. The ECS is a nested hierarchical mapping system and results in an information system with the capability to identify, organize, and describe ecologically significant land units for interdisciplinary analysis and prediction of the natural resource response to management activities. On a broad scale, the Baraga project area falls into the Southern Superior Uplands Section of the National Ecological Hierarchy (McNab & Avers, 1994, pp. 12-14).

As part of the ECS, each ELTP has slope definitions and specific guidelines for season of operation. For example, an area with severe compaction and rutting potential has an operating season designation restricting harvest activity to winter frozen conditions only, thereby reducing the risk for impacts to the soil. The **Land Type Associations** (Appendix F) and their areal extent are presented in Table 32. More detailed information on the characteristics of individual LTAs can be found in the project file.

Table 32 – LTA Summary

LTA (Great Lakes Assessment)	**LTA (Ottawa National Forest)**	**Acres in Project Area (all ownerships)**
212 Sn06 (map) Jn06 (book) *Silver River Lake Plain*	12sa3	795
212 Sn07 (map) Jn07 (book) *Sturgeon River Gorge*	20, 17sa4, 12sa3	366
212 Sn13 (map) Jn13 (book) *Merge Creek Dissected Moraines*	18	1309
212 Sn14 (map) Jn14 (book) *Baraga Sand Plains*	14, 15, 17sa3	7192

Forest Plan Direction

Incorporation of these guides, practices, and standards have been successfully employed on similar past vegetative management activities on the Ottawa and have proven to be effective (USDA Forest Service, 2003, pp. 91-95; USDA Forest Service, 2004, p. 57; USDA Forest Service, 2005, pp. 69-70; USDA Forest Service, 2007, pp. 23-24). The effects to soil resources are within the guidelines of the Forest Plan (USDA Forest Service, 2006, pp. 2-7, 2-8, 2-26, 2-27);

METHODOLOGY

Timber harvest, prescribed fire, firebreak creation and maintenance, and road construction and reconstruction activities are assumed to have the greatest impact on the soils in the project area; therefore, they will be emphasized in the effects section. All other activities included in the action alternatives were considered to be either for the specific purpose of improving or rehabilitating soil or watershed resource values, or having effects insignificant enough to the soil resource to not warrant analysis.

Existing system roads and trails within the project area are not considered part of the productive land base. System roads and trails are a designated use of the soil resource and are therefore excluded from the affected area when analyzing potential soil disturbance. For the purpose of this analysis, road numbers analyzed encompass the total miles of roads being used specifically for the Baraga Plains Restoration Project.

The proposed alternatives for management within the project area occur on 29 different ELTPs. For this project, ELTPs have been spatially intersected with the proposed harvest activities, fire activities, and road work areas.

The Handbook for Soil Management in Region 9 (USDA Forest Service, 2005) provides guidance on soil quality standards and definitions of detrimental disturbance. The Ottawa has implemented soil quality monitoring on the forest using this guidance. Results for monitoring from across the forest have indicated that detrimental disturbance has generally ranged from 0% to just over 5% of any one unit (USDA Forest Service, 2008, p. 24). The Region 9 Standards are met only if 85% or more of an area is maintained in a non-detrimentally disturbed condition.

Analyses of the potential effects to the soil resource from such disturbances incorporate protection measures (various practices, standards, and guidelines created to minimize or eliminate risk) into the project design for all action Alternatives. They include:

- Water Quality Management Practices on Forest Land (MI DNR & MI DEQ, 2009);
- Project specific riparian guidelines;
- ELTP specific guidelines for season of operation; and
- Other design criteria specified in Appendix D of the EA.

Bounds of Analysis

Potential direct and indirect effects to the soil resource are reasonably confined to the soil directly beneath where the disturbance factors are taking place. Thus, the bounds of analysis for determining direct and indirect effects of proposed activities will be the portions of the ELTPs that fall within the project boundary. Effects may extend slightly to the edges of adjacent ELTPs in some instances, but not to an extent where the effect would extend outside of the immediate project area. Each ELTP has its own unique ecological characteristics and capabilities and is affected differently to some extent from surface operations, but the ELTPs do not interact with each other; i.e. compaction in one ELTP does not cause adjacent ELTPs to be compacted nor does it cause a neighboring ELTP to react differently to compaction.

Measurement Indicators

The alternatives contain activity proposals which could impact the long term productivity of the land. Such effects may occur in the form of compaction and rutting, erosion and displacement, or nutrient removal, and may be impacted by any of the following activities:

- Miles of road construction and reconstruction;
- Miles of road obliteration and decommissioning;
- Acres of timber harvest, associated skid trails and log landings;
- Acres of prescribed fire and fire break creation;
- Miles of maintenance and unauthorized road use; and
- Miles of restricted OHV travel.

EFFECTS ANALYSIS

Alternative 1

Direct and Indirect Effects

Soil Compaction and Rutting

No soil compaction or rutting would occur from forest management or any associated activities as none are proposed in Alternative 1. Natural soil formation processes would continue and historical compaction, if any, would remain and continue to be naturally mitigated. Unauthorized OHV use would continue, with riders potentially utilizing illegal cross country travel to avoid existing problem areas on roads and trails, indirectly affecting the forest floor. Existing historical ruts would persist. Alternative 1 would have no direct or indirect effects on the soil resource from compaction or rutting.

Soil Erosion and Displacement

The potential for soil erosion and displacement is very low as no ground disturbing activities are proposed in this Alternative. The forces of natural erosion would continue on a very small scale as they have since the glaciers retreated. Existing erosion occurrences would persist. Alternative 1 would have no direct or indirect effects on the soil resource from erosion or displacement.

Soil Productivity

The potential for site productivity impacts is very low since no harvest is proposed in Alternative 1. Natural soil formation processes, including biomass accumulation and other natural inputs, would continue as normal. There would be no direct or indirect effect to the soil productivity as a result of Alternative 1.

Direct and Indirect Effects

Alternatives 2 and 3

Alternatives 2 and 3 propose approximately 3,900 and 2,900 acres of timber harvest respectively as well as prescribed burn and mechanical treatments. Alternatives 2 and 3 both have 1.3 miles of road construction, 43.6 and 38.1 miles of road maintenance, and 3.1 and 2.6 miles of road reconstruction, respectively. Of the 9,481 acres of NFS lands within the Baraga project area, approximately 41% or 31% is proposed for management in Alternatives 2 and 3, respectively. Thus, up to 69% of the NFS lands within the project area either have no planned ground disturbing activities, or planned activities that would have negligible effects on the soil resource.

Areas of designated old growth are proposed in the Baraga project. These areas would be removed from the suited land base, making it unlikely that any equipment operations would occur within these stands. This reduces the likelihood for effects to the soil resource in the long-term.

Off-highway vehicle (OHV) use has the potential to cause soil disturbance due to cross country travel or poor road and trail location, for example. Roads and trails within the project area have been evaluated for OHV use. Those that are deemed suitable to support such use would remain on the MVUM or be added to it. Focusing the OHV use to the suitable roads and trails would limit disturbance to the soil resource.

Associated projects within the Baraga Plains project area are incorporated as a means to improve existing problem conditions within the project area. Various roads within the project area are in need of maintenance and/or decommissioning to repair existing damage and prevent any further damage to the soil resource. Both of the action alternatives contain proposals to improve these situations and restore them to properly functioning condition.

Alternatives 2 and 3 each have the potential to negatively impact the soil resource through timber harvest activities, prescribed fire, road work, or other associated project activities. The following two tables summarize potential soil disturbance ratings for the proposed management operations in the project area. The ratings noted in the tables are based on the most limiting condition of the soil in question. These risk ratings do not factor in the requirements and guidelines put in place to protect the soil resource. Ratings for compaction and rutting potential are based on the ECS defined operating season given to each ELTP on the forest. Specific information regarding the ECS can be found in Appendix B of the Soil Resource Report. A rating of slight indicates that few restrictions are necessary for equipment use. A rating of moderate indicates that equipment use may be limited and that seasonal restrictions would be more limiting. A rating of severe indicates that equipment use may be very difficult unless major considerations are made (i.e. winter only operations).

Ratings for erosion and displacement potential are similar to those for compaction and rutting potential. However, for erosion potential, ratings are based on slope delineation. A rating of slight indicates that little erosion is likely. A rating of moderate indicates that erosion control measures may be needed, and a rating of severe indicates that significant erosion may be a factor.

Soil Compaction and Rutting

The soil compaction and rutting risk potential due to harvest operations is slight for 92% or 99% of the proposed harvest areas in Alternatives 2 and 3, respectively (see Table 33). These areas are moderately well drained or better, generally have medium to coarse textures, and are usually operable during most periods throughout the year.

Table 33 - Compaction and Rutting Potential (Acres)

Risk to the Soil Resource	Alternative 2	Alternative 3
Slight	3622 (92%)	2894 (99%)
Moderate	0 (0%)	0 (0%)
Severe	305 (8%)	27 (1%)

There are no proposed harvest areas with a moderate risk for soil compaction and rutting in either of Alternatives 2 or 3.

The soil compaction and rutting risk potential is severe for 8% or 1% of the proposed harvest areas within Alternatives 2 and 3, respectively. These soils are generally fine textured or mucky near the surface and are somewhat poorly to very poorly drained. These areas are generally excluded or are dropped from harvest operations through sale preparation activities. If they are operated, they are restricted to a winter only operating season. Allowing harvest operations after the ground is frozen greatly reduces the risk to the soils from compaction and rutting.

There are additional tools built into the ECS which can be used to minimize the soil effects from compaction and rutting. Operating season restrictions are a very integral

part of the land management practices on the Ottawa. ECS applications, low ground pressure equipment options, and the checks and balances done from sale layout all the way through to sale administration are used as ways to minimize impacts to the soil resource. The incorporation of design features, Michigan Best Management Practices, Forest Plan standards and guidelines, and sale layout and administration greatly minimize any risks to the soil resource.

Skid trails are a necessary component of harvest operations. Main skid trails have a higher potential for compaction due to repetitive use. Because compaction is more evident on wet soils than on dry soils, the moisture conditions of the ground can raise the compaction potential of the soil (Pritchett & Fisher, 1987, p. 115), thus, season of operation restrictions are incorporated into management activities. Dry ground or winter frozen only restrictions have been incorporated into ELTPs partially based on soil moisture content. When soil moisture is low, soil strength increases, thereby decreasing the compaction potential of the soil (National Council for Air and Stream Improvement, Inc., 2004, p. 2). Through the use of site-specific operational soil design criteria and sale administration tools, compaction may be avoided or isolated to portions of main trails.

Log landings are another source for compaction and rutting, but are generally of small extent. These areas may be scarified and re-vegetated, they may be maintained as dispersed camping sites, or they may be left to recover naturally. This recovery time will vary depending on the soil characteristics and the amount of compaction at the site. Though natural freeze-thaw cycles will help to repair any potential compaction, the effects may persist for decades (Grigal, 2000, p. 171).

Road construction is proposed for 1.30 miles in both Alternatives 2 and 3. Road construction is expected to compact the soil resource. It would change the resource from supporting a productive forest to becoming part of the permanent transportation system on the Ottawa. Road reconstruction is proposed for 3.1 and 2.6 miles in Alternatives 2 and 3, respectively. Road maintenance is proposed for 43.6 and 38.1 miles in Alternatives 2 and 3, respectively. Both road reconstruction and road maintenance would improve upon the current condition of the road system. Permanent roads and trails are considered a designated use, are not considered part of the productive land base, and are not considered detrimentally disturbed (USDA Forest Service, 2005). Any temporary roads created would be decommissioned when no longer being used for the proposed project and returned to productive forest land.

The action alternatives include 35.3 miles of road decommissioning. Decommissioning roads would discourage motorized use and prevent further compaction and/or rutting, and over time, would allow for recovery of existing compaction through natural processes, and would eventually return the land to productive forest.

In addition, 42.3 and 35.7 miles of roads and trails in Alternatives 2 and 3, respectively, would be open for OHV use. These designated roads and trails have been evaluated

for their impacts to the soil resource. Only roads and trails that can support OHV use would be open and available.

The creation and maintenance of a fire break in Alternative 2 could have similar effects to a low use skid trail, depending on what equipment is used to create and maintain the fire break. Compaction and rutting would not be factors if heavy equipment was not used for such purposes. Impacts to the soil would be greatly minimized if the work was done by hand, using an OHV, or if equipment traveled the road and reached into the area to accomplish the mowing.

Largely, the difference between Alternatives 2 and 3 is visible in the severe compaction and rutting risk potential category for the proposed harvest areas. Alternative 2 has an 8% risk, while Alternative 3 has a 1% risk. There is a larger area of proposed harvest activity within LTA Sn13 (Merge Creek Dissected Moraines) in Alternative 2 than what is in Alternative 3, and that is causing the difference in the risk ratings. This reduced risk is due to less harvest in Compartment 107, which is described in more detail in Chapter 2.

In all ground-based timber harvest related activities, incidental rutting may occur. However, by incorporating site-specific operational soil design criteria and sale administration tools, rutting is either avoided or isolated to portions of main skid trails. Rutting that does occur may be leveled to reduce erosion potential and restore overland flow patterns within the timeframe of the sale.

Short-term detrimental compaction would likely occur on temporary roads, log landings, and primary skid trails, however, site-specific operational requirements and soil protection guidelines would minimize the extent, degree, distribution, and duration of compaction and rutting, as observed in the Ottawa's soil quality monitoring results (USDA Forest Service, 2004, p. 57; USDA Forest Service, 2005, pp. 69-70; USDA Forest Service, 2007, pp. 23-24). Long-term soil productivity within the project area would not be impaired due to compaction or rutting.

Soil Erosion and Displacement

The soil erosion and displacement risk potential due to harvest operations is slight for 86% or 91% of the proposed harvest areas in Alternatives 2 and 3, respectively (see Table 34). These areas generally have slopes ranging from 0% to 18%.

Table 34 - Erosion and Displacement Potential (Acres)

Risk to the Soil Resource	Alternative 2	Alternative 3
Slight	3363 (86%)	2652 (91%)
Moderate	275 (7%)	232 (8%)
Severe	289 (7%)	37 (1%)

The soil erosion and displacement risk potential due to harvest operations is moderate for 7% or 8% of the proposed harvest areas in Alternatives 2 and 3, respectively. These areas generally have slopes ranging from 18% to 35%, and are more vulnerable to

erosion in areas of exposed soil. In these areas, the appropriate erosion control measures (i.e. design features, water diversion structures, slash placement on skid trails, and re-vegetating exposed soil areas) would be implemented in order to minimize soil erosion and its impacts.

The soil erosion and displacement risk potential due to harvest operations is severe for 7% or 1% of the proposed harvest in Alternatives 2 and 3, respectively. Slopes in these areas generally range from 35% to 55%, and are very vulnerable to erosion in areas of exposed soil. Operation of harvest equipment on these slopes is generally avoided, as stated in the Forest Plan and in the design criteria in Appendix D.

Erosion is an ever-present natural process that has existed through time. In a forested setting, vegetation and litter absorb the energy of falling rain and deter surface erosion from occurring (Pritchett & Fisher, 1987, p. 304). Management activities that expose the mineral soil by removing forest floor, decreasing its infiltration capacity by compaction, removing natural debris dams, and providing routes for accelerated water movement via roads and skid trails all increase erosion potential compared to the natural runoff system (Grigal, 2000, p. 170). However, proven soil stabilization practices, site specific design criteria, Forest Plan, and Michigan Best Management Practice (BMP) guidance are utilized by sale administration staff to minimize any such effects. Additionally, with the fertility of the soils in the project area, nearly all exposed soil would quickly become naturally re-vegetated and stabilized within one to three growing seasons.

Generally stands proposed for harvest are on gentle sloping topography. Areas of steeper slope inclusions are more susceptible to erosion and are generally excluded from harvest activity. Skid trails within harvest areas may have exposed mineral soil due to repetitive use by harvest equipment. These areas would likely naturally re-vegetate and become stabilized within one to three growing seasons. Where appropriate, soil stabilization practices such as water bars, check dams, and seeding would be applied on skid trails, log landings, and temporary roads.

The potential for erosion is increased in all new road construction and reconstruction due to the areas of bare soil, both on and along the road grade. Modern road construction and reconstruction activities incorporate Michigan Best Management Practices which consider the soil resource. Design criteria specify seeding large exposed areas of bare soil with approved seed mixtures to help facilitate re-vegetation if necessary and keep erosion to a minimum. While system roads are a dedicated use and are not considered part of the productive soil resource, they do have the potential to affect the soil resource because they are a potential source of offsite soil and water routing. Design criteria for roads and water diversion structures would minimize the effects of the road system on the soil resource. Existing roadbeds are used whenever possible.

Road maintenance has the potential to improve soil and water conditions through evaluation and maintenance of drainage and water control structures. In all road work,

design criteria for roads and water diversion structures would minimize the effects of the road system on the soil resource.

Decommissioning roads potentially creates long-term benefits for the soil resource by reducing or eliminating off site soil movement. The alternatives also propose road closures, which may increase the longevity of water routing devices.

While prescribed fire generally produces smaller amounts of sediment yield than wildfires, the proposed prescribed burn could increase the erosion potential. Slope is a major factor in determining the amount of sediment yielded during periods of rainfall following fire (Neary, Ryan, & DeBano, 2005, p. 49). The proposed burn area encompasses some areas of steeper slopes (i.e. 18 to 35%); however, the ELTPs within the burn area are comprised of deep, dry, sandy soils with rapid percolation rates. Conducting a low intensity burn would not substantially heat the soil and would therefore avoid effects accelerating erosion (i.e. water repellency), maintaining the rapid percolation of water through the soil. The least amount of damage to the soil occurs during cool-burning, low-severity fires. These fires do not heat the soil substantially, and the changes in most soil properties are only minor and are of short duration (Neary, Ryan, & DeBano, 2005, p. 51). Previous soil temperature monitoring of prescribed burning on LTA Sn14 (Baraga Sand Plains) validate that low intensity burns can be successfully conducted in this area (USDA Forest Service, 2009).

The creation and maintenance of a fire break in Alternative 2 could have similar effects to a low use skid trail. However, mowing of the fire break would likely cause minimal erosion, as the ground cover would remain in place. For mechanical creation or maintenance of the fuel break, design features restricting equipment operations would also apply should heavy equipment be used.

Similar to what was discussed in the compaction and rutting category, the difference between Alternatives 2 and 3 is visible in the severe erosion and displacement risk potential category for the proposed harvest areas. Alternative 2 has a 7% risk, while Alternative 3 has a 1% risk. There is a larger area of proposed harvest activity within LTA Sn13 (Merge Creek Dissected Moraines) in Alternative 2 than what is in Alternative 3, and that is causing the difference in the risk ratings.

Sale administration practices, adherence to site- specific direction found in the design criteria, and guidance laid out in the Forest Plan would minimize the potential for soil erosion and displacement from ground disturbing activities. The soils within the Baraga project area would not be detrimentally disturbed from the effects of soil erosion due to project implementation. Short-term detrimental effects from soil displacement may occur in areas where stumps, rocks, and other debris are cleared from landings and temporary roads. No long-term impairment to the soil resource from soil erosion or displacement effects would occur as the result of implementation of either of the action alternatives.

Soil Productivity

The timber harvest and prescribed fire activities included in Alternatives 2 and 3 of the Baraga project have the potential to impact the inherent soil productivity of the proposed treatment areas. Harvesting trees and removing the merchantable bole and bark would remove some nutrients from the treatment area. However, less than a third of the nutrients are immobilized in the merchantable stem wood and bark. The remainder returns to the soil reserve in foliage, branches, fruits, and roots (Pritchett & Fisher, 1987, p. 427). Design criteria stipulating the amount of fine woody debris to leave after harvest would help maintain the nutrients on site; this would also assist to define where biomass harvesting could occur. Soil productivity may also be impacted if sufficient erosion, compaction, rutting, or displacement should occur. As discussed in previous sections, the potential for such effects is low.

