



United States  
Department of  
Agriculture

Forest Service  
Eastern Region

Huron-Manistee  
National Forests

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# Huron-Manistee National Forests

## Land and Resource Management Plan (as Amended January 2012)

### Cooperating Agencies:

United States Department of the Interior-Bureau of Land Management  
United States Department of the Interior-Fish and Wildlife Service  
United States Department of the Interior-National Park Service United  
States Environmental Protection Agency



HURON-MANISTEE NATIONAL FORESTS  
 Cadillac, Michigan  
 September 2013

2006 FOREST PLAN, AMENDMENT NO. 1

**Table 1. Guide to Page Numbers Where Amendment #1 has Resulted in Changes to the 2006 Forest Plan.**

<b>REPLACE Original 2006 Forest Plan Page Numbers</b>	<b>WITH Amendment #1 Replacement Page Numbers</b>
i through vi	Same
II-1 through II-2	Same
II-11 through II-12	Same
II-15 through II-24	Same
II-29 through II-40	II-29 through II-41
Chapter III – Management Area Direction Table of Contents (not numbered)	Same
III-1	Same
III-2.1-1 through III-2.1-2	Same
III-4.2-1 through III-4.2-4	Same
III-4.3-1 through III-4.3-2	Same
III-4.4-1 through III-4.4-2	Same
III-5.1-1 through III-5.1-2	Same
III-6.1-1 through III-6.1-11	<i>Remove all pages – no replacements.</i>
III-6.2-1 through III-6.2-2	Same
III-7.1-1 through III-7.1-2	Same
III-8.1-1 through III-8.1-4	Same
III-8.2-1 through III-8.2-2	Same
III-8.3-1 through III-8.3-2	Same
III-8.4-1 through III-8.4-4	III-8.4-1 through III-8.4-14
III-9.1-1 through III-9.1-2	Same
III-9.2-1 through III-9.2-2	Same
Appendix A – Scenery Management System; A-13 through A-16	Same
Appendix A – Scenery Management System; A-27 through A-30	Same
Appendix B – Harvest Cutting Methods Table of Contents (not numbered)	Same
Appendix B – Harvest Cutting Methods; B-1 through B-23	Same
Appendix D – Proposed and Probable Practices, Goods Produced and Other Information Table of Contents (not numbered)	Same
Appendix D – Proposed and Probable Practices, Goods Produced and Other Information; D-7 through D-23	D-7 through D-25

**Table 2. Guide to Page Numbers Where Administrative Corrections (as of July 1, 2013) have Resulted in Changes to the 2006 Forest Plan.**

REPLACE Original 2006 Forest Plan Page Numbers	WITH Administrative Correction Replacement Page Numbers	Administrative Correction Number and Topic
I-1 through I-2	Same	Administrative Correction #2 – Introduction — Regarding delisting bald eagle from the List of Endangered and Threatened Species.
II-13 through II-14	Same	Administrative Correction #1 – D-8 Guideline — Clarification concerning use of motorized vehicles on trails.
II-25 through II-26	Same	Administrative Correction #2 – Delisting bald eagle from the List of Endangered and Threatened Species.
II-29 through II-30	Same	Administrative Correction #2 – Maintains bald eagle on Regional Forester Sensitive Species list.
Appendix D – Proposed and Probable Practices, Goods Produced and Other Information; D-1	Same	Administrative Correction #3 – Corrects Table D-1. Classification of National Forest System Land for Timber Production. Line: <i>Land not appropriate for timber production due to other resource management (riparian areas, campgrounds, unique areas, etc.)</i>
Appendix D – Proposed and Probable Practices, Goods Produced and Other Information; D-2 through D-3	Same	Administrative Correction #6 – Corrects Figure D-1; long-term sustained yield.  Administrative Correction #7 – Corrects Table D-2 and Table D-3; million cubic feet volume for decade 1 and 2.

**Table 2. Guide to Page Numbers Where Administrative Corrections (as of July 1, 2013) have Resulted in Changes to the 2006 Forest Plan (Continued).**

<p align="center"><b>REPLACE Original 2006 Forest Plan Page Numbers</b></p>	<p align="center"><b>WITH Administrative Correction Replacement Page Numbers</b></p>	<p align="center"><b>Administrative Correction Number and Topic</b></p>
<p>Appendix D – Proposed and Probable Practices, Goods Produced and Other Information; D-4</p>	<p align="center">Same</p>	<p>Administrative Correction #4 – Corrects Table D-4; typographical errors in projected acreage figures for several vegetation classes.</p>
<p>Appendix D – Proposed and Probable Practices, Goods Produced and Other Information; D-5 through D-6</p>	<p align="center">Same</p>	<p>Administrative Correction #5 – Corrects Table D-5; corrects typographical errors in projected acreage figures for several vegetation classes.</p>

Digest: Pursuant to a lawsuit filed with the U.S. Court of Appeals for the Sixth Circuit; *Dep't of Agriculture*, No. 09-1712, 2010 WL 5393839 (6th Cir. Nov. 17, 2010), a Supplemental Environmental Impact Statement for the Huron-Manistee National Forests 2006 Land and Resource Management Plan was prepared. This amendment documents the decision made based on the review of the analysis conducted in the Supplemental Environmental Impact Statement.