Generally, for the LTAs within the project area that have moderate to high fertility, the proposed harvest activities typically leave the majority of the crown on site. However, LTA Sn14 typically has low fertility, and the majority of the proposed activities on this LTA are comprised of thinning, clearcut, and burning. On these lower nutrient sites, woody biomass harvest may be considered. Biomass and whole tree harvest operations are generally discouraged on nutrient poor soils, with the exception of jack pine management. Because jack pine demonstrates low nutrient content and a low amount of nutrient cycling between the soil and the trees, it has a moderate nutrient requirement (Foster & Morrison, 1976, p. 118). Additionally, jack pine also demonstrates a greatly reduced rate of nutrient accumulation beyond age 30 (Foster & Morrison, 1976, p. 115). It appears that a steady-state condition between the addition and decomposition of organic matter in the forest floor is reached sometime beyond that age (Foster & Morrison, 1976, p. 116).

Prescribed fire management has the potential to impact soil productivity. Fire can affect the soil in a variety of ways. General relationships of fire on soil properties are well understood, however, the specific area effects are highly variable and depend on the degree of intensity and the duration of the fire, temperature, soil moisture, soil texture, etc. Fire can destroy organic matter, both on the surface and possibly within the upper layers of the soil, remove or decrease the protective forest floor, volatize large amounts of nitrogen and small amounts of other elements, and may transform these nutrients into soluble materials that can be more easily absorbed by plants or lost by leaching or erosion. Heating the underlying soil layers can also alter the physical, chemical, and biological properties of the soil. Generally, the severity of fire effects is proportional to the intensity and duration of soil heating.

Properly executed prescribed burns can be beneficial. Fire and associated soil heating combusts organic matter and releases an abundant supply of highly soluble and available nutrients (Neary, Ryan, & DeBano, 2005, p. 70). LTA Sn14 is a landscape of which fire was historically an integral component and therefore is prone to fire. There will be a burn plan which will specify methods and conditions so that a light burn is the

result. By limiting the duration and intensity of the burn, soil productivity will be protected in the burn area.

New road construction would remove land from the productive forest. Such areas would become part of the permanent transportation system. Alternatives 2 and 3 propose 1.30 miles of road construction. New temporary roads would remove the resource from the productive forest base for the short term. Post-harvest, these temporary roads would be restored as outlined in the project's design criteria to become part of the productive land base once again.

Alternatives 2 and 3 include proposals to decommission 35.4 miles of roads. Such actions would return these areas to productive land over the long-term.

In each of the action Alternatives, 211 acres of old growth designation is proposed. Such a designation ensures that nutrients currently on the site would remain on site and continue to be cycled through the system.

Each action alternative also proposes removing 24 acres of previously classified old growth into the suited land base. As discussed previously, most soils can replace the nutrients in the harvested timber without a long-term decrease in productivity (Pritchett & Fisher, 1987, p. 427). The soils in the proposed declassified old growth have low fertility as they lie within LTA Sn14, and should they be harvested in the future, productivity would be maintained through the application of the Forest Plan, and through restrictive design features built into all Forest projects. Long-term impairment to the soil productivity resulting in the implementation of either of the action alternatives would be negligible.

Summary of Alternatives

The difference between Alternatives 2 and 3 is slight with utilization of protective measures discussed previously. The two Alternatives differ in their proposals for harvest activity within LTA Sn13, the Merge Creek Dissected Moraines. Alternative 2 includes more activity within the LTA, and would have more risk associated with it in both compaction and rutting, and erosion and displacement potential. However, with the utilization of protective measures previously discussed, implementing one alternative over the other would have negligible overall effects. Direct and indirect effects to the soil as a result of compaction and rutting, erosion and displacement, or productivity changes would be minimal. Thus, implementing Alternative 2 or 3 would not impair the long-term productivity of the soils in or around the project area.

Cumulative Effects

Bounds of Analysis

The bounds of analysis for the cumulative effects were determined to be the boundaries of the ELTPs that occur within the project area. The implementation of Alternative 1

would not result in any direct, indirect, or cumulative effects to the soil resource. Cumulative impacts to the soil from compaction and rutting, erosion and displacement, and site productivity are confined to the soil directly beneath where the disturbance factors (i.e. machinery operations) take place, and not to an extent where the effect would transcend ELTP boundaries. Cumulative impacts would not affect surrounding ELTPs or alter responses to impacts. For the purpose of this analysis, historical impacts to the soil resource are measured from two different time periods in the past: 1) late 1800s through the early 1900s logging era as the effects of harvest and subsequent fires are still evident in the soil resource today; and 2) more recently, 15 years to the present. Reasonably foreseeable future actions will be addressed to approximately 15 years into the future, which correlates with the ongoing implementation of the 2006 Forest Plan.

Past Actions

Effects on the soil resource from historical land uses have dealt primarily with the exploitative logging practices and associated activities that occurred during the late 1800s and early 1900s. Clearing of land for homesteads and farming is also evidenced by archaeological records. This activity was limited in the project area and remains limited today. Activities included but were not limited to; cutting of timber with no restoration plans for the land, building of roads and railroads in poor locations such as through wetlands and up steep slopes, equipment operations during wet soil conditions with no regard for residual damage, activities such as dam building, and construction of camps which contributed to rutting, erosion, compaction, and declines in site productivity, and uncontrolled logging slash fires. These activities affected the soil and landform to varying degrees depending on the ecological characteristics associated with the different LTAs.

Due to the temporary nature of many of the historic roads, naturally occurring mitigation processes such as freeze/thaw cycles, soil fauna activity, and rapid vegetative regeneration, many of the historical effects have been greatly reduced. Compaction has been released, erosion has slowed or stopped, and trees have grown in on old roadbeds. Some effects, such as ruts on old roads and in the woods and erosion and sedimentation at stream crossings, remain.

In 2007, a Decision Memo was signed authorizing the use of prescribed fire to maintain openings for habitat and wildlife. This project included prescribed fire treatments in the area, which occurred in 2007 and 2009. Soil temperature monitoring within the burn areas validated that the burn was of low intensity (USDA Forest Service, 2009). Fire lines mostly utilized existing roads. Some mineral soil exposure occurred where fire lines were created with a bulldozer.

The Baraga Bump wildfire occurred within the Baraga project area in May of 2007. A BAER assessment was completed in response to the fire, and as part of that assessment, it was determined that no significant reduction of in soil surface organic matter occurred, and no evidence of **hydrophobicity** (Appendix F) was found (USDA

Forest Service, 2008). The area that was burned in the Baraga Bump wildfire has no Baraga Plains Restoration Project activities proposals within it.

Management activities on the Forest have been designed to minimize detrimental impacts to soil, water quality, and other resource values through the application of site-specific design criteria, Michigan Best Management Practices, and other applicable guides. Monitoring of final timber harvests has shown that harvest lands have adequately restocked (USDA Forest Service, 2007, pp. 10-11; USDA Forest Service, 2008, pp. 8-9; USDA Forest Service, 2009, pp. 11-12). On-going soil quality monitoring on the Forest has confirmed the effectiveness of project design criteria in protecting soil quality (USDA Forest Service, 2004, p. 57; USDA Forest Service, 2005, pp. 69-70; USDA Forest Service, 2008, pp. 23-24; USDA Forest Service, 2009).

Present Actions

Other present day activities that are likely occurring on private land within the project area include timber harvest, road building and use, recreational motorized access, dispersed camping, or land clearing or conversion. The Baraga project area is not experiencing a rapid rate of development at this time, and private land associated activities are not likely to be appreciably different in content and scale from what is occurring at present.

Guidelines and practices described in the effects section and in the EA are being followed for present day management activities on the Ottawa. Ecosystem management principles have modified and blended standard silvicultural practices to mimic natural disturbances and maintain or enhance natural diversity. Sale activity is carefully monitored with thorough sale administration practices.

Present day activities proposed in the project area are greatly improved over past actions. Forest Plan direction, Michigan Best Management Practices, and design criteria specific to each project area are effective in preventing and minimizing detrimental effects to the soil resource. Therefore, little cumulative soil resource damage is expected to occur within private or federally-owned land due to ongoing activities. No significant cumulative effects to the soil resource would occur.

Future Actions

At this time, future activities planned within the Baraga project area include additional prescribed burning within the project area if Alternative 2 is chosen. That project proposes burning on a 4 to 5 year burn interval, unless monitoring indicates a need to change that schedule. For this and any other future activities that should occur in the area, resource protection measures would continue to be implemented and would be improved upon with new research and information. Private land associated activities are expected to continue, and may decrease due to the relatively young stand in the area.

Conclusions

The Baraga project contains alternatives that would introduce ground disturbing activities into the area and may cause limited and isolated areas of soil disturbance. The management and road work activities proposed in the Baraga Plains Restoration Project action alternatives would have negligible long-term or short-term effects on the soil resource within the project area. Adherence to Forest Plan direction, site-specific design criteria, and within the contract provisions would minimize or eliminate any adverse impacts due to compaction, rutting, erosion, displacement, or nutrient removal. Given the effects disclosed in the past, present, and reasonably foreseeable future, in addition to the impacts associated with implementing Alternatives 2 or 3, there would be minor, negative effects to the soil resource. No significant cumulative effects are anticipated.

HERITAGE RESOURCES

AFFECTED ENVIRONMENT

Cultural resource reconnaissance (CRR) surveys have been conducted within the proposed project area and all of the stands proposed for treatment within the analysis area. Three sites were found during CRR surveys; these sites included historic logging camps and one railroad logging camp.

Forest Plan Direction

The applicable direction of the Forest Plan for the heritage resource can be found on page 2-5 (2006).

METHODOLOGY

Application of the law, policy and direction provide the protection of heritage resources. In all action alternatives, management activities proposed could directly, indirectly or cumulatively affect heritage resources. However, activities are subject to regulations outlined in Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and as promulgated by 36 CFR 800, to address affects to the heritage resources. Section 106 compliance was completed for this project in consultation with the Michigan State Historic Preservation Officer and local Tribal Historic Preservation Officers.

Three cultural resource sites were identified during the field survey of the area. None of the sites have been evaluated for their significance. Until such time occurs, each site must be protected as if were listed on the National Register of Historic Places.

Since all known sites would be protected through project design criteria as well as through implementation of Forest Plan direction, possible effects of the proposed

alternatives on the heritage resource are discussed qualitatively and the overall risk is reported in general terms.

Bounds of Analysis

The bounds of analysis for the project's heritage resources is the project area. This also includes a 100 foot buffer area adjacent to each heritage site. This area was selected because the most immediate risk from any project activity with ground disturbing effects would occur within the vicinity of the identified heritage resource sites.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

Alternative 1 would result in no direct effects to cultural resource sites because no activities would occur. Existing sites would remain intact. Indirect effects could include degradation of the cultural resources sites due to benign neglect.

Direct and Indirect Effects

Alternative 2

Alternative 2 would cause the highest potential for risk of adverse effects to heritage resources due to the increased amount of timber harvest and associated roadwork. Heritage resource sites have a higher potential for impacts where treatment is proposed. As design criteria (Appendix D) would be implemented for any action under Alternative 2, no direct or indirect effects to heritage resources are anticipated.

Direct and Indirect Effects

Alternative 3

Alternative 3 would have less potential for risk of impacts to heritage resources due to fewer acres of timber harvest proposed as well as a decreased amount of associated roadwork. This alternative also has fewer proposed project activities, and therefore the risk to heritage resources is further reduced. The same design criteria would be implemented for any action under this alternative and therefore no direct or indirect effects to heritage resources is anticipated.

Cumulative Effects

Based on the above information, and the determination that no direct or indirect effects would occur as a result of alternative implementation, no cumulative effects to heritage resources are expected.

ECONOMICS

INTRODUCTION

Analysis of the economic environment is a complex subject that is generally analyzed at a broader scale than an individual timber sale or vegetation management project (VMP), such as the Baraga Plains Restoration project. Therefore, an evaluation of the effects from the proposed actions on economics will be performed at the scale larger than the project area. The economic analysis for this project will focus on the aspects of how implementation of this VMP would affect local communities, and whether the revenues associated with implementation of timber harvest would exceed the costs of selling the timber.

This analysis has been tiered to the Forest Plan and its FEIS, which discusses in detail the social and economic effects of forest management for the Ottawa and surrounding areas (pp. 3-198 to 3-224) as well as data disclosed in the Ottawa's M&E Reports.

AFFECTED ENVIRONMENT

The Ottawa encompasses small towns, unincorporated villages, and some rural, year-round and vacation homes, hunting camps, farms and forested land. The primary industries employing the population of the western Upper Peninsula of Michigan are logging, forest products manufacturing (paper and lumber milling) and tourism. Unemployment has historically been high in the western Upper Peninsula of Michigan and income levels have historically been low relative to more urban areas of the state.

The Ottawa represents about 19% of the forested lands in the western Upper Peninsula and accounts for 15% of the timber removed in the area (M&E Report, 2003, p. 50). Commercial timber sales generate revenue to the US Treasury, and also create jobs in both logging and manufacturing of primary and secondary products. Volume harvested in a given year depends on several factors, including the number of sales and amount of volume under contract, the capability of the operators, market conditions, and operating conditions (2009 M&E Report, p. 11).

Payments to Counties

The Forest Service makes three kinds of annual payments from timber-generated receipts to the states in which NF lands reside. These payments are distributed through the Payment in Lieu of Taxes (PILT), the 25% Fund Act, and the Secure Rural Schools and Community Self-Determination Act. The latter two funds benefit local school districts and assist to improve county road systems.

The PILT Payment is a federal payment to local governments that helps to offset losses in property taxes due to nontaxable federal lands within their boundaries (M&E Report 2003, p. 169). As revenues under PILT are distributed by the Department of Interior,

and none of the alternatives considered in this analysis would affect the nature of this funding, the PILT will not be discussed further. The 25% Fund Act returns 25% of all revenues to the State of Michigan for distribution among the counties whose borders overlap with the Ottawa. The Secure Rural Schools and Community Self-Determination Act offers a payment based on the three, highest 25% payments made to the state (Public Law 106-393, 2008).

METHODOLOGY

The economic effects of project implementation will be shown through a summary of the financial revenues (benefits) and costs of the alternative proposals. Economic efficiency of management can be measured in terms of benefits, costs, and with a benefit to cost ratio (refer to Table 35). For the ease of comparison, the financial efficiency of Alternatives 1, 2 and 3 will be determined by using the benefit to cost ratio. Estimated volumes and acres are used for this analysis, and therefore this analysis serves only as a comparative tool (refer to Table 35). This analysis evaluates the costs and benefits of implementing commercial timber harvests, which includes the harvest of both merchantable and non-merchantable timber products. The latter is specific to a portion of stands within the proposed 520 acre prescribed burn area as further described below. Additional assumptions and data used in this analysis are located in the Project File (Tab D).

Quick-Silver is a statistical, modeling program that was used to perform the calculations needed to display the differences of costs and benefits per alternative. This program provides an economic analysis of long-term, on-the-ground resource management projects. The use of Quick-Silver also allows the present net values (PNVs) to be displayed, which is the difference between the discounted value of all outputs (revenue or benefit) and the total discounted costs required for managing a project area. Comparative figures shown in the Tables 35 and 36 do include a 4% discounted rate for inflation.

Costs - Project expenses that are generally incurred include administrative costs as well as expenditures needed for future reforestation efforts and refinements to the transportation system to facilitate timber harvest. Direct and indirect costs include expenses from project planning and implementation. Reforestation costs are dependent on the amount of acres treated and the type of reforestation activities proposed within those stands proposed for treatment through commercial harvest operations.

Benefits - Project revenues are determined by the current stumpage price of both sawtimber and pulpwood for each vegetative species identified for treatment. Therefore, the revenue per alternative can vary depending upon the number of acres proposed for treatment, the type of vegetation being treated, and the type of silviculture prescription assigned to each timber stand identified as requiring treatment at this time. Calculations used for benefits are the amount of return obtained per hundred cubic feet (CCF) for any given forest product.

The volume estimations provided in this analysis are based on whole stand acres. Therefore, it is important to note that the estimations should only be used for comparative purposes as the application of project design criteria and other measures taken during timber sale design would likely change the amount of acres implemented. The adaptive management strategy is illustrated in Appendix G and more thoroughly discussed in Chapter 2, is also an important consideration. The amount of funding needed to implement the prescribed burn in the 520 acre block would vary depending upon the success of the burn and the degree of post-burn restorative activities needed to meet habitat objectives. This analysis assumes a successful completion of the prescribed burn as the amount and extent of post-burn activities needed is unknown at this time.

Non-Monetary Costs and Benefits - In addition to monetary costs and revenues, each alternative produces non-monetary costs and benefits. A portion of timber sale generated revenue is deposited into the project's Knutson-Vandenberg (K-V) fund. This fund may be used for habitat improvement projects that are deemed beneficial to the project area by the ID Team, such as for the improvement of fisheries and wildlife habitat. The resulting benefits of K-V projects cannot be quantified in this economic analysis because it is not possible to estimate objective monetary values for these benefits on a project basis. The relative values of such benefits are discussed qualitatively in the comparison of alternatives.

Bounds of Analysis

The bounds of analysis for determining direct, indirect, and cumulative effects of proposed activities are the communities within Baraga, Houghton, and Ontonagon counties. This analysis scale is appropriate since these communities would directly benefit from monies generated from land management activities. Effects upon local communities cannot be adequately assessed at a project level scale; it is recognized that other communities could benefit from the implementation of this project. These specific counties were chosen to provide an estimation of the direct and indirect benefits of timber sale implementation within this portion of the Ottawa.

The temporal bounds of analysis specific to the cumulative effects analysis considers activities that took place during the turn-of-the-20th-century logging era as many communities were built during this timeframe in response to the local logging industry established at the end of the 19th century. Detailed analysis for cumulative effects will be limited to a time period covering the past 10 years through the next 10 years to incorporate the remaining effects from previous harvest entries through the planning efforts for future harvest within the bounds of analysis. Implementation of the majority of timber harvest authorized through a decision (under either action alternative) for this project may be accomplished within the next 10 years.

Measurement Indicators

To further quantify the potential effects of project implementation upon the economic environment, the following measurement indicators will be evaluated to compare the efficiency of the proposed activities for all alternatives.

- Total revenues gained from proposed activities.
- Total costs spent to implement proposed activities.
- A benefit to cost ratio to show economic efficiency of each alternative.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

This alternative would not include any ground disturbing activities. This alternative would not yield any revenues, or accrue any additional costs related to the project area. The absence of timber sale-generated receipts would negate any potential funds available for use in habitat improvement projects using K-V fund authorities as well as transportation system refinements needed to address resource damage concerns. Other costs would be required to provide needed road work in the area. However, annual road maintenance would take place regardless of the implementation of any alternative and therefore is not included in this analysis.

This alternative represents a lost economic opportunity to increase the growth and quality of timber. As such, the future quantity and quality of timber value would be reduced. Over time, there is a risk that timber value may decrease as stands continue to age and become prone to insect and disease problems if not treated. This alternative would not support the purpose and need for supporting the local community economy as no supply of forest products would be provided under this alternative. No funds would be generated by this alternative for payments to the counties as described in the affected environment. The prescribed fire actions would not take place and therefore the habitat objectives described for botanical and wildlife resources would not be met. Alternative 1 would rank last in economic efficiency and social benefits, when compared with the action alternatives (see Table 35).

Direct and Indirect Effects

Alternative 2

Alternative 2 would assist to meet the purpose and need of this project. Timber sale contracts under this proposal, in addition to on-going timber sales within the bounds of analysis authorized via prior decisions, would help to secure employment for local loggers and logging dependent industries, and supply saw log and pulpwood supplies to area mills. Indirectly, the proposed action along with other on-going harvest activity would support jobs in other local businesses and industries in the communities that

provide products and services to those engaged in harvesting or processing timber. Timber sale-generated receipts would provide potential funds available for use in non-priced public benefits, such as recreation and habitat improvement projects through the collection and use of K-V funds.