BARRY PAULSON  
Forest Supervisor



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## Preface

The Land and Resource Management Plan (Forest Plan) establishes direction for natural resource management on the Huron-Manistee National Forests. The Final Environmental Impact Statement which accompanies the Forest Plan describes the analysis which was used in development of the Forest Plan.

If any particular part of the Forest Plan or specific application of the Forest Plan is found to be invalid, the remainder of the Forest Plan and its application will not be affected.

For more information about the Forest Plan, please contact the Forest Supervisor at:

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## Organization of the Forest Plan

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The Forest Plan is organized into five chapters and six appendices.

### ***Chapter I – Understanding the Forest Plan:***

This chapter discusses the general purpose of the Forest Plan, the Forest Plan revision process, the relationship of the Forest Plan to laws and other documents, and direction for implementing the Forest Plan. Definitions of goals, desired conditions and objectives, and Standards and Guidelines are provided in this chapter. A discussion of basic principles of management, tools and techniques, site-specific project-level decisions, operational activities exempt from the National Environmental Policy Act procedures, budgets, and Forest Plan amendments are also included in this chapter.

### ***Chapter II – Forest-wide Management Direction:***

This chapter discusses the management direction for the Huron-Manistee National Forests as a whole. Forest-wide goals and objectives and the desired condition of the Forests are identified, followed by the Standards and Guidelines which management practices follow to meet the intent of the various management prescriptions.

### ***Chapter III – Management Area Direction:***

This chapter identifies desired conditions, objectives, Standards and Guidelines for each individual management area. The general purpose of management activities for each of these

units is provided, including the landscape description, goals and objectives and desired future conditions.

#### ***Chapter IV – Monitoring and Evaluation:***

This chapter presents a plan to monitor and evaluate the effects of management practices, including legal and regulatory requirements.

#### ***Appendix A – Scenery Management System:***

This appendix describes the characterization of Scenery Management System classes.

#### ***Appendix B – Harvest Cutting Methods:***

This appendix describes various methods used for timber harvest.

#### ***Appendix C – Ecological Classification System:***

This appendix describes landscape classifications.

#### ***Appendix D – Proposed and Probable Practices, Goods Produced and Other Information:***

This appendix contains an estimate of the goods and services provided, the proposed and probable management practices expected, and other information including land classification.

#### ***Appendix E – References:***

This appendix provides references for the Forest Plan.

#### ***Appendix F – Glossary:***

This appendix provides a definition for terms used in the Forest Plan.

## Chapter I - Understanding the Forest Plan

### Introduction

Lying between the shores of Lake Michigan and Lake Huron in the northern half of the Lower Peninsula of Michigan, the Huron-Manistee National Forests (Forests) are located in a transitional zone between forested lands to the north and agricultural lands to the south. Formed by glaciers thousands of years ago, these lands are characterized by relatively low relief, abundant sand, clear water and diverse forests. These lands were exploited by wholesale clearcutting, burning and poor farming practices around the turn of the 20<sup>th</sup> Century. The diverse, maturing forest ecosystems that exist today are the result of nearly a century of forest management by the Forest Service and its conservation partners.

The Forests serve as a “backyard” playground for many Midwest residents with over 60 million people living within a day’s drive of enjoying the Forests’ recreation opportunities. Much of the Forests’ lands are intermingled with private and state lands and other recreational facilities.

Water resources on the Huron-Manistee National Forests include 1,800 miles of streams and 17,000 acres of lakes. The Forests contain legendary high quality, cold-water river systems of national significance. The Au Sable, Manistee, Bear Creek, Pere Marquette and Pine Wild and Scenic Rivers and tributaries provide a nationally-recognized network of premier “blue ribbon” fishing opportunities.

The Huron-Manistee National Forests continue to provide a variety of benefits to the people who use them. The Forests’ vegetation management program is the primary tool for restoring and providing a diverse range of sustainable habitats for many species, supporting forest health and providing wood fiber. The Forests also provide unique habitats for a variety of rare and sensitive fish, plant and animal species, including approximately one-half of the known breeding habitat in the United States for the endangered Kirtland’s warbler. The Forests also provide critical habitat for other threatened and endangered species such as piping plover, Pitcher’s thistle, and Karner blue butterfly; and provide habitat for a variety of game species. The Huron-Manistee National Forests also provide opportunities for the development of mineral resources, where such use can occur in an environmentally safe and sound manner.