A portion of timber revenues from this alternative would be returned to adjacent counties within the Forest boundary for use in the local school districts and maintenance of county road systems. Any activities implemented using the stewardship contracting authority would offer opportunities to accomplish work on the ground, with focus on environmental restoration projects, to benefit rural communities and implement important activities that may not be otherwise funded. However, monies generated through timber sale receipts under this authority would not be available to either the 25% Fund or Secure Rural Schools Act funds.

The value and growth of the timber products in the project area is likely to increase over time as unhealthy and over-stocked trees are removed from treated stands. A variety of forest products, plant and wildlife habitat, and opportunities provided for outdoor recreation pursuits (i.e., OHV access) would be offered. All of these factors can positively affect the forest-influenced community as a whole. Providing forest products, sustaining timber-related jobs, and maintaining habitat for game species would continue to provide spending dollars and income for local communities because timber-related positions, as well as hunters and other recreating public are likely to continue to shop, visit and recreate in the local area.

Costs - The total costs associated with harvest entry under Alternative 2 are estimated at approximately $2.5 million (see Table 35). Of this total, approximately $2.3 million would be needed for the direct and indirect costs of project implementation, which includes activities associated with the 520 acre prescribed fire. Reforestation project costs are estimated at around $147,000 and transportation system costs would be about $135,000 (see Project File, Tab D).

Benefits - Alternative 2 would harvest approximately 56,279 CCF of timber products from northern hardwood, conifer and aspen forest types (see Table 36), which includes harvest of merchantable and unmerchantable jack pine from the 520 acre block to reduce fuel loads in the area prior to the prescribed burn. Growth and value of products from the residual stands would continue to increase as a result of improved vigor from this harvest entry. The total, estimated revenues from the sale of timber products would be approximately $1.2 million (refer to Table 35). When comparing alternatives, Alternative 2 ranks the higher in net return and the funds allotted for county payments. Alternative 2 is the highest for economic efficiency. Although this alternative has more timber harvest and more miles of road maintenance and reconstruction, there is an overall increased benefit when compared to Alternative 3.

Direct and Indirect Effects

Alternative 3

Alternative 3 would assist to meet the purpose and need of this project. The discussion under Alternative 2 pertaining to the benefits of increased employment opportunities, supply of timber products, non-priced public benefits, K-V funds, other project funds, and the county payments also applies to Alternative 3. Alternative 3 plans to treat fewer acres than Alternative 2, and therefore the total estimated costs of timber sale operation and resulting CCF of timber products obtained are lower.

The total costs associated with harvest entry under Alternative 3 are estimated at $2.1 million (see Table 35). Of this total, approximately $1.8 million would be needed for the direct and indirect costs of project implementation. Reforestation project costs are estimated at around $106,000 and transportation system costs would be about $119,000 (see Project File, Tab D).

Benefits - Alternative 3 would harvest approximately 48641 CCF of timber products from northern hardwood, mixed conifer and aspen forest types (see Table 36), which also includes harvest of timber in the 520 acre block as described under Alternative 2. Growth and value of products from the residual stands would continue to increase as a result of improved vigor from this harvest entry. The total estimated revenues from the sale of timber products would be approximately $970,000 (refer to Table 35). Alternative 3 ranks the second highest in both net return and the funds allotted for county payments as well as economic efficiency. The cost to benefit ratio is reduced due to the decreased amount of timber harvest proposed. As outlined in Chapter 2, this decrease is tied to the issue raised for timber harvest within Compartment 107.

Table 35 - Economic Comparison of Alternatives

Measure	**Alternative 1**	**Alternative 2**	**Alternative 3**
Estimated Revenues (million)	0	1,164,653	969,993
Estimated Costs (million)	0	2,476,757	2,122,608
Benefit to Cost Ratio	0	0.47	0.46

Table 36 - Total Acres and Estimated Harvested Volume by Alternative

Altern -ative	**Total Acres**	**Total Volume produced by product group and proposal (CCF)[1]**					
		Mixed Hardwood Sawtimber	Mixed Hardwood Pulp	Mixed Conifer Sawtimber	Mixed Conifer Pulp	Aspen Pulp	Total CCF by Alternative
1	Timber 0	0	0	0	0	0	**0**

Altern -ative	Total Acres	Total Volume produced by product group and proposal (CCF)[1]					
		Mixed Hardwood Sawtimber	Mixed Hardwood Pulp	Mixed Conifer Sawtimber	Mixed Conifer Pulp	Aspen Pulp	Total CCF by Alternative
2	3,434	728	10,590	1,186	23,478	15,688	**56,279**
3	2,410	368	6,561	1,082	22,014	14,607	**48,641**

[1]*Includes CCF associated with harvest within the 520-acre block, which includes removal of unmerchantable timber products for fuel load reduction that is not accounted for in the total acres treated (Project File, Tab D).*

Cumulative Effects

Past and Present Influences

Employment in the logging industry has played an important role in developing and sustaining communities in the western Upper Peninsula. Harvesting, dating back to the 1800s, supported several small towns in and around the Ottawa. The primary employers for the western Upper Peninsula continue to include those industries involved with logging, and other forest products, such as paper and lumber milling. Employment in the logging industry has historically and currently continues to fluctuate based on market demands and weather conditions.

Several projects within Baraga, Houghton, and Ontonagon counties have been authorized for implementation within the past 10 years, including (but not limited to) the Baltimore, Bluff Divide, Deadstream-McLellan, Plantation Lakes, Ridge and Rousseau East projects. None of these projects overlap with the project boundary. As noted in the project Silviculturist's specialist report, approximately 2,016 acres of commercial timber harvest activities have been accomplished within the project area in the past 10 years. Operations associated with the previous harvest entry within the project area ended in 2001 from the Drifter timber sale, and therefore, no spatial overlap of economic effects would be present if the Baraga Plains Restoration project was implemented.

There are privately owned, forested lands that could also be harvested within the project area; however, no harvest activities have occurred on this property in the bounds of analysis described.

Present actions include all on-going preparation for, and implementation of, harvest activities on NF land covered under a signed decision, such as those projects mentioned above. Timber sale operations in these project areas would remain active at the time of implementation for this proposed project. Although positive effects to the local economic environment would occur due to the temporal overlap of project implementation, there would be no spatial overlap of effects since none of the project boundaries overlap with the Baraga Plains Restoration project. The combined harvest

opportunities on Forest and industry lands could help to provide wood products for an increasing demand.

The volume harvested in 2009 was about 3,700 acres (29.5 million board feet [MMBF] or 4.7 million cubic feet [MMCF]), which is a decrease over the amount harvested in 2008 and 2007 (39.1 MMBF [6.3 MMCF] and 34.9 MMBF [5.2 MMCF], respectively). Poor markets and a reduced demand for wood products were the chief factors involved in the reduced harvest. The 3,700 acres is equivalent to about 0.75 percent of the acreage determined suitable for active timber production in the Forest Plan (2009 M&E Report, p. 10).

The past and present harvest operations as outlined have positively influenced the local economic environment through providing employment opportunities, supplying forest products, enhancing forest types and providing other non-priced benefits (i.e., habitat enhancement), and increased funding through receipts generated from timber harvest (see Project File, Tab D). When combined with the proposed actions of this project, the money from timber sale receipts would further increase the benefits to local communities, as well as sustain and/or increase employment opportunities in the logging industry.

Reasonably Foreseeable Future Influences

Reasonably foreseeable future actions include all potential harvest activities on NFS land, as well as other ownerships, that could affect the economic base of the local communities within and adjacent to the Ottawa. The Pori Junction project is located northwest of the Baraga Plains Restoration project boundary. The Pori Junction project is currently being surveyed and preparation and design of this project is expected to continue into fiscal year 2011 and beyond. The Pori Junction project boundary does not spatially overlap with this project. As the sales associated with the Pori Junction project would take several years to complete, future operations for these projects would likely begin during a period of time when actions associated with the Baraga Plains Restoration project are still being completed. These projects would assist to generate timber receipts for local community benefits, help to secure future employment in the local logging industry and provide a means of improving resource conditions on the Ottawa (non-priced benefits). Timber sale generated receipts from these projects would be divided among the counties to support not only Baraga, Houghton, and Ontonagon counties, but all others encompassed by the Forest's proclamation boundary.

The combined, potential, future harvest opportunities on Forest and private lands would help to provide wood products and support local communities. Although future sale values may fluctuate due to the variation in stumpage values, implementation of future projects (on NFS and/or private land) would result in maintaining and/or increasing current employment levels in the logging industry, which would sustain the local communities' economic status a whole through dollars spent at local businesses. In addition, future timber harvest management opportunities would improve stand conditions, thereby maintaining the quality of residual trees for future uses.

When adding the effects of past, present and reasonably foreseeable actions to those anticipated under the proposed alternatives, the action alternatives would provide the most economic benefit and other non-priced benefits. Alternative 1 would offset current trends for forest product output on the Ottawa and timber-generated receipts would be decreased. However, this offset is not expected to be long-term as other projects are currently underway or are being analyzed.

Given the opportunities provided by either action alternative, it is anticipated that implementation of either action alternative would result in a positive cumulative effect for the following: 1) availability of employment opportunities in the logging industry, 2) employment related income and subsequent generation of federal tax dollars, 3) supply of timber products to support area mills, 4) providing non-priced benefits, such as habitat improvement; 5) support of local businesses and industries in the communities that provide products and services to those engaged in harvesting or processing timber, and 6) increased county funding via the 25% Payment fund though the Secure Schools and Rural Communities Self-Determination Act.

Due to the anticipated costs and benefits of implementing either action alternative, in consideration of other past, on-going and planned activities within the spatial and temporal bounds of this analysis, the cumulative effects are not anticipated to be significant.

CHAPTER 4 – LIST OF CONTRIBUTORS AND CONSULTANTS

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5. Joanne Thurber – Field Biologist
6. Dean Karlovich – Fire Management Officer
7. David Steffensen, Silviculturist and ID Team Leader
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APPENDIX A

MAPS

Map 1

Baraga Plains Restoration Project Vicinity Map

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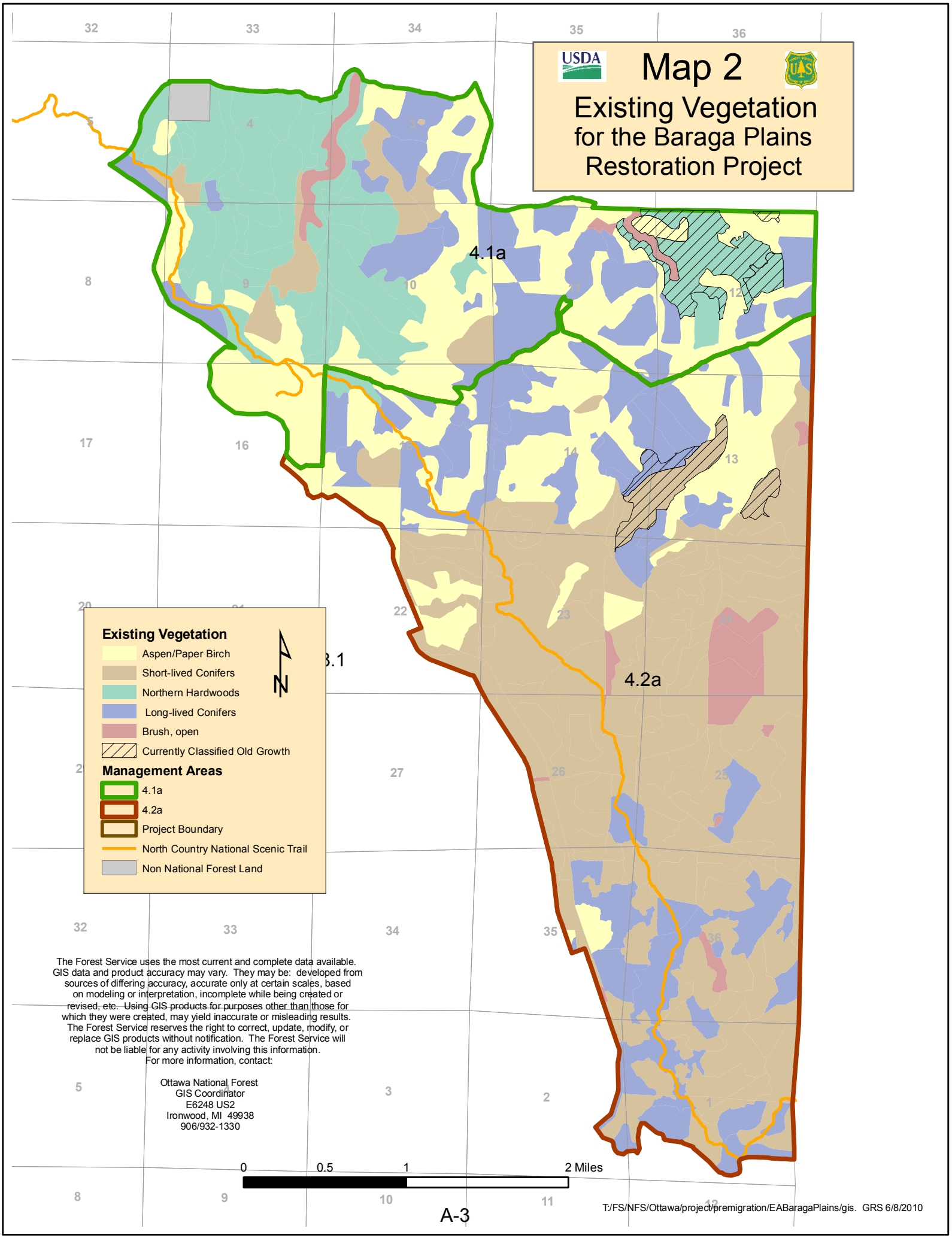

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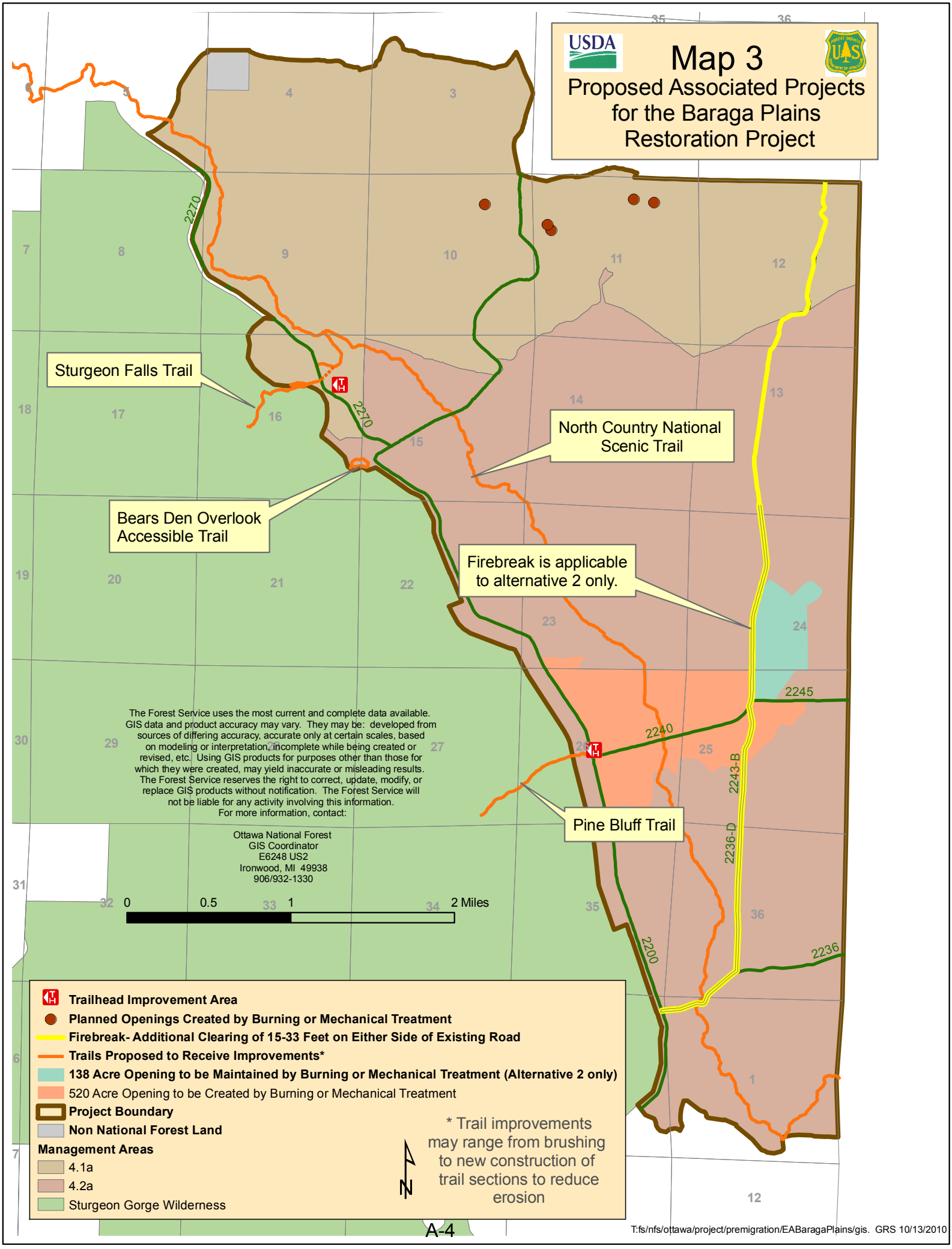
T:/FS/NFS/Ottawa/project/premigration/EABaragaPlains/gis. GRS 6/8/2010


USDA
Map 3
Proposed Associated Projects for the Baraga Plains Restoration Project
Sturgeon Falls Trail
North Country National Scenic Trail
Bears Den Overlook Accessible Trail
Firebreak is applicable to alternative 2 only.
Pine Bluff Trail
2270
2240
2245
2243-B
2236-D
2200
2236
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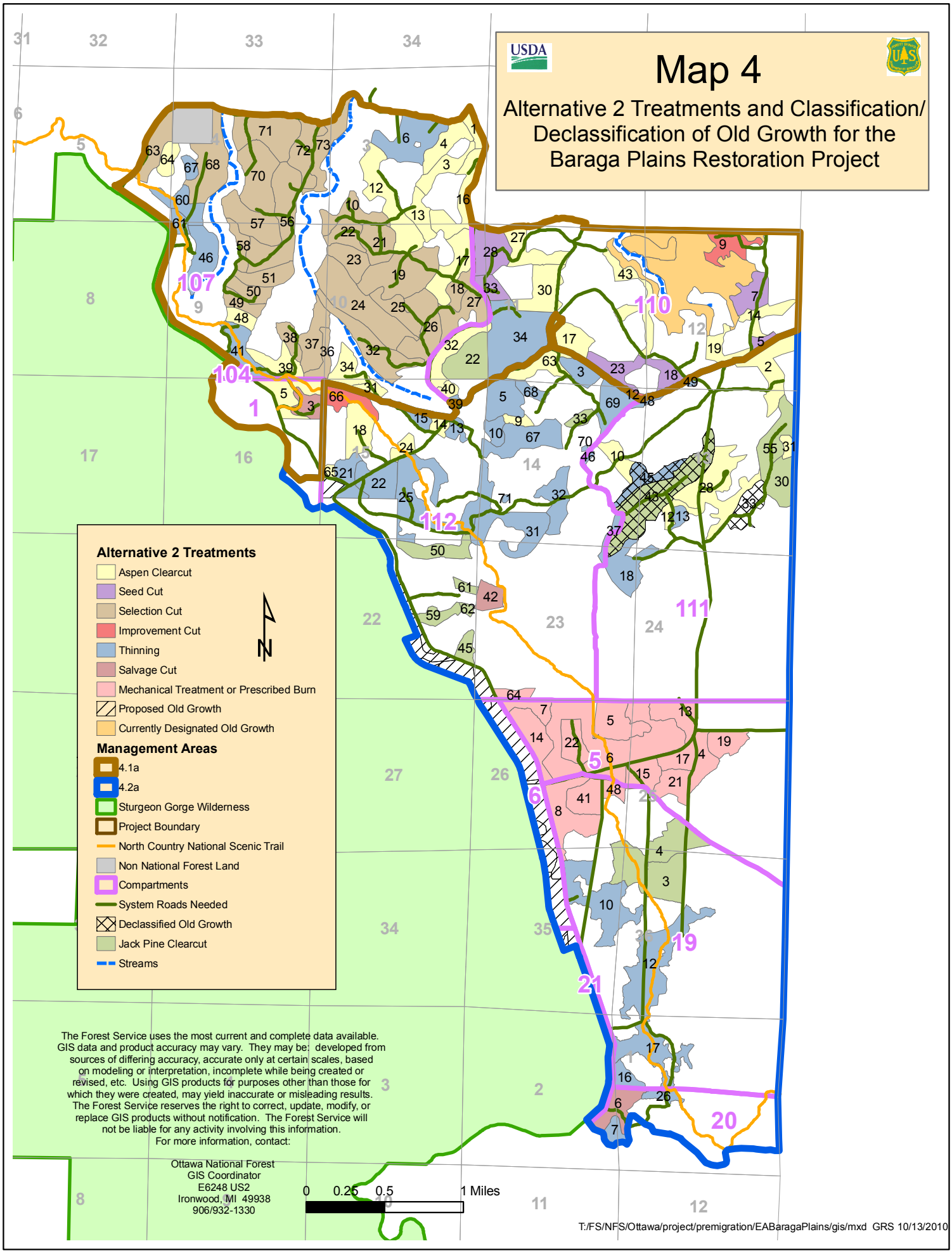
GIS Coordinator
E6248 US2
Ironwood, MI 49938
906/932-1330
0
0.5
1
2 Miles
Trailhead Improvement Area
Planned Openings Created by Burning or Mechanical Treatment
Firebreak- Additional Clearing of 15-33 Feet on Either Side of Existing Road
Trails Proposed to Receive Improvements*
138 Acre Opening to be Maintained by Burning or Mechanical Treatment (Alternative 2 only)
520 Acre Opening to be Created by Burning or Mechanical Treatment
Project Boundary
Non National Forest Land
Management Areas
4.1a
4.2a
Sturgeon Gorge Wilderness
* Trail improvements may range from brushing to new construction of trail sections to reduce erosion
N
T:fs/nfs/ottawa/project/premigration/EABaragaPlains/gis. GRS 10/13/2010