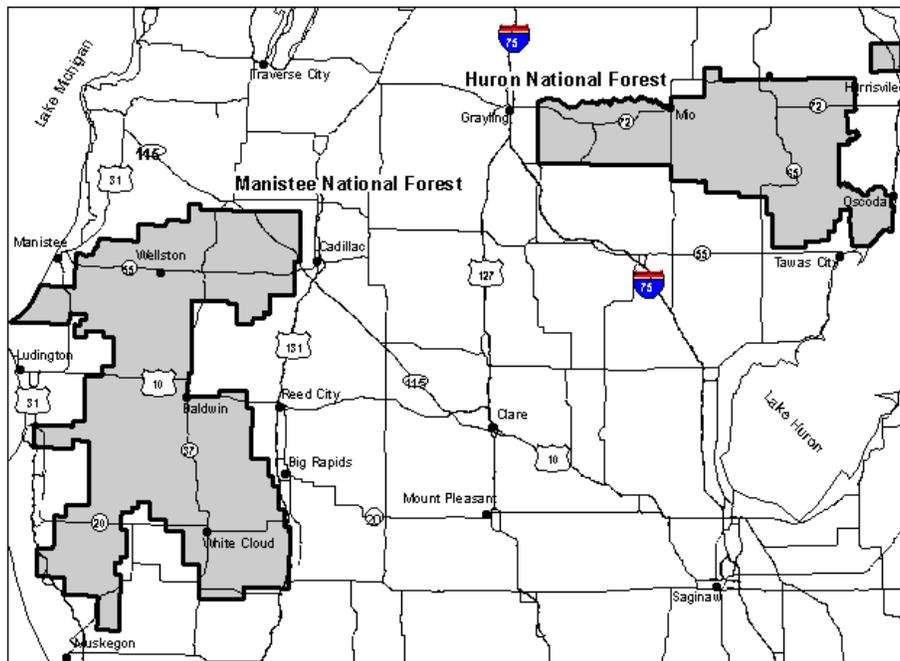
### Location of the Forests

The Huron-Manistee National Forests are located in the northern Lower Peninsula of Michigan. As shown in Figure I-1, the Forests are actually two proclaimed National Forests combined in 1945 for administrative purposes.

The Huron National Forest is approximately 60 miles wide and from 12 to 30 miles long. It abuts Lake Huron at Tawas and north of Harrisville and is located in portions of Alcona, Crawford, Iosco, Ogemaw and Oscoda Counties.

The Manistee National Forest is approximately 40 miles wide and 75 miles long. It abuts Lake Michigan south of Manistee and extends inland south to the Muskegon area and is located in portions of Lake, Manistee, Mason, Mecosta, Montcalm, Muskegon, Newaygo, Oceana and Wexford Counties.

**Figure I-1. Location Maps of the Huron-Manistee National Forests.**



## Purpose of the Forest Plan

The Huron-Manistee National Forests' Land and Resource Management Plan (Forest Plan) guides all natural resource management activities for the Huron-Manistee National Forests. It describes desired resource conditions, resource management practices, levels of resource production and management, and the availability of suitable land and resource management.

The purpose of the Forest Plan is to provide management direction to ensure that ecosystems are capable of providing a sustainable flow of beneficial goods and services to the public. More specifically, it establishes:

- Goals and Desired Conditions: How the Forests should look if the Forest Plan is successfully implemented.
- Objectives: Measurable, planned results that contribute to reaching the desired conditions.
- Standards: Required action or resource status designed to meet the desired conditions and objectives.
- Guidelines: Preferred action used to reach desired conditions and objectives.
- Management direction that is applicable Forest-wide.
- Management direction that is applicable only to specific management areas.
- Management direction that is applicable only to specific landscape ecosystems.
- Monitoring and evaluation requirements.
- Designation of land as suitable or not suitable for timber production and other resource management activities.

Land use determinations and Standards and Guidelines constitute a statement of the Forest Plan's management direction; however, the actual outputs, services, and rates of implementation are dependent on annual budgets from Congress.

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## Revising the Forest Plan

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### ***Revising the 1986 Forest Plan, as Amended:***

A Forest Plan for the Huron-Manistee National Forests was issued in 1986. The National Forest Management Act regulations require that forest plans be revised every 10 to 15 years (36 CFR 219.10). This Forest Plan is a result of that revision process.

The Huron-Manistee National Forests prepared a Final Environmental Impact Statement in 2006. The revised Forest Plan is based on the alternative that the Regional Forester selected in the Record of Decision for the Forest Plan Revision (2006). The selected alternative, Alternative B, is described in Chapter II of the Final Environmental Impact Statement and the Record of Decision.

The revised Forest Plan is a result of extensive analysis and considerations addressed in the accompanying Final Environmental Impact Statement. The Final Environmental Impact Statement refers to or describes the planning process and the analysis procedures used to develop the revised Forest Plan. The Final Environmental Impact Statement also describes other alternatives for the Forest Plan that were considered in the planning process.

This revised Forest Plan completely replaces the 1986 Forest Plan, as amended.

### ***Forest Plan Revision in the Future:***

The Forest Supervisor is required to review conditions of the land at least every five years to determine if the Forest Plan needs to be revised. If monitoring and evaluation indicate that immediate changes are needed and these needed changes cannot be handled by amendment, then it would be necessary to revise the Forest Plan. As stated earlier, the Forest Plan will be revised every 10 to 15 years.