Map 4
Alternative 2 Treatments and Classification/ Declassification of Old Growth for the Baraga Plains Restoration Project
USDA
Alternative 2 Treatments
Aspen Clearcut
Seed Cut
Selection Cut
Improvement Cut
Thinning
Salvage Cut
Mechanical Treatment or Prescribed Burn
Proposed Old Growth
Currently Designated Old Growth
Management Areas
4.1a
4.2a
Sturgeon Gorge Wilderness
Project Boundary
North Country National Scenic Trail
Non National Forest Land
Compartments
System Roads Needed
Declassified Old Growth
Jack Pine Clearcut
Streams
N
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Ironwood, MI 49938
906/932-1330
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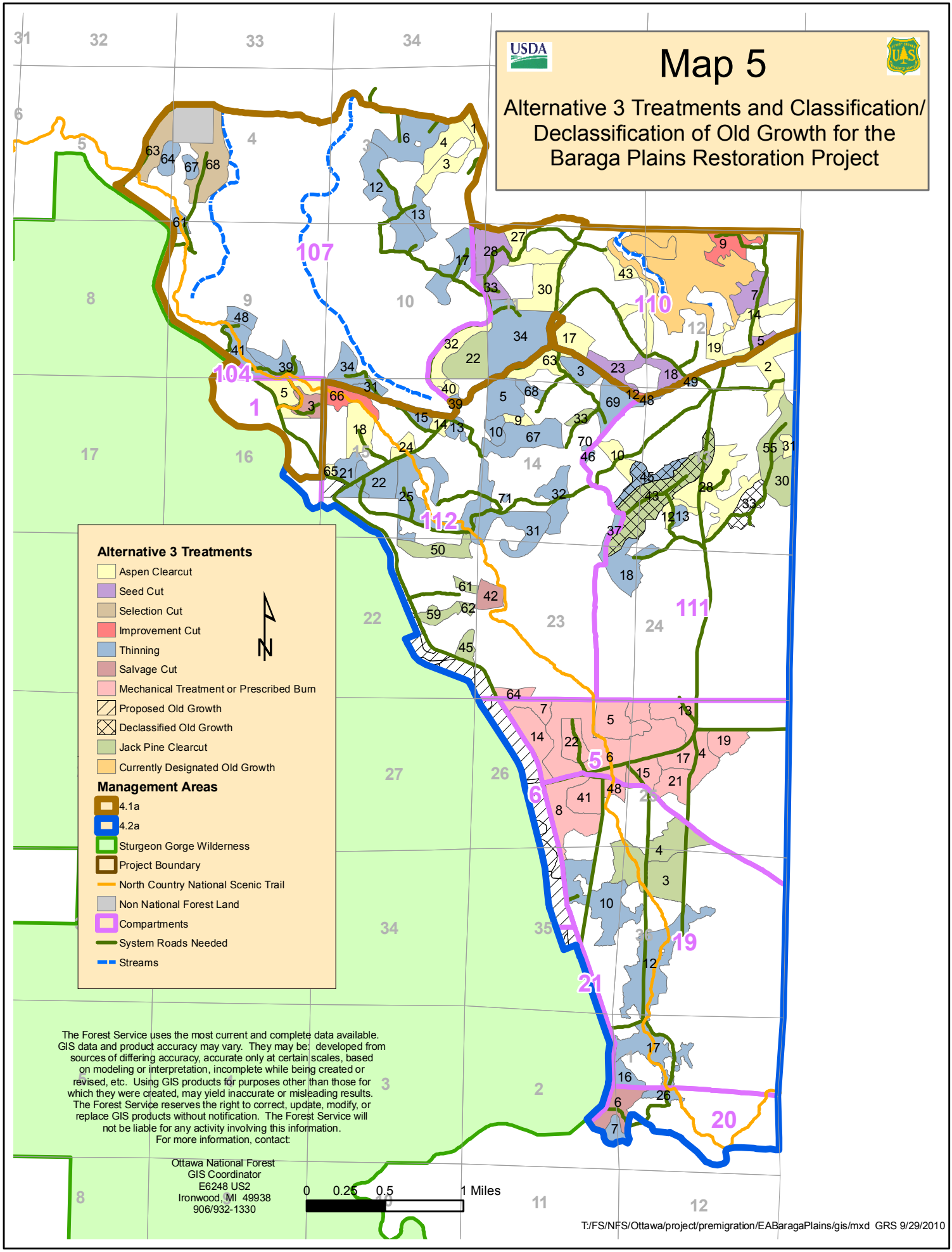
Map 5
Alternative 3 Treatments and Classification/ Declassification of Old Growth for the Baraga Plains Restoration Project
Alternative 3 Treatments
Aspen Clearcut
Seed Cut
Selection Cut
Improvement Cut
Thinning
Salvage Cut
Mechanical Treatment or Prescribed Burn
Proposed Old Growth
Declassified Old Growth
Jack Pine Clearcut
Currently Designated Old Growth
Management Areas
4.1a
4.2a
Sturgeon Gorge Wilderness
Project Boundary
North Country National Scenic Trail
Non National Forest Land
Compartments
System Roads Needed
Streams
N
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E6248 US2
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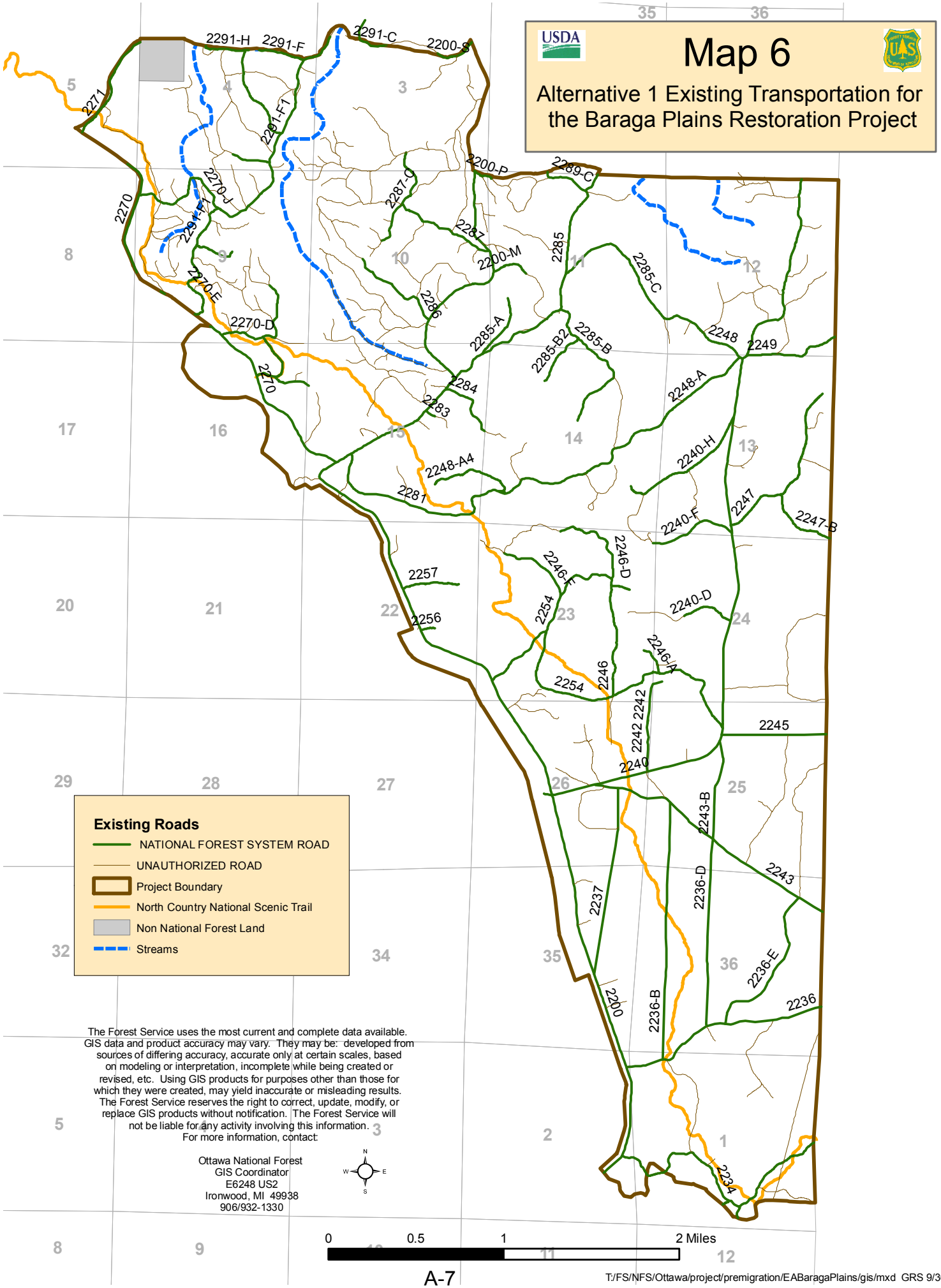
906/932-1330
0 0.25 0.5 1 Miles
T:/FS/NFS/Ottawa/project/premigration/EABaragaPlains/gis/mxd GRS 9/29/2010


Map 6
Alternative 1 Existing Transportation for the Baraga Plains Restoration Project
USDA
Existing Roads
NATIONAL FOREST SYSTEM ROAD
UNAUTHORIZED ROAD
Project Boundary
North Country National Scenic Trail
Non National Forest Land
Streams
2291-H
2291-F
2291-C
2200-S
2271
2291-F1
2270-J
2270
2291-F2
2270-E
2270-D
2270
2287-C
2200-P
2289-C
2287
2200-M
2285
2285-C
2286
2285-A
2285-B2
2285-B
2248
2249
2284
2283
2248-A
2248-A4
2240-H
2281
2240-F
2247
2247-B
2257
2246-T
2246-D
2256
2254
2240-D
2246-A
2246
2254
2242
2242
2245
2240
2243-B
2243
2237
2236-D
2236-E
2200
2236-B
2236
2234
0
0.5
1
2 Miles
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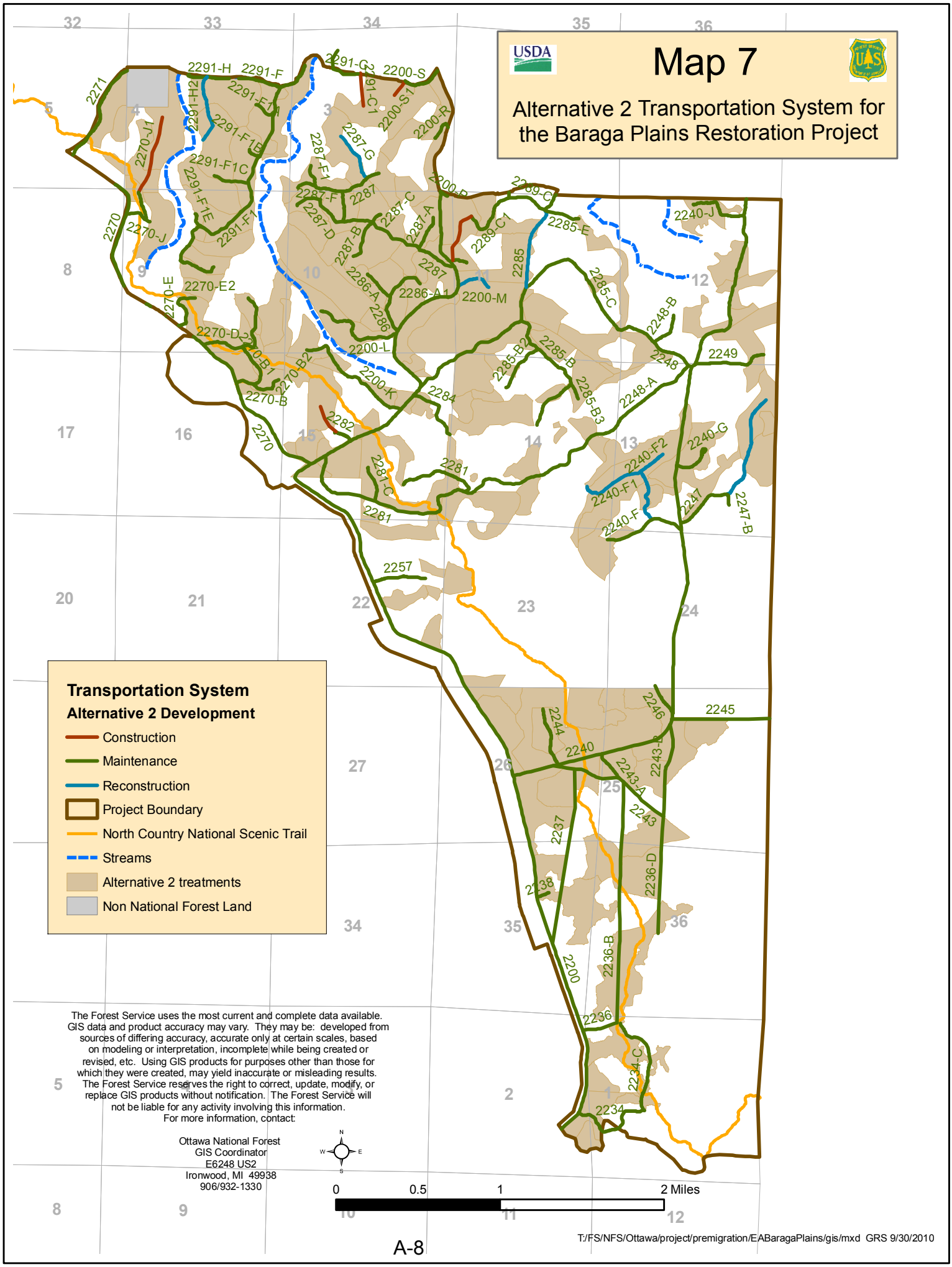
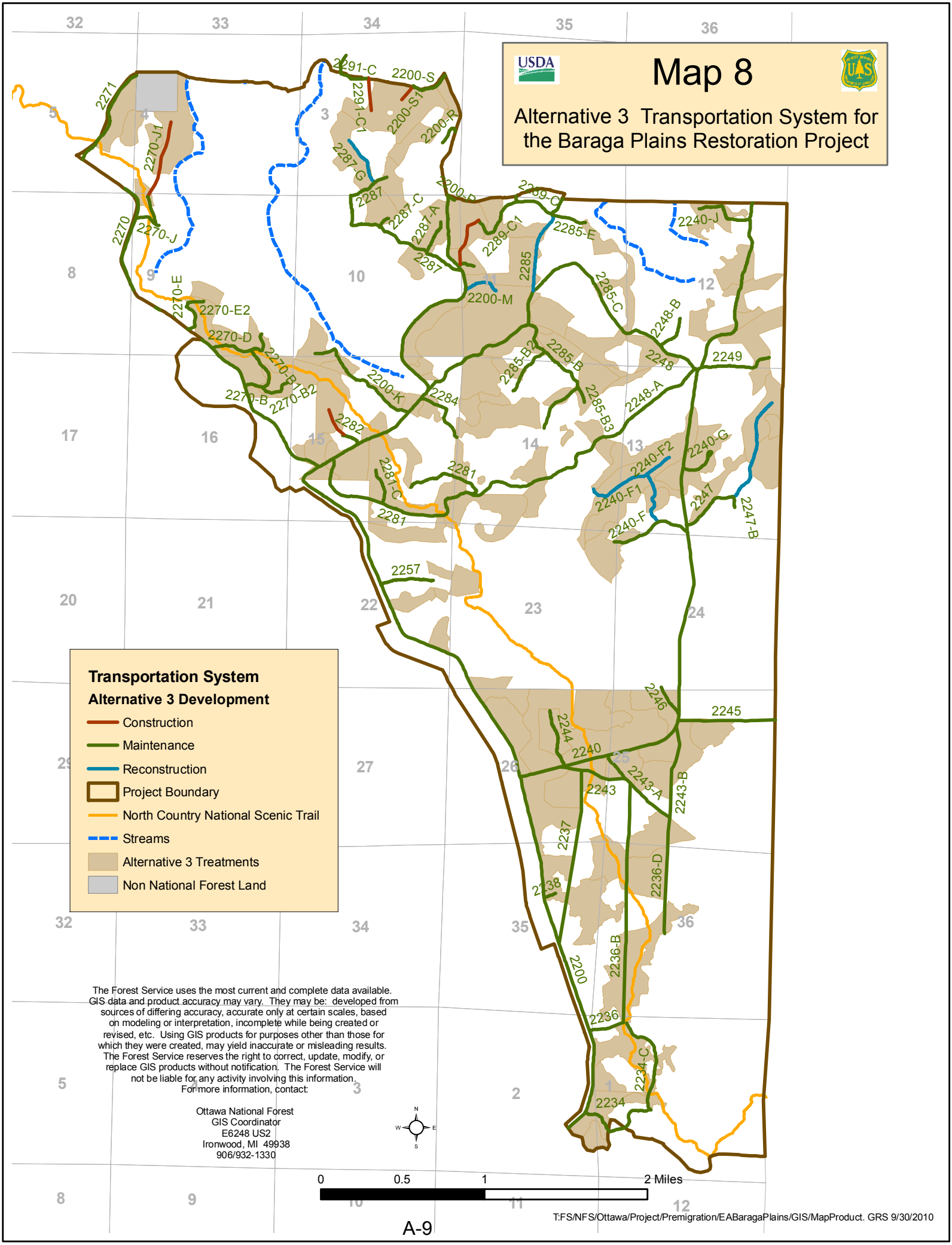

Map 7
Alternative 2 Transportation System for the Baraga Plains Restoration Project
USDA
Transportation System
Alternative 2 Development
Construction
Maintenance
Reconstruction
Project Boundary
North Country National Scenic Trail
Streams
Alternative 2 treatments
Non National Forest Land
The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. The Forest Service will not be liable for any activity involving this information.
For more information, contact:
Ottawa National Forest
GIS Coordinator
E6248 US2
Ironwood, MI 49938
906/932-1330
0
0.5
1
2 Miles
T:/FS/NFS/Ottawa/project/premigration/EABaragaPlains/gis/mxd GRS 9/30/2010


Map 8
Alternative 3 Transportation System for the Baraga Plains Restoration Project
Transportation System
Alternative 3 Development
Construction
Maintenance
Reconstruction
Project Boundary
North Country National Scenic Trail
Streams
Alternative 3 Treatments
Non National Forest Land
The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. The Forest Service will not be liable for any activity involving this information.
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GIS Coordinator
E6248 US2
Ironwood, MI 49938
906/932-1330
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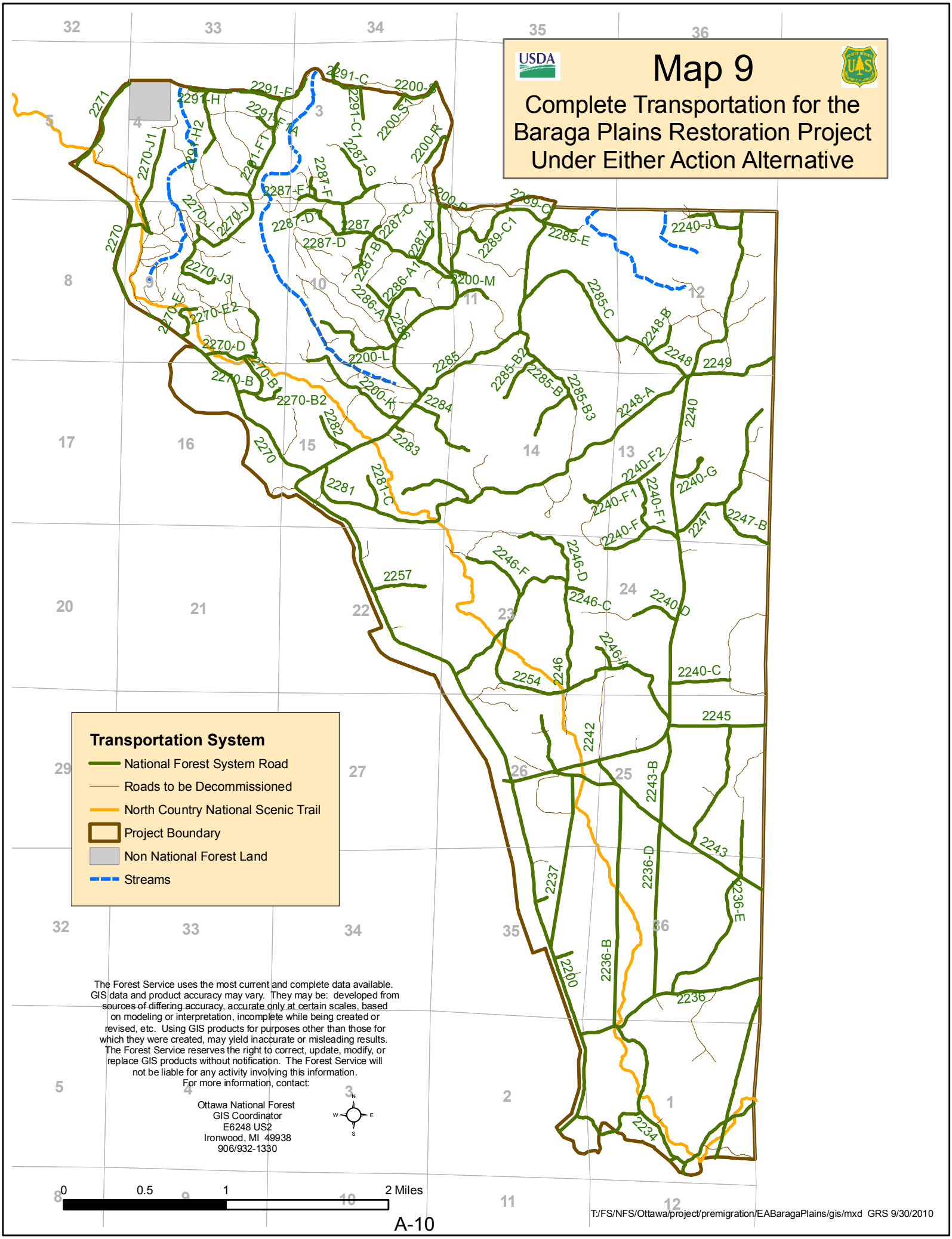
0.5
1
2 Miles
T:FS/NFS/Ottawa/Project/Premigration/EABaragaPlains/GIS/MapProduct. GRS 9/30/2010


Map 9
Complete Transportation for the Baraga Plains Restoration Project Under Either Action Alternative
USDA
Transportation System
National Forest System Road
Roads to be Decommissioned
North Country National Scenic Trail
Project Boundary
Non National Forest Land
Streams
The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. The Forest Service will not be liable for any activity involving this information.
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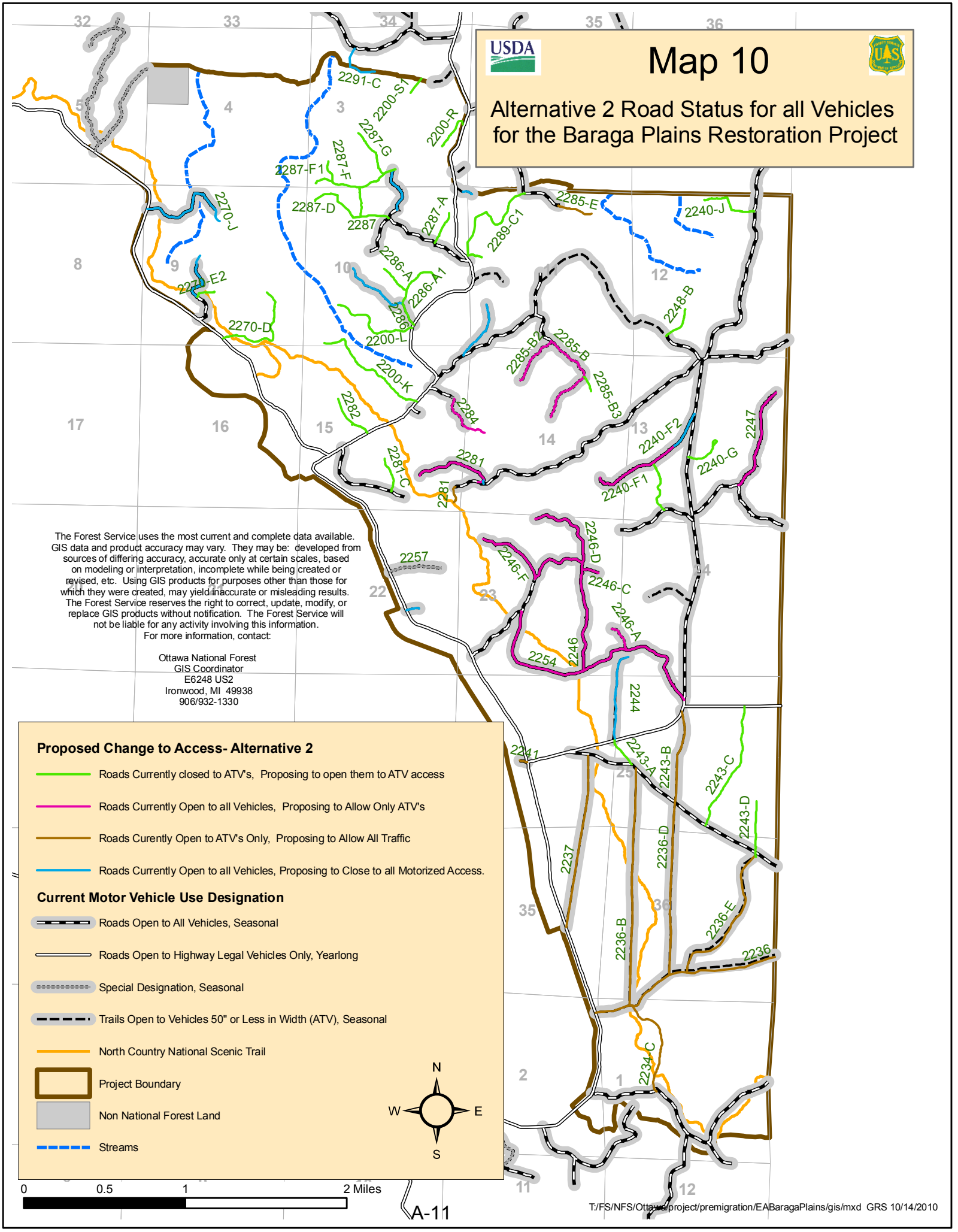
GIS Coordinator
E6248 US2
Ironwood, MI 49938
906/932-1330
0 0.5 1 2 Miles
T:/FS/NFS/Ottawa/project/premigration/EABaragaPlains/gis/mxd GRS 9/30/2010


Map 10
Alternative 2 Road Status for all Vehicles for the Baraga Plains Restoration Project
USDA
The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. The Forest Service will not be liable for any activity involving this information.
For more information, contact:
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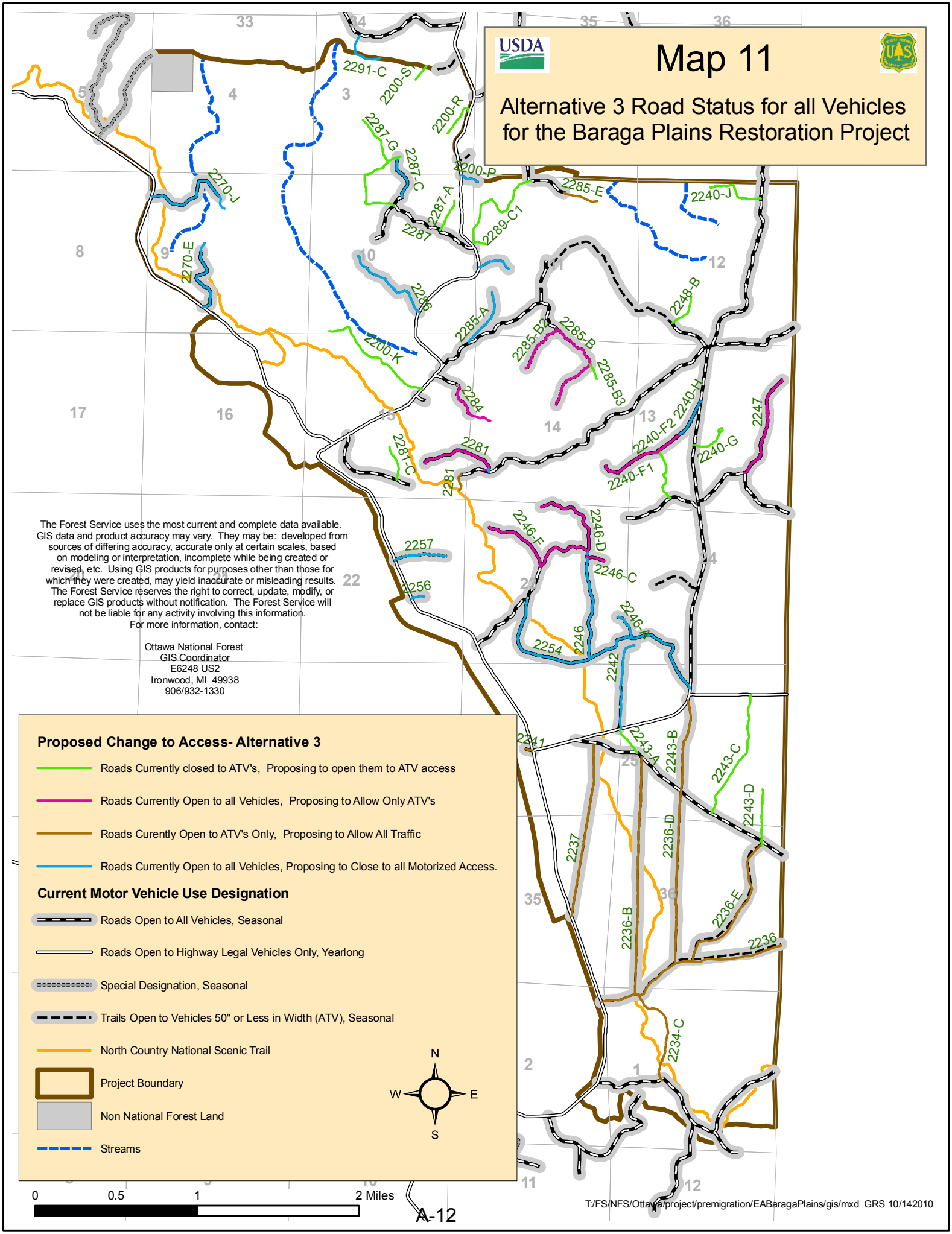
GIS Coordinator
E6248 US2
Ironwood, MI 49938
906/932-1330
Proposed Change to Access- Alternative 2
Roads Currently closed to ATV's, Proposing to open them to ATV access
Roads Currently Open to all Vehicles, Proposing to Allow Only ATV's
Roads Curently Open to ATV's Only, Proposing to Allow All Traffic
Roads Currently Open to all Vehicles, Proposing to Close to all Motorized Access.
Current Motor Vehicle Use Designation
Roads Open to All Vehicles, Seasonal
Roads Open to Highway Legal Vehicles Only, Yearlong
Special Designation, Seasonal
Trails Open to Vehicles 50" or Less in Width (ATV), Seasonal
North Country National Scenic Trail
Project Boundary
Non National Forest Land
Streams
N
W
E
S
0
0.5
1
2 Miles
2291-C
2200-S1
2200-R
2287-G
2287-F
2287-F1
2287-D
2287
2287-A
2289-C1
2285-E
2240-J
2270-J
2270-E2
2270-D
2286-A
2286-A1
2286
2200-L
2200-K
2248-B
2285-B2
2285-B
2285-B3
2282
2284
2281-C
2281
2281
2240-F2
2240-G
2247
2240-F1
2257
2246-D
2246-F
2246-C
2246-A
2246
2254
2244
2241
2243-A
2243-B
2243-C
2243-D
2237
2236-D
2236-E
2236-B
2236
2234-C
A-11
T:/FS/NFS/Ottawa/project/premigration/EABaragaPlains/gis/mxd GRS 10/14/2010


Map 11
Alternative 3 Road Status for all Vehicles for the Baraga Plains Restoration Project
USDA
The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. The Forest Service will not be liable for any activity involving this information.
For more information, contact:
Ottawa National Forest
GIS Coordinator
E6248 US2
Ironwood, MI 49938
906/932-1330
Proposed Change to Access- Alternative 3
Roads Currently closed to ATV's, Proposing to open them to ATV access
Roads Currently Open to all Vehicles, Proposing to Allow Only ATV's
Roads Curently Open to ATV's Only, Proposing to Allow All Traffic
Roads Currently Open to all Vehicles, Proposing to Close to all Motorized Access.
Current Motor Vehicle Use Designation
Roads Open to All Vehicles, Seasonal
Roads Open to Highway Legal Vehicles Only, Yearlong
Special Designation, Seasonal
Trails Open to Vehicles 50" or Less in Width (ATV), Seasonal
North Country National Scenic Trail
Project Boundary
Non National Forest Land
Streams
N
W
E
S
0
0.5
1
2 Miles
2291-C
2200-S
2200-R
2287-G
2287-C
2200-P
2270-J
2287-A
2287
2289-C1
2285-E
2240-J
2270-E
2286
2285-A
2248-B
2200-K
2285-B2
2285-B
2285-B3
2284
2240-H
2240-F2
2247
2281-C
2281
2240-G
2240-F1
2246-F
2246-D
2257
2246-C
2256
2246-E
2254
2246
2242
2241
2243-A
2243-B
2243-C
2243-D
2237
2236-D
2236-E
2236-B
2236
2234-C
T:/FS/NFS/Ottawa/project/premigration/EABaragaPlains/gis/mxd GRS 10/142010

APPENDIX B

VEGETATIVE TREATMENTS BY STAND AND COMPARTMENT NUMBER

Table 1- Prescription Burn Treatments by Compartment and Stand[1]

Prescription Burn Treatment	Compartment	Stand	Acres
520 Acre Burn	005	004	10
	005	005	10
	005	006	17
	005	007	22
	005	013	24
	005	014	24
	005	015	24
	005	017	25
	005	019	26
	005	021	28
	005	022	29
	019	008	37
	019	041	39
	019	048	53
	112	064	151

[1]The prescribed burn acres and the area that will be burned are a close approximation: there may be some boundary adjustments and acre adjustments closer to the time of the prescribed burn.

Table 2 – Vegetative Treatments by Compartment, and Stand for Alternative 2

Compartment	Stand	Treatment	Existing Forest Type	Acres
001	003	Salvage Sanitary	Paper Birch	18
001	005	Stand clear cut	Quaking Aspen	36
005	004	Stand clear cut[1]	Jack Pine	24
005	005	Stand clear cut[1]	Jack Pine	39
005	006	Stand clear cut[1]	Jack Pine	151
005	007	Stand clear cut[1]	Jack Pine	17
005	013	Stand clear cut[1]	Jack Pine	29
005	014	Stand clear cut[1]	Jack Pine	37
005	015	Stand clear cut[1]	Jack Pine	24
005	017	Stand clear cut[1]	Jack Pine	22
005	019	Stand clear cut[1]	Jack Pine	24
005	021	Stand clear cut[1]	Jack Pine	25
005	022	Stand clear cut[1]	Jack Pine	26
019	003	Stand clear cut	Jack Pine	39
019	004	Stand clear cut	Jack Pine	74
019	008	Stand clear cut[1]	Jack Pine	53
019	010	Commercial Thin	Red Pine	74
019	012	Commercial Thin	Red Pine	91

Compartment	Stand	Treatment	Existing Forest Type	Acres
019	016	Commercial Thin	Red Pine	14
019	017	Commercial Thin	Red Pine	48
019	041	Stand clear cut[1]	Jack Pine	28
019	048	Stand clear cut[1]	Jack Pine	10
020	006	Salvage Sanitary	Jack Pine	32
020	007	Commercial Thin	Red Pine	12
020	026	Commercial Thin	Red Pine	10
107	001	Stand clear cut	Quaking Aspen	11
107	003	Stand clear cut	Asp/PB/Bls fir/Spr	21
107	004	Stand clear cut	Asp/PB/Bls fir/Spr	26
107	006	Commercial Thin	White Pine	56
107	010	Selection Ind Tree	Mixed Hardwoods	29
107	012	Stand clear cut	Bls/Spr/Aspen/PB	61
107	013	Stand clear cut	Bls/Spr/Aspen/PB	20
107	016	Stand clear cut	Asp/PB/Bls fir/Spr	41
107	017	Stand clear cut	Paper Birch	40
107	018	Selection Ind Tree	Mixed Hardwoods	17
107	019	Selection Ind Tree	Hemlock	71
107	021	Selection Ind Tree	Mixed Hardwoods	30
107	022	Selection Ind Tree	N hrdwds/Hemlock	21
107	023	Selection Ind Tree	N hrdwds/Hemlock	24
107	024	Selection Ind Tree	Mixed Hardwoods	82
107	025	Selection Ind Tree	Mixed Hardwoods	23
107	026	Selection Group	Asp/PB/Bls fir/Spr	50
107	027	Selection Group	Asp/PB/Bls fir/Spr	34
107	031	Stand clear cut	Asp/PB/Bls fir/Spr	10
107	032	Selection Ind Tree	Mixed Hardwoods	55
107	034	Stand clear cut	Asp/PB/Bls fir/Spr	24
107	036	Selection Ind Tree	N hrdwds/Hemlock	15
107	037	Selection Ind Tree	Mixed Hardwoods	33
107	038	Selection Group	Paper Birch	14
107	039	Stand clear cut	Quaking Aspen	26
107	041	Commercial Thin	Northern Red Oak	32
107	046	Commercial Thin	Mixed Hardwoods	38
107	048	Stand clear cut	Quaking Aspen	11
107	049	Selection Ind Tree	Mixed Hardwoods	14
107	050	Selection Ind Tree	N hrdwds/Hemlock	18
107	051	Selection Ind Tree	Mixed Hardwoods	24
107	056	Selection Ind Tree	Mixed Hardwoods	73
107	057	Selection Ind Tree	Mixed Hardwoods	42
107	058	Selection Ind Tree	Mixed Hardwoods	14
107	060	Commercial Thin	Bls/Spr/Aspen/PB	24
107	061	Commercial Thin	Bigtooth Aspen	9