### ***Forest Service Planning Rule:***

The 2004 Forest Plan revision process was conducted under the 1982 version of the Forest Service planning rule, as permitted by section 219.13(e) of the 2004 rule. Subsequent revisions or amendments to the Forest Plan will be developed under applicable planning rules.

### ***Consultation with Tribes:***

Beginning in the mid-19<sup>th</sup> Century, the government of the United States made treaties with various American Indian tribes and bands. To ensure that the rights of sovereign American Indian governments are fully respected, the President has directed agencies to operate within a government-to-government relationship. This includes consultation with tribal governments prior to taking actions affecting resources in which Tribal governments may have an interest; assessment of the impact of plans, projects and programs to assure that tribal governments' rights and interests are considered; and the removal of any procedural impediments to working directly and effectively with tribal governments.

The Forest Service honors the U.S. government trust responsibility and treaty obligations toward American Indian tribes within a government-to-government relationship throughout the process of preparing and implementing the revised Forest Plan.

Government-to-government consultation is ongoing between the Forest Service and American Indian tribes and bands that were signatory to the Washington Treaty of 1836 and Saginaw Treaty of 1819. These American Indian tribes and bands have treaty right interests in the Forests. This consultation supports Executive Order 13175 (November 6, 2000), which recognizes the sovereignty of federally-recognized American Indian tribes.

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## **Relationship of the Forest Plan to Other Documents**

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- **Organic Administration Act of 1897:** The Organic Administration Act of 1897 authorized the creation of what is now the National Forest System. The law established forest reserves “to improve and protect the forests within the boundaries, or for the purpose of securing favorable water flows, and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States...”

- **Multiple-Use Sustained Yield Act of 1960:** In this Act, Congress affirmed the application of sustainability to the broad range of resources over which the Forest Service has responsibility. This Act confirms the authority to manage the national forests “for outdoor recreation, range, timber, watershed, and wildlife and fish purposes.”
- **Wild and Scenic Rivers Act of 1968:** For the segments of rivers that have been designated or considered eligible for consideration as National Wild, Scenic, or Recreational Rivers under the Wild and Scenic Rivers Act, the Forest Service is required to provide for the protection of the river values. The Forest Plan addresses resource protection, development of land and facilities, public use and other management practices necessary or desirable to maintain the eligibility of the river segments.
- **National Environmental Policy Act of 1969:** The National Environmental Policy Act ensures that environmental information is made available to public officials and citizens before decisions are made and before action is taken. This disclosure helps public officials make decisions based on an understanding of environmental consequences and take actions to protect, restore and enhance the environment. Essential to this process are accurate scientific analyses, expert agency input and public involvement; all of which have been part of the revision process. The revised Forest Plan has been analyzed and the potential effects have been disclosed in the accompanying Environmental Impact Statement. The Act may also require environmental analysis and disclosure for some site-specific actions implemented under the Forest Plan.
- **Endangered Species Act of 1973:** One of the purposes of the Endangered Species Act is to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved. The Act requires federal agencies to carry out programs for the conservation of endangered and threatened species in consultation with the U.S. Fish and Wildlife Service.
- **National Forest Management Act of 1976:** The National Forest Management Act requires that National Forest System lands be managed for a variety of uses on a sustained basis to ensure in perpetuity a continued supply of goods and services to the American people. The Act's regulations also establish analytical and procedural requirements for developing, revising, and amending forest plans. The Forest Plan embodies the provisions of the National Forest Management Act and regulations on forest plan implementation.

The National Forest Management Act requires that “permits, contracts and other instruments for use and occupancy” of National Forest System lands be “consistent” with the Forest Plan [16 U.S.C. 1640(i)].

- **Healthy Forest Restoration Act of 2003:** This Act provides new tools to be used to reduce the wildfire risk to communities, municipal water supplies and other at-risk federal lands; and provides for the restoration of fire-adapted ecosystems. The Forest Plan includes direction on reduction of hazardous fuels.

- **Forest Service Directives:** The Forest Service Directive System, including the Forest Service Manual and the Forest Service Handbook, provides Forest Service direction and is not repeated in the Forest Plan.
- **Management Direction:** Management direction is guidance for managing resources and uses of National Forest System lands. This direction has been developed for resources, for instance, wildlife and vegetation, on a Forest-wide basis and for management areas. Chapter II contains management direction that applies Forest-wide. More specific direction for individual management areas is in Chapter III.

Direction for managing National Forest System land comes from a variety of levels. National and regional direction includes laws, Executive Orders, regulations and Forest Service policy, although they may not be restated in the Forest Plan. Forest Plans adhere to national and regional management direction. Forest plans set Forest-wide, landscape, and management area land management direction through the objectives, desired conditions, Standards and Guidelines. Site-specific, project-level decisions implement the direction in the Forest Plan.

Goals, desired conditions and objectives often form the purpose and need for site-specific projects. Not every project will further each goal and objective, but those goals and objectives that are prescriptive in nature and apply to the project are not optional.