Compartment	Stand	Treatment	Existing Forest Type	Acres
107	063	Selection Ind Tree	Mixed Hardwoods	33
107	064	Stand clear cut	Quaking Aspen	14
107	067	Commercial Thin	Mixed Hardwoods	7
107	068	Selection Ind Tree	Mixed Hardwoods	56
107	070	Selection Ind Tree	Mixed Hardwoods	56
107	071	Selection Ind Tree	Mixed Hardwoods	58
107	072	Selection Ind Tree	Mixed Hardwoods	35
107	073	Selection Ind Tree	Mixed Hardwoods	35
110	005	Seed Cut-Shltrwd	Quaking Aspen	8
110	007	Seed Cut-Shltrwd	Quaking Aspen	27
110	009	Improvement	Quaking Aspen	27
110	012	Improvement	Red Pine	3
110	014	Stand clear cut	Quaking Aspen	19
110	017	Stand clear cut	Quaking Aspen	26
110	018	Seed Cut-Shltrwd	Paper Birch	18
110	019	Stand clear cut	Quaking Aspen	19
110	022	Stand clear cut	Jack Pine	40
110	023	Seed Cut-Shltrwd	Quaking Aspen	26
110	027	Stand clear cut	Quaking Aspen	33
110	028	Seed Cut-Shltrwd	White Pine	41
110	030	Stand clear cut	Quaking Aspen	39
110	032	Stand clear cut	Paper Birch	33
110	033	Seed Cut-Shltrwd	Quaking Aspen	16
110	034	Commercial Thin	Red Pine	95
110	039	Commercial Thin	Red Pine	2
110	040	Stand clear cut	Quaking Aspen	6
110	043	Stand clear cut	Quaking Aspen	35
111	002	Stand clear cut	Bigtooth Aspen	46
111	010	Stand clear cut	Bigtooth Aspen	17
111	012	Stand clear cut	Bigtooth Aspen	10
111	013	Commercial Thin	Red Pine	7
111	018	Commercial Thin	Red Pine	37
111	028	Stand clear cut	Bigtooth Aspen	73
111	030	Stand clear cut	Jack Pine	30
111	031	Stand clear cut	Bigtooth Aspen	7
111	043	Stand clear cut	Jack Pine	90
111	045	Commercial Thin	Red Pine	23
111	046	Commercial Thin	Red Pine	3
111	048	Commercial Thin	Red Pine	6
111	049	Commercial Thin	Red Pine	2
111	055	Stand clear cut	Jack Pine	39
112	003	Commercial Thin	Red Pine	20
112	005	Commercial Thin	Red Pine	34

Compartment	Stand	Treatment	Existing Forest Type	Acres
112	009	Stand clear cut	Quaking Aspen	6
112	010	Commercial Thin	Red Pine	12
112	013	Commercial Thin	Red Pine	9
112	014	Stand clear cut	Quaking Aspen	9
112	015	Commercial Thin	Red Pine	10
112	018	Stand clear cut	Bigtooth Aspen	31
112	021	Commercial Thin	R/W Pine/Oak	23
112	022	Commercial Thin	Jack Pine	34
112	024	Stand clear cut	Bigtooth Aspen	10
112	025	Commercial Thin	Red Pine	93
112	031	Commercial Thin	Jack Pine	51
112	032	Commercial Thin	Red Pine	31
112	033	Stand clear cut	Jack Pine	7
112	037	Commercial Thin	Jack Pine	8
112	042	Salvage Sanitary	Jack Pine	17
112	045	Stand clear cut	Jack Pine	11
112	050	Stand clear cut	Jack Pine	27
112	059	Stand clear cut	Jack Pine	14
112	061	Stand clear cut	Jack Pine	5
112	062	Stand clear cut	Jack Pine	3
112	063	Stand clear cut	Quaking Aspen	34
112	064	Stand clear cut[1]	Jack Pine	10
112	065	Stand clear cut	Bigtooth Aspen	4
112	066	Improvement	Northern Red Oak	26
112	067	Commercial Thin	Red Pine	47
112	068	Commercial Thin	Red Pine	9
112	069	Commercial Thin	Red Pine	32
112	070	Commercial Thin	Red Pine	1
112	071	Commercial Thin	Red Pine	1
Total				**3915**

[1]These stands are going to be treated with prescribed fire; however as a precursor, the stands will be pretreated to reduce hazardous fuels, as such the acres are different.
Asp = Aspen, PB = Paper Birch, Bls = Balsam Fir, Spr = Spruce, Shltrwd = Shelterwood.

Table 3 - Vegetative Treatments by Compartment, and Stand for Alternative 3

Compartment	Stand	Treatment	Existing Forest Type	Acres
001	003	Salvage Sanitary	Paper Birch	18
001	005	Stand clear cut	Quaking Aspen	36
005	004	Stand clear cut[1]	Jack Pine	24
005	005	Stand clear cut[1]	Jack Pine	39
005	006	Stand clear cut[1]	Jack Pine	151

Compartment	Stand	Treatment	Existing Forest Type	Acres
005	007	Stand clear cut[1]	Jack Pine	17
005	013	Stand clear cut[1]	Jack Pine	29
005	014	Stand clear cut[1]	Jack Pine	37
005	015	Stand clear cut[1]	Jack Pine	24
005	017	Stand clear cut[1]	Jack Pine	22
005	019	Stand clear cut[1]	Jack Pine	24
005	021	Stand clear cut[1]	Jack Pine	25
005	022	Stand clear cut[1]	Jack Pine	26
019	003	Stand clear cut	Jack Pine	39
019	004	Stand clear cut	Jack Pine	74
019	008	Stand clear cut[1]	Jack Pine	53
019	010	Commercial Thin	Red Pine	74
019	012	Commercial Thin	Red Pine	91
019	016	Commercial Thin	Red Pine	14
019	017	Commercial Thin	Red Pine	48
019	041	Stand clear cut[1]	Jack Pine	28
019	048	Stand clear cut[1]	Jack Pine	10
020	006	Salvage Sanitary	Jack Pine	32
020	007	Commercial Thin	Red Pine	12
020	026	Commercial Thin	Red Pine	10
107	001	Stand clear cut	Quaking Aspen	11
107	003	Stand clear cut	Asp/PB/Bls fir/Spr	21
107	004	Stand clear cut	Asp/PB/Bls fir/Spr	26
107	006	Commercial Thin	White Pine	56
107	012	Commercial Thin	Bls/Spr/Aspen/PB	61
107	013	Commercial Thin	Bls/Spr/Aspen/PB	20
107	017	Commercial Thin	Paper Birch	40
107	031	Commercial Thin	Asp/PB/Bls fir/Spr	10
107	034	Commercial Thin	Asp/PB/Bls fir/Spr	24
107	041	Commercial Thin	Northern Red Oak	32
107	048	Commercial Thin	Quaking Aspen	11
107	061	Commercial Thin	Bigtooth Aspen	9
107	063	Selection Ind Tree	Mixed Hardwoods	33
107	064	Commercial Thin	Quaking Aspen	14
107	067	Commercial Thin	Mixed Hardwoods	7
107	068	Selection Ind Tree	Mixed Hardwoods	56
110	005	Seed Cut-Shltrwd	Quaking Aspen	8
110	007	Seed Cut-Shltrwd	Quaking Aspen	27
110	009	Improvement	Quaking Aspen	27
110	012	Improvement	Red Pine	3
110	014	Stand clear cut	Quaking Aspen	19
110	017	Stand clear cut	Quaking Aspen	26
110	018	Seed Cut-Shltrwd	Paper Birch	18

Compartment	Stand	Treatment	Existing Forest Type	Acres
110	019	Stand clear cut	Quaking Aspen	19
110	022	Stand clear cut	Jack Pine	40
110	023	Seed Cut-Shltrwd	Quaking Aspen	26
110	027	Stand clear cut	Quaking Aspen	33
110	028	Seed Cut-Shltrwd	White Pine	41
110	030	Stand clear cut	Quaking Aspen	39
110	032	Stand clear cut	Paper Birch	33
110	033	Seed Cut-Shltrwd	Quaking Aspen	16
110	034	Commercial Thin	Red Pine	95
110	039	Commercial Thin	Red Pine	2
110	040	Stand clear cut	Quaking Aspen	6
110	043	Stand clear cut	Quaking Aspen	35
111	002	Stand clear cut	Bigtooth Aspen	46
111	010	Stand clear cut	Bigtooth Aspen	17
111	012	Stand clear cut	Bigtooth Aspen	10
111	013	Commercial Thin	Red Pine	7
111	018	Commercial Thin	Red Pine	37
111	028	Stand clear cut	Bigtooth Aspen	73
111	030	Stand clear cut	Jack Pine	30
111	031	Stand clear cut	Bigtooth Aspen	7
111	043	Stand clear cut	Jack Pine	90
111	045	Commercial Thin	Red Pine	23
111	046	Commercial Thin	Red Pine	3
111	048	Commercial Thin	Red Pine	6
111	049	Commercial Thin	Red Pine	2
111	055	Stand clear cut	Jack Pine	39
112	003	Commercial Thin	Red Pine	20
112	005	Commercial Thin	Red Pine	34
112	009	Stand clear cut	Quaking Aspen	6
112	010	Commercial Thin	Red Pine	12
112	013	Commercial Thin	Red Pine	9
112	014	Stand clear cut	Quaking Aspen	9
112	015	Commercial Thin	Red Pine	10
112	018	Stand clear cut	Bigtooth Aspen	31
112	021	Commercial Thin	R/W Pine/Oak	23
112	022	Commercial Thin	Jack Pine	34
112	024	Stand clear cut	Bigtooth Aspen	10
112	025	Commercial Thin	Red Pine	93
112	031	Commercial Thin	Jack Pine	51
112	032	Commercial Thin	Red Pine	31
112	033	Stand clear cut	Jack Pine	7
112	037	Commercial Thin	Jack Pine	8
112	042	Salvage Sanitary	Jack Pine	17

Compartment	Stand	Treatment	Existing Forest Type	Acres
112	045	Stand clear cut	Jack Pine	11
112	050	Stand clear cut	Jack Pine	27
112	059	Stand clear cut	Jack Pine	14
112	061	Stand clear cut	Jack Pine	5
112	062	Stand clear cut	Jack Pine	3
112	063	Stand clear cut	Quaking Aspen	34
112	064	Stand clear cut[1]	Jack Pine	10
112	065	Stand clear cut	Bigtooth Aspen	4
112	066	Improvement	Northern Red Oak	26
112	067	Commercial Thin	Red Pine	47
112	068	Commercial Thin	Red Pine	9
112	069	Commercial Thin	Red Pine	32
112	070	Commercial Thin	Red Pine	1
112	071	Commercial Thin	Red Pine	1
Total				**2920**

[1]These stands are going to be treated with prescribed fire; however as a precursor, the stands will be pretreated to reduce hazardous fuels, as such the acres are different.
Asp = Aspen, PB = Paper Birch, Bls = Balsam Fir, Spr = Spruce, Shltrwd = Shelterwood.

Table 4 – Old Growth by Compartment, Stand and Acres

Compartment	Stand	Description	Acres
006	001	Proposed Old Growth	99
006	002	Proposed Old Growth	9
006	008	Proposed Old Growth	55
006	012	Proposed Old Growth	39
006	015	Proposed Old Growth	54
006	017	Proposed Old Growth	7
021	001	Proposed Old Growth	11
021	003	Proposed Old Growth	3
021	004	Proposed Old Growth	121
021	005	Proposed Old Growth	51
021	006	Proposed Old Growth	30
021	011	Proposed Old Growth	72
111	033	Proposed Old Growth	24
112	020	Proposed Old Growth	9
112	052	Proposed Old Growth	7
112	053	Proposed Old Growth	13
112	054	Proposed Old Growth	37
112	055	Proposed Old Growth	14
112	056	Proposed Old Growth	24
112	057	Proposed Old Growth	33

Compartment	Stand	Description	Acres
112	058	Proposed Old Growth	13
110	008	Existing Old Growth	172
110	001	Existing Old Growth	5
110	043	Existing Old Growth	90
110	007	Existing Old Growth	27
110	016	Existing Old Growth	22

APPENDIX C

MANAGEMENT INDICATOR SPECIES

The Forest Service monitors population trends of selected wildlife and plant species, called Management Indicator Species (MIS), to determine the effects of management activities. Table 1 displays population trends for each of the species or group of species on the Ottawa. Table C-1 also displays which of the species have potentially suitable habitat within the Mud Lake Project Area, and whether effects to the species are expected as a result of implementing the alternatives analyzed in the Baraga EA.

Table C-1 Summary of Effects to MIS by Alternative

Mgmt. Indicator Species	Population Trend	Habitat Available ?	Effects Alt. 1[1]	Effects Alt. 2[1]	Effects Alt. 3[1]
Ruffed Grouse	Cyclical, but stable	Yes	Yes (-)	Yes (+)	Yes (+)
American marten	Stable	Yes	Yes (+)	Neutral	Neutral
EPT (Mayfly-stonefly-caddisfly index)	Need information, probably stable to increasing	Yes, a very small amount	Yes (-)	Yes (+)	Yes (+)
Cutleaf toothwort	No trend information available, likely stable, possibly increasing	Yes, north end, hardwood only	Yes (+)	Yes (-)	Yes (-)

[1]*Note that (+) and (-) are used to denote magnitude of positive or negative effects produced by alternatives. This does not imply that any of the alternatives would produce significant effects to the given MIS. Neutral effects means that effects are expected, but the positive and negative effects are approximately equal, and thus are off-setting.*

The basis for population trend information for ruffed grouse used in Table C1 is from the Ottawa's FY 2009 Monitoring and Evaluation (M&E) Report (pages 22-23). Population trends for American marten are derived from Michigan Department of Natural Resources (DNR) harvest surveys from 2008. Cutleaf toothwort populations are presumed to be stable on the Ottawa, based on presence/absence field records and anecdotal evidence.

AMERICAN MARTEN

The Ottawa National Forest selected the American marten as a Management Indicator Species (MIS) for large tracts of mature forest habitat with abundant vertical and horizontal cover. Suitability of habitat for marten on the Ottawa varies by management areas (MAs). Management areas containing mature forest with a coniferous understory and canopy component, woody debris on the forest floor with large stumps and logs, and large trees with holes contain the most suitable habitat on the Ottawa. All MAs on the Ottawa contain these components to a certain extent. Management areas with an early successional forest emphasis such as 4.2a contain less suitable habitat than MAs emphasizing late successional forest. However, even the early successional forest MAs contain some suitable habitat with riparian areas and designated old growth that has matured into suitability.

EFFECTS ANALYSIS FOR THE AMERICAN MARTEN

Direct and Indirect Effects

Alternative 1

Alternative 1 would have positive effects on habitat suitability for marten in MA 4.1a and neutral effects within MA 4.2a. Natural succession would result in a gradual trend toward more conifers in some areas (white pine, eastern hemlock, spruce), along with a gradual increase in snags, cavity trees, and woody debris on the forest floor. This increasingly-complex forest structure over time would benefit martens.

Alternatives 2 and 3

Under Alternatives 2 and 3, selection harvest and thinning of hardwood stands would generally have little effect on martens, since marten very rarely use hardwood stands that lack a conifer component. Clearcutting of aspen/fir stands would be detrimental to martens in the short-term; however, since these areas would be regenerated to aspen or mixed aspen/conifer stands, the long-term impacts of this clearcutting this habitat on marten would be minor.

Alternatives 2 and 3 would lead to removal of some trees (particularly defective trees) that would likely benefit marten as they age and become culls. These would eventually become dead snags and/or woody debris on the forest floor which is an important habitat component for marten. Design criteria number 5, including retention of snags and some defective trees, should minimize these losses.

Overall, the areas that would not be affected by timber harvest (i.e. Sturgeon River Gorge Wilderness, old growth retention areas, etc.) would provide the structure and connectivity most sought after by martens. In summary, Alternatives 2 and 3 would result in both positive and negative impacts to marten, with the net effect being about neutral.

Cumulative Effects

Past and Present Actions

The past actions that affected American marten were trapping and extensive logging, which combined, extirpated the species in the late 1800s/early 1900s. Trapping, which was a primary or secondary income for many during settlement times, was basically unregulated. The extirpation of the species primarily occurred when extensive logging, followed by fire removed old growth habitat, and the large down and standing coarse woody debris (CWD) required by this species.

Since enactment of the 1960 Multiple-Use Sustained Yield Act and other legislation beginning in the 1960's, management of NF lands has given equal or higher priority to other resources, including wildlife habitat for non-consumptive as well consumptive species. Over half of the land base on the Ottawa is in the "Unsuited" category, making it exempt from for timber harvest. These areas include designated wilderness, wild and scenic river corridors, riparian areas adjacent to perennial streams, lakes, and wetland areas that provide maturing forest with standing and down CWD, and connecting corridors to each other. This available habitat, combined with the re-introduction of the marten is contributing to the comeback and stable to increasing populations of this species.

Future Actions

Reasonably foreseeable future influences within the project area include an aging forest in the unsuitable areas for timber production, a stable to increasing prey base (pine squirrels) and a stable to increasing population of pine marten.

RUFFED GROUSE

Ruffed grouse rely largely on aspen habitats in a variety of age classes. Dense, young sapling stands are used for brood rearing; pole stands are needed for cover; and mature aspen provides food, especially through the winter, and additional cover. In the Forest Plan (page 2-8), the long-term objective for this species is to maintain 12,000 acres of 0-9 year-old aspen/paper birch regeneration, well-distributed on lands suited for timber production. Over time, this will ensure provision of all age classes of aspen. At this time, the Forest has about 8,200 acres of 0-9 year old aspen/birch types (FY 08 M&E Report).

Ruffed grouse populations are monitored State-wide annually by Michigan DNRE using standard drumming survey routes. Grouse survey routes are located throughout the ONF and are completed by ONF staff annually in cooperation with Michigan DNRE. As a whole, ruffed grouse numbers are highly variable between years, and seem to follow about a 7-10 year cycle. At the time of this writing (Spring 2010), grouse populations are near or slightly below a recent peak (2008-2009). The last peak occurred from 1999 to 2000.

The Forest Service suited lands within the BP project area are currently about 16% and 33% aspen dominated in MA4.2a and 4.1a respectively, with aspen as a sub-dominant species in other areas. None of the project area's aspen stands are in the 0-9 year age-class. Conversely, about 54% of the project area's aspen (approx. 1,150 acres total) is in stands greater than 60 years which are considered, over-mature and declining.

EFFECTS ANALYSIS FOR RUFFED GROUSE

Direct and Indirect Effects

Alternative 1

Under the No Action Alternative, all of the older aspen stands would begin converting to other forest types (hardwood, white pine, and spruce/fir) within the next couple of decades. This would negatively impact grouse over time, as these other forest types are not as favorable to grouse. Natural disturbances, such as wind throw, would probably maintain some aspen on the landscape, but it would most likely be a smaller amount than is currently present.

Alternative 2

Under Alternative 2, aspen would be regenerated on about 950 acres of which 736 acres would be clearcut. These actions would retain a significant aspen component in the area for future wildlife and timber needs. This would result in a more favorable impact on grouse habitat, as compared to the No Action Alternative. Some mature aspen stands would be deferred from treatment due to a variety of reasons. The 217 acres that are greater than 60 years old in MA 4.1a are not proposed for treatment due to a variety of reasons such as riparian concerns. Some of these stands would likely convert to other forest types over time, assuming no clearcut treatments are prescribed in future entries to this area. Overall, Alternative 2 would provide some positive impacts to grouse, particularly in the next decade, but would also probably result in the loss of some acres of mature aspen due to conversion to other forest types.