Some management direction refers to existing conditions. Existing conditions are the conditions found at the time of Forest Plan revision unless otherwise noted in the resource-specific or management area-specific direction.

- **Goals, Desired Conditions, and Objectives:** Goals and desired conditions are broad statements that describe the situation that the Forest Service will strive to achieve. They are generally timeless and not measurable. Goals and desired conditions describe the ends to be achieved, rather than the means of doing so. They are a narrative description of the state of the land and resources expected when objectives and their associated Standards and Guidelines are fully met.

Goals and desired conditions are not absolutes. Their primary purpose is to be considered when planning management activities. Efforts will be made to move resources toward desired conditions or maintain the current condition, if the current condition is the desired condition.

In many cases, there will be short-term impediments to reaching desired conditions, such as the current state of the resource, but the long-term aim would be to reach the desired conditions. Some areas on the landscape may be far from the desired condition, while other parts may be in the desired condition or have a greater likelihood of reaching it sooner.

Goals are broad statements of the Forests' overall purpose, while desired conditions describe what the Forests should look like in the future.

Objectives are measurable steps taken within a specified timeframe to move toward a desired condition. Objectives are generally achieved by implementing a site-specific project or activity. However, objectives are not “targets”. Targets for outputs are dependent upon budget and may or may not reflect Forest Plan emphasis areas.

Forest-wide objectives have been developed for resources, such as water (see Chapter II). Specific objectives were also developed for each landscape ecosystem (see Chapter II) and for management areas (see Chapter III).

- **Standards and Guidelines:** Standards and Guidelines are the specific technical direction for managing resources. They provide another link in moving toward the desired conditions.

Standards and Guidelines apply Forest-wide to National Forest System lands, unless more specific management area direction is found in Chapter III of the Forest Plan.

Only measures that are specific to the Huron-Manistee National Forests are included in the Standards and Guidelines. Laws, regulations and policies that apply to the entire National Forest System are not reiterated in the Standards and Guidelines. In addition, desired conditions and objectives that have a prescriptive component are not repeated in the Standards and Guidelines.

Standards are required limits to activities. These limitations help the Forests to reach the desired conditions and objectives. Standards also ensure compliance with laws, regulations, executive orders, and policy direction. Deviations from Standards must be analyzed and documented in Forest Plan amendments.

Guidelines are preferable limits to management actions that may be followed to achieve desired conditions. Guidelines are generally expected to be carried out. They help the Forests to reach the desired conditions and objectives in a way that permits operational flexibility to respond to variations over time. Deviations from Guidelines must be analyzed during project-level analysis and documented in a project decision document, but these deviations do not require a Forest Plan amendment.

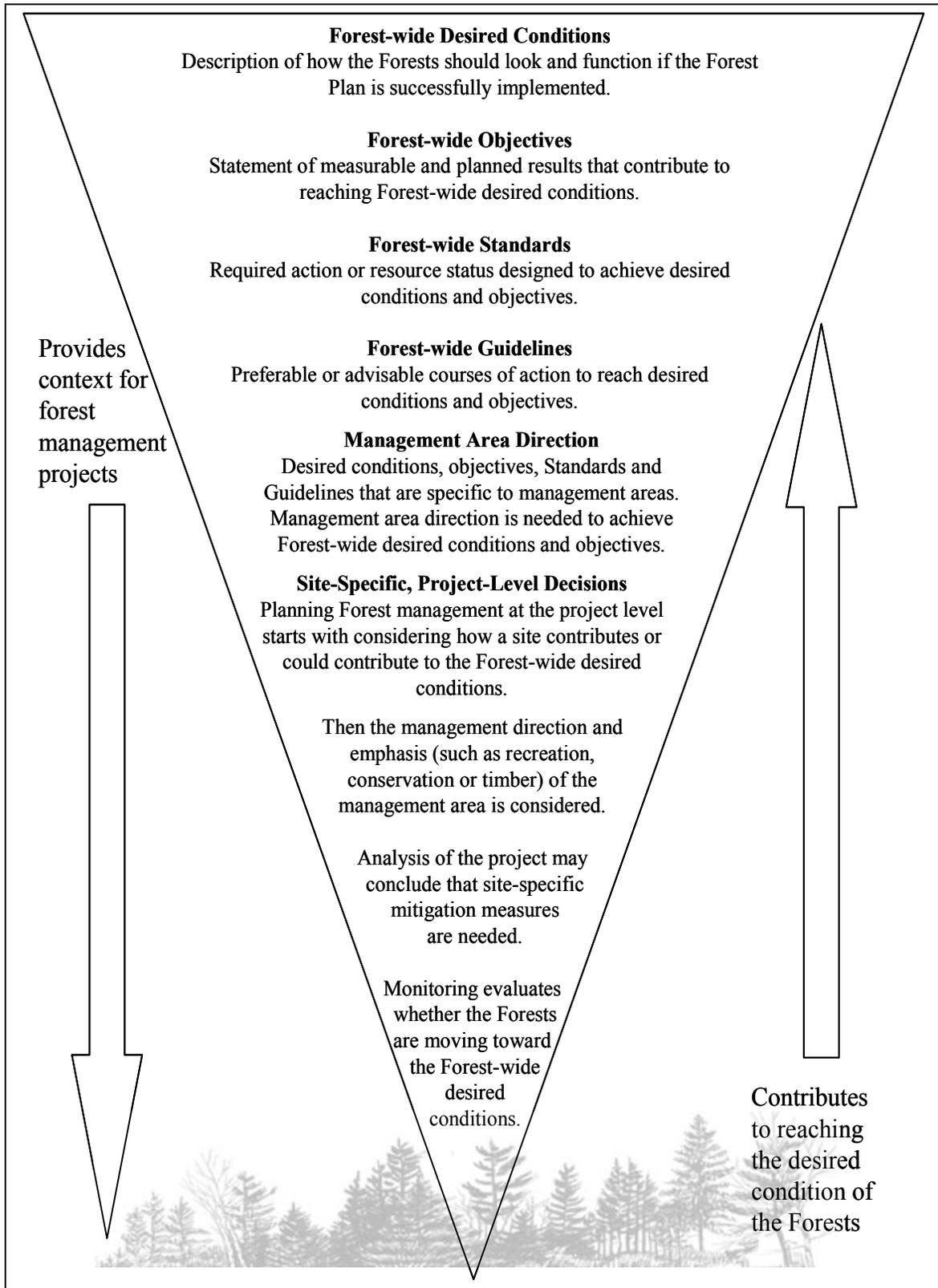
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## Implementing the Forest Plan

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The Forest Plan provides a framework and context that guides the Huron-Manistee National Forests’ day-to-day resource management operations. It is a strategic, programmatic document and does not make project-level decisions (see Figure I-2)

**Figure I-2. Process of Implementing the Forest Plan: Relationship Between Management Direction in the Forest Plan and Site-Specific Projects.**



***Basic Principles of Management:***

A set of fundamental principles guide management of the Huron-Manistee National Forests. Direction in the Forest Plan adds to and qualifies these basic principles.

- **Principle 1:** The Forest Service follows laws and regulations, as well as policies in Forest Service Manuals and Handbooks, which relate to managing National Forest System lands in addition to numerous treaties and trust responsibilities. The Forest Plan is designed to supplement, not replace, direction from these sources.
- **Principle 2:** The Forest Service coordinates management activities with the appropriate local, state or Tribal governments, as well as with other federal agencies.
- **Principle 3:** The Forest Service actively consults with Tribal governments and collaborates with interested organizations, groups and individuals.
- **Principle 4:** The Forest Service manages the Huron-Manistee National Forests for multiple uses. The Huron-Manistee National Forests are open for any legal public activity or management action, unless specially restricted in law, policy or the Forest Plan. While allowed, such activities and actions may require administrative review and authorization before they are implemented.

***Tools and Techniques:***

The Forests will reach their desired conditions for vegetation through natural ecological processes and by using a diverse range of management tools and techniques.

To the extent practical, timber management will be used to emulate naturally-occurring disturbances, for instance fire and windstorms. These management practices will include both even-aged and uneven-aged techniques. Clearcutting will continue to be used on the Forests when it is the optimal method to meet the objectives and requirements of the Forest Plan. The Forests will also use shelterwood, group selection, individual tree selection and other harvest methods to create or maintain multi-aged and uneven-aged stands.

Prescribed fire will be used alone or with silvicultural treatments to mimic the effects of natural fire. Management-ignited fire and lightning-caused fire will help maintain, enhance and restore natural ecological processes on the Forests. Minimum impact management tactics will generally be used in wildland fire suppression and prescribed fire application to reduce adverse fire suppression effects.

The Forests will promote re-growth of harvested or other disturbed forests with a variety of regeneration practices. This includes regenerating forests through tree planting, seeding and natural regeneration. Some areas will naturally change through forest succession.

The Forest will also reach its desired conditions for human uses by using a diverse range of management tools and techniques. Environmentally sustainable management practices will provide commodity and non-commodity resources to contribute to the social and economic stability of local communities. Management practices to achieve this include prescribed fire, timber harvest and traditional gathering activities.

The Forests will provide recreation opportunities in a multiple-use setting by using management tools such as the Scenery Management System and the Recreation Opportunity Spectrum.

Ecological functions of watershed and riparian areas will be enhanced or restored through techniques such as reconstructing or improving road and trail crossings, decommissioning unneeded roads, or using silvicultural treatments or fire to enhance shade, coarse wood recruitment or bank stability in riparian areas.

The Forests may create new roads and trails if needed for site-specific projects or to respond to increased demand. The majority of these roads will be Forest Service level 1 and temporary. They will be closed to public motorized use after they are not needed.

### ***Site-Specific Project-Level Decisions:***

“Implementing the Forest Plan” means developing and implementing site-specific forest management projects in order to reach the desired conditions established in the Forest Plan.