Alternative 3

The differences between Alternatives 2 and 3 would be 249 fewer acres of aspen regeneration and 163 fewer acres clearcut to create premium grouse habitat. Under this alternative, the same conversion of older aged aspen stands would occur as described for Alternative 2. Overall, Alternative 3 would provide fewer positive impacts to grouse than Alternative 2, but still more than Alternative 1. Both action alternatives would result in the loss of some acres of mature aspen due to conversion to other forest types, but substantially less than the no action alternative.

Cumulative Effects

The cumulative effects for ruffed grouse were analyzed at the Forest wide level, because MIS are used to help determine the effects of Forest Service management activities at the Forest scale. The temporal bounds of analysis include the early 1900s, when the area was heavily logged, to 2025, which is the approximate date that the current Forest Plan will cover, and over which future activities are reasonably foreseeable.

Past actions that affected ruffed grouse were extensive logging activities that created early successional forest. In the early to mid 1900s, these practices occurred across the forest without regard for sensitive areas, such as stream corridors and other riparian areas. Early successional species such as ruffed grouse and white-tailed deer thrived on these conditions and were limited mainly by more frequent severe winter conditions during the period between the 1950s and 1970s.

Since enactment of the 1960 Multiple-Use Sustained Yield Act and other legislation beginning in the 1960s, other resource concerns are limiting the number of acres we are able to maintain for aspen. Currently, about 198,000 acres of aspen exist on the forest. Approximately 80,000 acres are classified as unsuitable for timber production (FY 08 M&E Report).

From 2006-2008, an average 700 aspen regeneration acres were harvested yearly. This is substantially below the 1,700 needed Forest-wide to meet Forest Plan objectives (FY 08 M&E Report). As previously stated, Alternatives 2 and 3 would produce 573 to 736 acres of early successional aspen habitat over several years. This is about equivalent to the acres harvested on average between 2006 and 2008 and a substantial contribution toward Forest Plan goals.

Future influences on ruffed grouse are expected to remain the same within the project area over the next 20 to 25 years. Aspen regeneration within the project area is expected to remain at the approximate level proposed in the project area. Grouse populations will continue to increase/decrease on a 10-year cycle.

Conclusion

The effects of the alternatives on ruffed grouse are similar to those discussed for the spruce grouse (see BE and Chapter III of this document). The primary difference is that ruffed grouse benefit more positively to treatment of aspen/birch habitat (especially clearcuts) than do the spruce grouse. The no action alternative would have neutral benefits for ruffed grouse allowing low quality habitat to succeed to older-aged stands naturally. The two action alternatives would improve habitat quality significantly with alternative 2 treating about 163 acres of aspen/birch (736 total) more than Alternative 3. Both action alternatives would have positive effects for ruffed grouse and predators such as northern goshawk that rely on grouse for forage.

Alternative 1 would have a negative effect on grouse because no early successional habitat would be created and much of the 701-950 acres slated for treatment would succeed to northern hardwoods or other Forest types not suitable for grouse. Contrarily, Alternatives 2 and 3 would have positive effects on grouse, contributing to the Forest wide goal of treating about 1,700 acres of aspen annually Forestwide.

AQUATIC INDICATOR SPECIES

(EPHEMEROPTERA-PLECOPTERA-TRICHOPTERA)

EPT is not a single species; rather it is an index that evaluates water quality based on the relative abundance of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) species compared with other aquatic macroinvertebrates. The EPT index has a long history of use for bio-monitoring of water quality in the United States and abroad (Barbour et al. 1999, pages 7-13 - 18; Lenat and Penrose 1996). These three insect Orders are attractive bio-indicators because their larvae are aquatic and many are sensitive to water quality parameters such as temperature, sediment, oxygen content, and toxicants. They can be found in many aquatic habitats, such as ponds, ditches, and lakes, but most require running water. They are especially abundant in clean, cold, well oxygenated streams and rivers (particularly the Plecoptera). Most species require some form of hard substrate, such as rocks or wood. Hard substrates provide them a place to feed, shelter from fast currents or predators, and as attachment points for their cases or retreats (trichopterans only). Most are herbivores or detritivores, employing a wide range of feeding methods including scraping algae off rocks, shredding leaf litter, or building silken nets and filtering food particles from the water. There are also omnivorous and carnivorous EPT species, such as in the Family Perlidae or Perlodidae (Plecoptera). These insects are important components of the food web, converting internal stream primary production (e.g. algae), or external organic inputs (e.g. leaf litter) into food for higher trophic levels, such as fish.

Streams on and near the Ottawa were severely impacted during the late 19th – early 20th century logging, when riparian forests were cut and large amounts of sediment entered the streams. Since then, modern management practices have lead to a generally improving trend in riparian condition and water quality. Although riparian and stream conditions are improving, many streams still have sediment, both from historic and contemporary sources, working its way through the system. Most sediment currently being generated on the Ottawa comes from roads, which intercept run-off and efficiently route sediment-laden water to streams. Once sediment enters a stream, it tends to move slowly through the system because many of the Ottawa's streams are low gradient and lack sufficient power to quickly flush the sediment out. Sediment buries rocks that EPT live on, and fills in interstitial spaces between rocks that EPT use as refuge. Besides too much sediment, many streams have too little large woody debris (LWD). Large woody debris was removed from streams, as well as any other obstructions, such as boulders, to facilitate log drives, often using splash dams. Large woody debris is a very important channel forming element, and its lack has led to stream channels being simplified (i.e. lacking pools) and often being straighter. Logging

of the riparian areas removed most of the large trees that would have eventually fallen into the streams. Removal of the canopy also allowed water temperatures to rise, making the habitat unsuitable for many EPT species.

Because EPT is a new MIS, little data on their population trends have been collected. It is likely that Forest-wide, their populations are stable to increasing, because of the generally improving condition of the streams and riparian areas. However, there are likely streams that historically had EPT populations that are currently unsuitable due to the modifications associated with the logging period. One EPT monitoring site, on Clear Creek, is located approximately 3.5 miles downstream of the project area.

Within the project area, there are approximately 6 miles of perennial streams, but none are particularly good EPT habitat.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

Under this alternative, stream and riparian conditions would slowly improve. Riparian trees would mature and begin providing LWD and shade to streams over the long term. Sediment would flush and expose rocky substrate. No stream habitat improvement work would occur. The miles of road and number of stream crossings would remain the same. This alternative would have a negative effect on EPT across the project area in the short term because nothing would be done to reduce road generated sediment by decommissioning roads and reducing the number of stream crossings.

Alternatives 2 and 3

These alternatives would have a small positive effect on EPT and their habitat by reducing the road density and number of stream crossings. This would reduce sediment sources over the long run by substantially reducing the number of places roads intersect with streams. The effect would be small because there is so little suitable stream habitat in the project area.

Cumulative Effects (All Alternatives)

The cumulative effects analysis area for water and riparian resources is the Black Creek-Sturgeon River, Clear Creek-Sturgeon Creek, and the Prickett Lake-Sturgeon River HUC 6 subwatersheds (Figure 7). This area was chosen because the entirety of all streams in the project area that could serve as habitat for these insects are contained with the subwatersheds. The temporal bounds of analysis are the late 1800's and early 1900's, when the area was heavily logged and burned, to approximately 2019, which is the period over which future activities are reasonably foreseeable.

Past actions that affected EPT habitat were logging, which removed canopy cover over streams, causing elevated water temperatures, and removed the source of LWD. Streams were also used to move logs, and were cleaned of logs and rocks that would have interfered with log drives. Roads and railroad grades interfered with local hydrology creating wetlands where they did not exist, and draining others. Roads and logging both generated sediment that reduced water quality. Present actions that affect EPT habitat are roads, logging, residential development, ATV use in and around streams, railroads, and invasive species, such as rusty crayfish.

Since the logging era, riparian forests have recovered substantially, due to improvements in BMPs, but there remains a general lack of LWD, and too much sediment, in the streams. Roads and logging continue to contribute sediment to streams but improved management practices have reduced the amount considerably.

Future actions likely to affect EPT habitat are roads, logging, agriculture, residential development around Covington and Big Lake, ATV use in and around streams, railroads, and invasive species, such as rusty crayfish. Logging, both on NFS and State and private land is expected to occur in the future. Increased use of BMPs would reduce sediment impacts on streams. Invasive species would continue to spread, but increased awareness, as well as more management direction in the 2006 Forest Plan would help lessen the impact of these invaders. ATV use would probably increase, but on NFS land would be confined to a system of designated routes with proper stream crossings and drainage devices.

There would be a small cumulative increase in sediment under all alternatives due to existing sediment sources (e.g. road/stream crossings). Little additional sediment would be contributed to streams from actions proposed under either action alternative. Both of the action alternatives would result in fewer miles of open road, miles of road through wetlands, and a lower road density, therefore lessening the cumulative impact of sediment entering aquatic features over time. The rate of clearcutting is below the level that would lead to large changes in the hydrologic regime, therefore there would be no hydrological cumulative impacts.

Conclusion

Alternative 1 would have a small negative effect on EPT species and EPT habitat by maintaining the existing road system and number of road/stream crossings. Alternatives 2 to 3 would have a small positive effect on EPT species and habitat by reducing sediment sources, such as roads and stream crossings, and by improving stream conditions through the addition of LWD.

CUTLEAF TOOTHWORT

INTRODUCTION

Cutleaf toothwort (*Dentaria laciniata*≡*Cardamine concatenata*) is a low-growing native spring ephemeral in the mustard family. Cutleaf toothwort typically inhabits northern hardwoods and occasionally rocky areas. It was selected as an indicator species for management in northern hardwoods, a dominant forest type which is managed for timber on the Ottawa.

METHODOLOGY

The Ottawa has been conducting population surveys for cutleaf toothwort since the spring of 2006. None of these MIS surveys was conducted in the Baraga project area since it contains few rich mesic hardwood stands. However, site-specific botany field surveys were performed within the project area in 2009. These surveys have shown that cutleaf toothwort is only present within seven stands encompassed by Compartment 107 of the project area.

Bounds of Analysis

The analysis area for direct and indirect effects is the hardwood stands in the Baraga project area (north end) since this is where cutleaf toothwort habitat primarily occurs and where management activities could affect populations or habitat.

Measurement Indicators

- Percentage of northern hardwoods proposed for timber harvest that may provide habitat for the cutleaf toothwort.

EFFECTS ANALYSIS

Direct and Indirect Effects

Alternative 1

No northern hardwoods would be harvested, thus occupied and potential habitat would remain available for cutleaf toothwort, and existing populations would not be disturbed. Natural succession and aging of hardwoods stands could be beneficial to toothwort over time as more woody debris and complex forest floor structure develops.

Direct and Indirect Effects

Alternative 2

Treatments proposed for hardwood stands include about 72% of the project area's hardwoods. Cutleaf toothwort is present within six stands proposed for treatment. Impacts of timber harvest on spring ephemerals such as toothwort include the following: changes in light regime as overstory trees are removed; direct physical damage to plants from equipment, workers and falling trees; changes in soil characteristics including desiccation, increased temperatures, changes in water and nutrient availability, and compaction; isolation of populations inhibiting gene flow; introduction of non-native invasive plants which compete with the ephemerals; exposure of mineral soil and opening the seed bank which can favor aggressive native plants; microclimate changes including humidity decreases and wind increases; increased access and forage for deer; and other effects (Small and McCarthy 2002).

Toothwort plants in summer harvest stands could have the current year's growth destroyed by harvest activities. Toothwort rhizomes are close to the soil surface so that harvest activities could destroy these underground regenerating parts. Cutleaf toothwort produces seeds, but seed production is low (Bierzychudek 1982) and dispersal distances are short (Verheyen et al. 2003) so that it could be difficult for recolonization of a stand from plants that were not affected by harvest. Winter harvest would not directly impact toothwort plants since there would be no above ground parts and the below ground parts would be protected by snow.

Under either winter or summer harvest, the northern hardwood cover type would persist, and continue to provide potential habitat for cutleaf toothwort. However, selection of individual trees for harvest creates small gaps and promotes regeneration of shade tolerant tree species such as sugar maple (Crow et al. 2002). Sugar maple seedlings can dominate the understory, inhibiting the herb layer including cutleaf toothwort (Miller et al. 2002). Restoration of mature forest structure and composition translates to increased habitat suitable for toothwort in the long term.

Cutleaf toothwort is expected to persist in the project area, since some hardwoods would not be treated and some plants would persist in treated stands. However, there are likely to be losses of individual plants in individual stands resulting in an overall negative trend from this alternative.

Direct and Indirect Effects

Alternative 3

Effects would be similar to those described for the cutleaf toothwort under Alternative 2, but to a reduced degree. Treatments proposed include about 12% of the project area hardwoods. Cutleaf toothwort is present within three stands proposed for treatment.

Cutleaf toothwort is expected to persist in more of the project area, with only a slight negative trend.

Cumulative Effects

The analysis area for cumulative effects is hardwoods on the Ottawa National Forest plus those on the immediately surrounding lands: the main nearly contiguous hardwoods block in the western Upper Peninsula, since this is the habitat for cutleaf toothwort. The timeframe for analysis is from the early 1900s when the sharp increase in commercial timber harvesting began to have discernible effects on hardwood habitats, through the present and into the reasonably foreseeable future, about 15 years ahead, which represents the current planning period for the Forest Plan.

Past Actions

Much of the Ottawa and surrounding areas were heavily logged in the early 1900s. Clearcutting and other harvest methods and burning in hardwoods likely extirpated many cutleaf toothwort plants as well as decreasing the total acreage of northern hardwoods. Ongoing disturbance and slow recolonization rates common to forest herbs (Verheyen et al. 2003) may have prevented this species from returning to its historical population levels.

Timber harvest, road building, OHV use, and other Forest uses in hardwood stands also may have destroyed toothwort plants. Past stand management designed to restore mature forest structure (for example, down woody debris) and composition likely benefited toothwort and other spring ephemerals. Natural succession in early seral stands such as aspen results in some gradual conversions to hardwoods. Parcelization of lands adjacent to the Ottawa National Forest may have resulted in declines of cutleaf toothwort as these hardwood stands are logged off or exotics introduced. However, much of the western Upper Peninsula is still hardwood-dominated, providing ample habitat for cutleaf toothwort.

Present Actions

Numerous harvests occur in northern hardwoods on the Forest but many stands are left untreated. The harvests have the potential to reduce cutleaf toothwort populations as do other Forest land uses, as discussed above. Some management on the Forest is designed to convert stands to hardwoods, creating more toothwort habitat. Hardwoods in the surrounding area are also managed, with potential to impact toothwort populations. Much of the hardwood harvest on and off Forest is conducted in winter when impacts to toothwort are minimized. Analysis of the four years' worth of monitoring data for cutleaf toothwort found no statistically significant difference for the occurrence of cutleaf toothwort in managed versus unmanaged stands (see Project File).

Reasonably Foreseeable Future Actions

Timber management, forest opening creation, introduction of competing species, and other land uses are expected to continue, potentially affecting the abundance and distribution of cutleaf toothwort. Hardwood reserve areas and winter logging are expected to continue to provide unaffected toothwort habitat. MIS monitoring should provide more information on toothwort needs.

Since the Baraga project area has limited hardwoods (compared to the cumulative effects analysis area) and some toothwort is expected to remain, the slightly negative population effects of the action alternatives are not expected to add cumulative effects to this species.

APPENDIX D

DESIGN CRITERIA

WILDLIFE

1. For both Alternatives 2 and 3, activities such as timber harvest, fire management, and roads management, restrict activities from May 15th through August 15th in occupied Kirtland's warbler (KW) habitat. For Alternative 2, creating the fuel break in occupied KW habitat will be restricted until the habitat is no longer suitable and the habitat is no longer occupied.

2. Protect wolf and Canada lynx den sites and wolf rendezvous sites (if such are located) by utilizing the following criteria: (A) Protect lynx and wolf den sites (verified by wildlife biologists) and wolf rendezvous sites as determined by discovery, that have been used within the last two years; (B) Utilize a year-round restriction on land use activities (such as tree harvest and road construction) within 330 feet of a den site; and (C) within 2640 feet of a den or rendezvous site, land use activities such as tree harvest, road construction and maintenance, will be prohibited between March 1 and July 31.

3. Specific goshawk/red-shouldered hawk nest/territory protection measures would be applied to protect any active goshawk and/or red-shouldered hawk nests/territories found within the project area as outlined in the Forest Plan (pp. 2-27 and 2-30). If any raptor nest trees are found during project implementation, or any of the known nests become active, their location would be brought to the attention of the Wildlife Biologist for evaluation and recommendations. These measures could be expanded to include other raptor species designated as Threatened, Endangered, or a Regional Forester's Sensitive Species, should additional nests or territories be located during project implementation.

4. In hardwood selection and overstory removal stands, an objective of 3 to 5 snags (dead trees) per acre is desired to provide standing, cavity or den trees, and future dead and down woody debris. Of these, an average of 1 to 2 trees should be 18 inches or greater in diameter, and an average of 2 to 3 snags should be 8 inches or greater in diameter. All trees should be 20 feet or greater in height, and sound enough to last several years.

5. Retain approximately 2 to 4 existing or potential (live) den trees per acre in the hardwood selection and overstory removal stands. Large trees of poor form and low value (cull) are most desired. As a rule, 1 to 2 trees should be 18 inches or greater in diameter, and 1 to 2 live culls should be 8 inches or greater in diameter.

6. Where possible during harvest operations and site preparation activities for natural regeneration of aspen, retain young sapling conifer patches. Patches would consist of dense 2-10 foot tall balsam fir, spruce, and other conifer species, covering about 5 percent of the area. The objective is to preserve and enhance hiding cover within the clearcut for hares and other species.

7. Where possible during harvest operations and site preparation activities for prescribed burning activities of jack pine, retain 15-20 snags or live trees per acre. Snags and/or trees should be 6 inches or greater in diameter, and 20 feet or greater in height. The objective is to enhance and retain habitat for black-backed woodpeckers.

SILVICULTURE

ASPEN CLEARCUTS

8. All trees not reserved or otherwise described for retention should be removed. Noncommercial size balsam fir and red maple are not desirable because they reduce the amount of sunlight warming the ground which is needed for regeneration. However, during site-prep, retain some patches of low-to-the-ground conifer in a manner that adds to prey habitat for lynx and other wildlife and ensures adequate aspen regeneration at the same time.

9. In aspen clearcuts, limit harvest period to leaf off where there is marginal stocking (less than 40 BA) for aspen regeneration. Aspen sprouts best when roots have full reserve of nutrients in leaf off period.

10. Trees chosen for retention would be healthy and well distributed, depending on existing opportunities, to allow for aspen regeneration and growth of the retained tree. The retention of these species would be for structural and species diversity, to encourage recruitment of wildlife forage species, protect small wetland inclusions, and serve as possible future seed sources.

11. In aspen clearcut stands, one large, old live aspen tree per 10 acres would be retained (in addition to culls) to provide for snags and future large logs for wildlife. If these trees need to be felled for safety reasons, the tree would remain at the stump.

HARDWOOD TREATMENTS

12. For aspen patches that occur within other forest types that can produce an aspen inclusion at least 2 acres in size, treat as follows, 1) if patch is intermediate age, thin or leave untreated as needed to favor aspen, 2) if aspen patch is overmature (greater than 40 years old), cut all merchantable trees to promote regeneration and maintain aspen as a component of the hardwood stand for diversity and wildlife habitat, 3) follow up actions to cut noncommercial size trees within patch may be necessary to increase sunlight warming the ground.

13. Hardwood selection would generally occur after July 14th to minimize damage to residuals from logging equipment during the active growing season.

14. In hardwood thinning areas, when soils support summer operations, generally conduct summer operations for benefit of hemlock regeneration in hemlock inclusions and regeneration of yellow birch and northern red oak.