Project-level compliance with the National Forest Management Act is primarily concerned with consistency with the Forest Plan and the Act’s regulations.

Compliance with the National Environmental Policy Act involves the correct environmental analysis process for a specific proposal; proper documentation; and public disclosure of effects in an environmental assessment, environmental impact statement or categorical exclusion. When necessary, the Forests will perform environmental analysis on site-specific projects and activities. An analysis file or project file will be available for public review, but it is not always necessary to document the analysis in the form of an environmental assessment or environmental impact statement.

The data and evaluations in the Forest Plan and the Final Environmental Impact Statement for the Forest Plan are the basis for environmental analysis of site-specific projects.

The following are examples of project-level decisions that may require additional environmental analysis and disclosure as the Forest Plan is carried out:

- Timber harvest.
- Wildlife improvement projects.
- Prescribed burning.
- Watershed improvement projects.
- Trail or road construction.

***Operational Activities Exempt from the National Environmental Policy Act Procedures:***

Resource inventories, action plans, and schedules do not require additional environmental analysis and disclosure. The following are examples of operational activities that do not constitute project-level decisions and, therefore, are exempt from National Environmental Policy Act procedures:

- Developing five-year wildlife plans.
- Developing fire-situation reports.
- Scheduling maintenance for developed recreation sites.
- Preparing land ownership adjustment plans.

***Budgets:***

Annual Forests' budget proposals are based on the activities and actions required to achieve the desired conditions and objectives of the Forest Plan. The Forests' budget is approved on an annual basis by Congress.

Congress appropriates funds for stewardship and management of all 192 million acres of National Forest System land across the country. These appropriated funds are key to achieve the desired conditions and objectives stated in the Forest Plan through implementation of site-specific projects.

Upon receipt of the final budget, the Forests annually prepare an implementation budget. This budget is a result of program development, work planning and monitoring processes. Adjustments and changes to the Forests' program of work reflect current Congressional priorities within the overall management direction contained in the Forest Plan. The funding distribution between program components and the intensity or level of activities in those programs is a reflection of the Forest Plan as well as the will of Congress. The level of funding dictates the rate of implementation of the Forest Plan.

***Forest Plan Amendments:***

Most proposed activities will be consistent with direction in the Forest Plan. When management actions are found to be inconsistent with Forest Plan direction or site-specific analysis shows an error in the Forest Plan, the Forest Plan or the proposal must be adjusted according to the analysis. Adjusting the Forest Plan would require an amendment.

The need to amend Forest Plan management direction may result from:

- Changes in physical, biological, social or economic conditions.
- Recommendations of an interdisciplinary team based on the results of monitoring and evaluation.

- Determination by the Forest Supervisor that existing or proposed projects, permits, contracts, cooperative agreements or other instruments authorizing occupancy and use are appropriate, but not consistent with elements of the Forest Plan management direction.

Conflicts may be identified between different sections of management direction. For instance, there could be discrepancies in the selected alternative map and the narrative description of the selected alternative. The Forest Plan does not prioritize management direction; therefore, a discrepancy would need to be resolved by determining the management intent using a variety of information, such as the planning record, Final Environmental Impact Statement, and the revised Forest Plan. Minor technical errors may be corrected via errata and may not require a Forest Plan amendment.

The Forest Supervisor will determine whether proposed changes to the Forest Plan are significant or non-significant. “Significance” as used here, is defined by the National Forest Management Act regulations and is different than significance as used under the National Environmental Policy Act.

## Chapter II - Forest-wide Management Area Direction

### Introduction

The direction in this chapter establishes the management Standards and Guidelines for the Forests. This direction includes goals, objectives, desired future conditions and management prescriptions and their associated Standards and Guidelines.

Additional Standards and Guidelines are identified for individual management areas in Chapter III - Management Area Direction.

Table II-1 describes management areas on the Huron-Manistee National Forests.

**Table II-1. Management Area Descriptions.**

<b>Management Area</b>	<b>Title</b>	<b>Description</b>
2.1	Roaded Natural Rolling Plains and Morainal Hills	Management activities provide high volumes of quality hardwood timber products and firewood with special consideration for enhancing wildlife habitats. Emphasis is given to managing grouse, deer and wildlife emphasis areas and fish habitat. A broad variety of recreational opportunities is available and visual diversity is high.
4.2	Roaded Natural Sandy Plains and Hills	Management activities enhance and increase the variety of wildlife habitats with emphasis given to managing deer, grouse and Kirtland's warbler essential habitat. High volumes of timber products are produced. Emphasis includes reducing life-threatening and property-damaging wildfire potential and providing a variety of recreational opportunities.
4.3	Roaded Natural Wetlands	Management activities provide a variety of forest views and scenes and recreational experiences in a primarily motorized recreational environment. Fish and wildlife are abundant, and efforts are made to increase and enhance various habitats. Emphasis is given to managing deer, grouse and wildlife emphasis areas.
4.4	Rural	Management activities provide recreational opportunities, sources of firewood close to users, and moderate to high volumes of softwood timber products. Wildlife management is coordinated with adjacent non-National Forest System land management with emphasis on deer, grouse and other wildlife. Some small blocks will be managed to protect isolated, essential areas for endangered, threatened or sensitive species.