15. In hardwood thinning areas, remove all ironwood. There is an overabundance of ironwood regeneration in many of these stands as a result of heavy deer browse on other species.

16. In hardwood thinning areas, most white spruce 10 inches and greater should be removed unless needed for design features. Most of the white spruce that size has butt rot and is quite subject to windthrow where it occurs mixed in with hardwood stands.

JACK PINE CLEARCUTS WITHOUT USE OF FIRE

17. All slash resulting from logging operations shall either be 1) left at the stump when severed from the merchantable portion of the tree; or 2) delimbed in place as bunched with a chain flail or similar device prior to skidding to a central processing point, or 3) spread back evenly across the stand. The intent is to keep seed bearing slash distributed over site and/or not concentrated in piled slash.

18. Following logging operations, tops in jack pine clearcuts would usually be treated with anchor chain to further break up slash, scatter cones, scarify the site and minimize undesirable competition (red maple). Chaining would occur prior to the cones opening and within a minimum of 2 months to allow slash to cure so it breaks up easier.

19. All trees not reserved or otherwise described for retention, should be removed. Noncommercial size balsam fir and red maple are not desirable because they reduce the amount of sunlight warming the ground which is needed for regeneration.

20. In jack pine clearcuts retain some healthy and well-distributed (or clumped depending on existing condition) red pine, white pine, northern red oak or and fruit bearing trees.

21. There is no need to maintain all oak or other species in most cases. Trees chosen for retention would be healthy and well distributed, depending on existing opportunities, to allow for 1) jack pine regeneration 2) growth of the retained tree. The retention of these species would be for structural diversity, to encourage recruitment of wildlife forage species, and serve as possible future seed sources.

JACK PINE TREATMENT WITHIN THE 520 ACRE BURN AREA

22. In sapling stands, rows of trees will be left between skid trails for seed source and future down woody debris.

23. All dead limbs and boles will be left on site.

24. In areas where trees are greater than five inches dbh, an average of 20-25 seed trees will be left to provide a seed source.

TRANSPORTATION

25. Selection of a road closure device and closure procedures would follow the road access management guidelines for local roads on the Ottawa (see project file). Berms or gates may be used for road closures while road decommissioning activities, including closure of temporary roads, could result in blocking the entrance with berms and stabilization through slash placement. Roads that are currently overgrown with vegetation and are impassable would not need the entrance blocked.

26. Wherever practical, a closure device should be placed at the entrance of a network of roads rather than closing each individual segment. In addition, a closure device (e.g. berm) should be used when decommissioning any portion of a system road, except when the road is currently overgrown with vegetation and is already impassable to motorized vehicles.

27. Where possible, log landings would be located a minimum of 100 feet from collector roads.

BOTANY

28. Permanent Forest Openings used during timber sale operations, such as for landings or decking areas, would be restored. Piles of slash, logs or ends of logs and chip piles would be removed from openings and evenly scattered.

RARE PLANTS

29. If trail enhancement is selected, conduct botany field surveys in at least one blooming season in areas for which trail repair and realignment is planned, on the west side of the project area.

30. Protection measures for any new locations of TES species would be reviewed on a case-by-case basis to determine the appropriate action. Guidelines in existing recovery plans and conservation approaches would be followed to protect TES

location). The deciding official would make a final decision on additional protection measures.

31. Do not remove stumps, roots, or other below-ground biomass. No removal of litter unless needed for site objectives.

32. To the extent possible, retain existing large woody debris in all northern hardwoods and hemlock treatment stands. The LWD can be moved to allow for safe operations in the harvest area, i.e. off roads, skid trails and landings. Tops and limbs used to stabilize soil, typically on roads or skid trails, should be left in place following harvest operations.

33. In northern hardwoods and hemlock treatments, retain approximately 1/6 to 1/3 of the fine woody debris from harvested trees in the forest. Residues should be dispersed rather than accumulated.

34. Avoid re-entry for harvesting biomass. Re-entry is not allowed if tree regeneration has begun, or the site has been planted.

NNIP

35. Implement standard timber sale equipment cleaning provision.

37. For road construction, reconstruction, maintenance, decommissioning, and closure; culvert replacements; gravel surfacing; blading; berm and gate removal and installation; trail repair and enhancement; sign installation; and upland opening maintenance, whether completed by contractors or by the Ottawa NF, take reasonable measures to make each vehicle and piece of equipment free of soil, seeds, vegetative matter, and other debris that could contain or hold NNIP seeds, prior to entry into the Baraga project area.

38. If prescribed fire is used for project objectives, ensure that prescribed fire equipment and firefighter gear is free of weed seed (Ottawa high, new invader, and medium priority species) and propagules before use in the project area.

39. Trail repair and enhancement personnel should ensure their clothing and gear is free of weed seed (Ottawa high, new invader, and medium priority species) and propagules before use in the project area.

40. Retain native vegetation in and around project activity to the maximum extent possible consistent with project objectives.

41. Minimize soil disturbance to the extent practical, consistent with project objectives.

42. Use certified weed-seed-free (Ottawa high, new invader, and medium priority species) hay or straw mulch where feasible to obtain, or use other types of mulch

that do not contain seeds (paper slurry, coconut fiber etc.) Where gravel and other fill is needed, where feasible, use materials that do not contain seeds of ONF high or new invader priority weed species.

43. Freshly disturbed soil areas within payment units may be left to revegetate naturally or as follows under direction of Forest Service Official:
    - Seed where non-native invasive species are expected to be primary colonizers (e.g. adjacent knapweed or thistle infestation).
    - If non-native colonization and erosion potentials are low, avoid seeding to favor natural regeneration of native herbs and shrubs.
    - Any seeding should use a local native seed mix or a non-native, non-persistent seed mix appropriate to the site, as approved by an Ottawa Botanist.

44. Seed freshly disturbed bare soil along roadsides and in fire breaks/lines and trail work areas with a native seed mix or a non-native, non-persistent seed mix appropriate to the site, as approved by an Ottawa Botanist. Target species might be poverty oats, hair grass, ricegrass, little bluestem, goldenrods.

RECREATION

45. Manage the North Country National Scenic Trail through the project area to meet the management guidelines for the trail.

46. Harvest the stands adjacent to Snowmobile trail numbers 8 and 15 as not to directly affect the operation and maintenance of the trail, during its season of use. Restrict hauling on FSR 2200, 2236, and 2270 during the period from December 1st through March 15th (snowmobile trail).

47. Along trails and in harvest units not associated with the 520 acre prescribed burn and along FSR 2200 and 2270, apply VQO measures pertinent to the respect of Partial Retention, Modification, or Maximum Modification.

48. During harvest and burning operations, warning signs will be posted for users of the NCNST and the Sturgeon River Gorge (SRG) Wilderness.

49. Associated projects along the SRG wilderness will meet accessibility guidelines, and blend with the surrounding forest landscape to preserve the Recreational Opportunity Spectrum (ROS) setting.

50. Clearcuts within the project area would include an edge effect ratio that produces an uneven perimeter which would mimic natural stand disturbance, and benefit wildlife values, and decrease the visual present of human activity.

51. Placement of vortices (long narrow islands of residual trees to limit sight distance) within the clearcuts or burn areas that dissect the trail. These vortices should break the landscape into foreground and background as to mimic natural fire.

52. All MVUM changes on the ground will be posted (signed) for a minimum of one year after the change has been implemented.

53. Where appropriate, (i.e. a dry site capable of supporting camping use) the earthen berm or gate closure would be placed so as to allow room for dispersed camping sites off of collector roads. The length of the road left open should accommodate the parking of a camping trailer or provide adequate room for a tent site. This allows for ample dispersed camping opportunities in the long term.

54. All MVUM closures will be posted (signed) for a minimum of one year.

55. Skid trails crossing the NCNST would be designated by the sale administrator and would be perpendicular to the trail. Use only designated crossings.

56. Relocate the spur trail from the Sturgeon River Falls parking area to the NCNST once harvesting activities are completed.

SOILS

Where applicable to a timber sale contract, the following design features are in addition to timber sale contract provisions for protection of soil and water quality. Procedures include “Sustainable Soil and Water Quality Practices on Forest Land” issued by the Michigan Department of Natural Resources and the Michigan Department of Environmental Quality (MDNR, MDEQ, 2009).

57. Generally, sale area layout would exclude all mapped slopes greater than 35%.

58. Equipment operations would be prohibited on all slopes greater than 35% except in special situations where equipment operations on a very short slope would greatly facilitate timber sale operations and/or reduce impacts to soils in other areas. These skid trails would be approved by the sale administrator or soil scientist on a case by case basis.

59. Equipment operations on slopes 18% - 35% will be evaluated on a case by case basis by Forest Service personnel. If necessary, sale area layout may exclude these slopes within cutting units or areas would not be marked to avoid soil resource damage.

60. When possible, locate landings on well to moderately well drained uplands. Landings would be placed in areas where slope would direct sediment away from water bodies.

61. Timber harvest (heavy equipment) season of operation would follow Soil Scientist guidelines for the ELTP being operated on. Typically these guidelines would be used to develop operating restrictions, rather than referring to normal operating seasons. Operation outside of these periods must be approved on a case by case basis depending on ground conditions.

62. Logging debris (chips, bark, etc.) at landings will be reduced to a thickness that will not severely restrict vegetative growth on the area as determined by the sale administrator.

63. Road decommissioning will include blocking the road entrance with a berm, and placing slash, small trees, and brush along the first 100 feet of road, approximately. Decommissioning may also include manual or mechanical transplanting of trees and shrubs along the first 100 feet of road. Roads that are already overgrown with vegetation and thus impassable may not need the entrance blocked. The intent is to discourage unauthorized use.

64. Temporary roads used during a timber sale will be blocked following harvest in such a manner as to inhibit all forms of motorized use. The roadbed will be returned to the original landscape contour and all crossing structures removed to facilitate normal water flow.

65. Ecological Classification System (ECS) study plot center points (5 total in the project area) are located in Kenton District:

- Compartment 19 Stand 1
- Compartment 5 Stand 16

And in Ontonagon District:

- Compartment 112 Stand 32
- Compartment 110 Stand 5
- Compartment 107 Stand 13

Protection measures include prohibiting all harvest and machinery travel within a 50 foot radius of the plot center and protecting the three bearing trees.

66. Do not harvest fine woody debris on dry nutrient-poor sandy soils unless they are managed for jack pine. Jack pine stands may be harvested for woody biomass at rotations of 40 years or longer; younger jack pine stands are assessed on a case-by-case basis.

67. With the exception of jack pine stands, for soil productivity within stands that contain ELTPs with poor nutrient reserves (TM, TMV, AQV, QUA, PVD) there would not be any whole tree harvesting. Slash would either remain at the stump or be redistributed evenly over the cutting unit. These areas are generally within LTAs Sn13 and Sn14 (reference p. 2-26 of the Forest Plan).

68. Within prescribed burn areas, scatter any existing slash piles to limit the intensity and duration of soil heating caused by concentrated fuels.

HERITAGE

69. Cultural resource sites will be excluded from timber sale, prescribed fire, and all other activities. The area to be excluded has been identified by Forest Archaeologist and includes a 100 foot buffer area. The total area of cultural resources is approximately 3 acres.

70. There is always potential for unidentified cultural resources sites to be encountered as the project proceeds. If such sites were encountered, they would be protected.

RIPARIAN GUIDELINES

LTP/ Aquatic Feature	Compart-ments/ Stands Potentially Affected	No Harvest Zone: Harvest and Harvest Associated Equipment Restrictions (Riparian Area)	Riparian Corridor	Minimum Canopy Coverage [1]	Roads, Landings, Skid Trails, including Project Purpose for Special Projects
Small Permanently Flowing Streams	**Alt. 2**: **107**/32, 37, 46, 68, 73; **110**/9 **Alt. 3:** 107/46, 68; **110**/9	No commercial timber harvest or harvest associated equipment operation within 1 tree length of bankfull stage. OR when stream is nested within swamp, bog, or floodplain, no commercial timber harvest or equipment operation within 1 tree length of ELTP defined swamp, bog, or floodplain.	When permanently flowing (perennial) stream is nested within swamp, bog, or floodplain eltp, go to the top of the adjacent slope plus 1 tree length OR 2 tree lengths back from the edge of the swamp, bog, or floodplain, whichever is greater. Otherwise, area to the top of the adjacent slope plus 1 tree length. OR 3 tree lengths back from the bankfull stage; whichever is greater.	Maintain 75% crown canopy closure within riparian corridor.	Avoid new road/landing construction within riparian area where possible. Skid trails would direct activities outside of riparian area as quickly as possible. Avoid crossing small permanently flowing (perennial) streams where possible. When crossing is unavoidable, use designated stream crossings with coordination with MI-DNR. Discourage removal of limbs and other logging debris from riparian area where possible. Retain existing cull trees and snags in riparian areas where possible.
Lakes and Ponds	**Alt. 2**: **107**/60, 64, 67, 68, 71, 73 **Alt. 3: 107**/60, 64, 67, 68	No commercial timber harvest or harvest associated equipment operation within 2 tree lengths from edge of lake/pond. If the lake is nested within a swamp, bog, or floodplain that is 2 tree lengths or more in width, then there would be no commercial timber harvest or equipment operation within 1 tree length of the edge of the ELTP defined swamp, bog, or floodplain.	Entire ELTP plus the area to the top of the adjacent slope plus 1 tree length. OR 2 tree lengths from the edge of the lake/pond or adjacent ELTP defined swamp, bog, or floodplain; whichever is greater.	Maintain 50% crown canopy closure within riparian corridor.	Avoid new road/landing construction within riparian area where possible. Skid trails would direct activities outside of riparian area as quickly as possible. Discourage removal of limbs and other logging debris from riparian area where possible. Retain existing cull trees and snags in riparian areas where possible.

LTP/ Aquatic Feature	Compart-ments/ Stands Potentially Affected	No Harvest Zone: Harvest and Harvest Associated Equipment Restrictions (Riparian Area)	Riparian Corridor	Minimum Canopy Coverage [1]	Roads, Landings, Skid Trails, including Project Purpose for Special Projects
Forest Seasonal Ponds (1/2 acre in size or larger)	Where found (Alternatives 2-3)	No equipment within seasonal ponds. No commercial timber harvest within 1/2 tree length of edge of seasonal ponds	The whole seasonal pond plus 1 tree length.	Maintain 75% crown canopy closure within riparian corridor.	No equipment would be permitted within seasonal ponds and no landings would be permitted within 150 feet of seasonal ponds; Avoid new road/landing construction within riparian area where possible; Skid trails would direct activities outside of riparian area as quickly as possible; Seasonal ponds would not become disposal area for slash; Retain existing cull trees and snags in riparian areas where possible.
Wetland – Forested Linear Wetland (ELTP:)	Alt. 2: **107**/24, 32, 37, 51, 60, 63, 64, 70, 71, 73 **Alt. 3: 107**/60, 63, 64	No commercial timber harvest or harvest associated equipment operation within 1/2 tree length of edge of ELTP defined floodplain.	Edge of forested wetland plus 1 tree length.	Maintain 50% crown canopy closure within riparian corridor.	Same as above.

[1] *This is part of riparian ecotone that lies beyond the no harvest zone.*

APPENDIX E

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APPENDIX F

GLOSSARY

Accipiter – a group of birds of prey in the family Accipitridae, many of which are named as goshawks and sparrowhawks. These birds are slender with short broad rounded wings and a long tail which helps them maneuver in flight. They have long legs and long sharp talons used to kill their prey, and a sharp hooked bill used in feeding. Females tend to be larger than males. They often ambush their prey, mainly small birds and mammals, capturing it after a short chase. The typical flight pattern is a series of flaps followed by a short glide. They are commonly found in wooded or shrubby areas.

All Terrain Vehicle (ATV) – Any motor vehicle 50" or less in width, designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, march, swampland, or other natural terrain.

Condition Class 1 – Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.

Condition Class 2 – Moderate departure from the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.

Condition Class 3 – High departure from the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.

Dendritic – Having many tree like branches.

Ecological Land Type Phase (ELTP) – An ecological map unit which is a subdivision of landtype associations or groupings of landtype phases that are areas of land with a distinct combination or combinations of natural, physical, chemical and biological properties that cause it to respond in a predictable and relatively uniform manner to the application of given land management practices. In a relatively undisturbed state and/or a given stage of plan succession, an ELTP is usually occupied by a predictable and relatively uniform plant community or communities.

Edaphic - a general term referring to characteristics of the soil. This could be, for example, the drainage, the texture, or soil chemical properties, such as the pH. Edaphic characteristics are often used to describe plant communities that are found only on specific soil conditions.

Even-Aged Management – A stand containing a single age class in which the range of tree ages is usually less than 20 percent of the normal rotation or life span. Timber management actions that result in the creation of stands of trees in which the trees are essentially the same age. Clearcut, shelterwood, or seed-tree harvest methods produce even-aged stands.

Group Selection – A cutting method in which trees are removed periodically in small groups. This silvicultural treatment results in small openings that form mosaics of age-class groups and leads to the formation of an uneven-aged stand.

Hardened Water Crossing – Gravel or rock hardened dips in the running surface of the roadbed. This allows water to flow across the road bed while supporting vehicular traffic.

Hydrophobicity – Repelling, tending not to combine with, or incapable of dissolving in water.

Lacustrine – Lakebed sediments or deposits.

Landtype Association – Landtype associations are landscape scale map units defined by a dominant geomorphic process type, similar landforms, surficial and near-surface geologic formations, and associations of soil families and potential natural vegetation at the series level.

Modified Clearcuts – a clearcutting method in which varying numbers of reserve trees are not harvested to attain goals other than regeneration.

Natural Gap Phase Dynamics – The ecological changes that result from naturally created openings created within the forest canopy.

Off Highway Vehicle (OHV) – Any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, march, swampland, or other natural terrain (36 CFR 212.1). Pick-up trucks, sport utility vehicles, trail bikes, and ATVs are subsets of OHVs.

Operational Maintenance Level (OML) – The intended level of maintenance to be received by each road commensurate with the planned function and use of the road.

- **OML 1** – Assigned to intermittent service roads when they are closed to highway vehicle traffic. Planned road deterioration may occur at this level. Appropriate traffic management strategies are “prohibit” and “eliminate.” OML 1 roads may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, are not maintained, but may be open and suitable for non-motorized uses.
- **OML 2** – Assigned to roads operated for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted (such as log haul), dispersed recreation, or other specialized uses. Appropriate traffic management strategies are either “discourage or prohibit passenger cars” or “accept or discourage high clearance vehicles.”
- **OML 3** – Assigned to roads open and maintained for travel by a prudent driver in a passenger car. User comfort and convenience are not considered priorities.

Roads are typically low speed, single lane with turnouts and spot surfacing. Roads may also be double lane. Appropriate traffic management strategies are either to "encourage" or "accept." Discourage or prohibit strategies may be employed for certain classes of vehicles or users.

- **OML 4** – Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double laned and aggregate surfaced.

Salvage Harvesting Method **–** The removal of dead trees or trees damaged or dying because of injurious agents other than competition, to recover economic value that would otherwise be lost.

Semi-Primitive Non-Motorized (SPNM) - Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size (2,500 acres). Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on site controls and restrictions may be present, but are subtle. Motorized use is not permitted.

Selection Harvest – Uneven-aged (selection) methods regenerate and maintain a multiaged structure by removing some trees in all size classes either singly or in small groups.

Serotinous - A pinecone or other seed case that requires heat from a fire to open and release the seed.

Shelterwood Harvest – Method of regenerating an even-aged stand in which trees are removed to establish a new age class beneath the shelter of residual trees.

Unauthorized Road – An existing roadbed that is no longer managed as a Forest System Road. These are closed to all motorized use.

Uneven-Aged Management – A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes. Examples are individual tree and group selection harvest.

Roaded Natural (RN) – Area is characterized by a predominantly natural-appearing environment with moderate evidence of the sights and sounds of other humans. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate but with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment (Forest Plan, p. B-1).

Xeric – Characterized or adapted to an extremely dry habitat.

APPENDIX G

ADAPTIVE MANAGEMENT DIAGRAM