**Table II-1. Management Area Descriptions (Continued).**

5.1	Wilderness	Management activities of Congressionally-designated Wilderness provide for protection and enhancement of wilderness characteristics and values. Primitive or semiprimitive, non-mechanized recreational opportunities occur in a natural environment emphasizing solitude. Recreational opportunities could include backpacking, hiking, camping, canoeing, hunting, fishing, cross-country skiing, snowshoeing and other nonmotorized activities.
6.2	Semiprimitive Motorized Areas	Management activities provide for semiprimitive motorized recreational experiences. Consideration also will be given to providing habitat diversity.
7.1	Concentrated Recreation Areas	Management activities provide for a quality recreation experience.
8.1	Wild and Scenic Rivers	Management activities provide for Wild and Scenic River attributes and values.
8.2	Research Natural Areas	Management activities provide for non-destructive research, education and ecological representation.
8.3	Experimental Forests	Management activities provide for forest and biological research.
8.4	Special Areas	Management activities provide for management of nationally designated areas such as monuments, flower sanctuaries, prairies, and more seclude, less-roaded areas.
9.1	Candidate Research Natural Areas	Lands in holding for candidate Research Natural Areas until establishment record and environmental documentation is completed for designation. Management activities provide for Research Natural Area attributes and values.
9.2	Wild and Scenic Study Rivers	Lands in holding until studies and environmental documentation for designation are completed. Management activities provide for the protection of Wild and Scenic River attributes and values.

### ***Maps of Forest-wide Management Areas:***

See the enclosed Forests' maps for a display of the management area locations on the Huron-Manistee National Forests.

***Forest-wide Goals and Objectives and Desired Future Condition:*****Goals and Objectives:****Health and Safety:**

- Suppress wildfires using an appropriate management response, in a manner compatible with Management Area objectives. Prevention, pre-suppression and suppression activities will be based on analysis of past fire occurrence, fire intensities and values at risk.
- Encourage adequate fire prevention, fire-safe construction and presuppression activities on private lands in wildland/urban interface fire prone areas.
- Fire suppression activities should be the least impacting to the environment while providing for safety, but still achieve the objectives of fire suppression.
- Suppress fires occurring on private lands inside the Forests' fire protection boundary as defined under established agreements.
- Create agreements for fire detection and suppression on National Forest System lands with cooperating firefighting agencies to define suppression actions commensurate with established resource management prescriptions.
- Fire use is suitable on National Forest System lands. Fire use will, to the extent possible, mimic natural processes to accomplish resource objectives, while protecting wilderness values and cultural, historical and developed resources.
- Implement fuels reduction and fuelbreak projects where conditions warrant for the protection of life, property and safety. High-risk areas adjacent to private land will receive treatment priority.
- Provide for the protection of National Forest System lands and for the property and safety of users.
- Provide for Law Enforcement and compliance patrols based on user activity and resource protection needs.
- Maintain a transportation system that meets health and safety, resource and administrative needs.

**Public Relations and Partnerships:**

- Work to achieve informed public consent during development and implementation of land and resource management plans and programs.
- Through information programs, explain the correlation of resource management direction and activities with public interests and concerns. Design programs and information based on audience analyses as well as land and resource needs.
- Cooperate with and encourage agencies, tribes, states, counties and other partners in education and outreach.
- Implement a public information and education program to explain areas of special significance in coordination with other public and private organizations to reduce the number, intensity and cost of conflict-producing and resource-damaging situations.
- Work with affected American Indian tribes in a government-to-government relationship.

### **Public Relations and Partnerships (Continued):**

- Use a combination of personal contacts, brochures, maps and informational signing to inform and educate users about forest management.
- Identify and publicize resource management opportunities that will help volunteer organizations, individuals and local communities enhance their self-sufficiency and social well-being.
- Integrate public involvement and forest management with regional and national objectives.
- Work to acquire public input and participation in a timely manner in developing programmatic and site-specific environmental resource management analyses.

### **Natural Resources:**

- Monitor and evaluate effectiveness of management practices.
- Manage designated old growth across all management areas and vegetation classes emphasizing old growth characteristics.
- Integrate the Scenery Management System (see Appendix F-Glossary for definitions) into project-level planning.
- Meet species viability needs, achieve fire hazard reduction, and accomplish fiber production from regulated (Allowable Sale Quantity) and non-regulated (non-chargeable) forest lands primarily through timber harvest.
- Monitor wildlife responses to management practices using identified Management Indicator Species to determine the effects of management practices on wildlife and fish populations.
- Reduce non-native invasive species infestations and prevent new invasive species from becoming established, when possible.
- Wildlife and fisheries habitats and plant communities shall be managed to maintain viable populations of existing native and desired non-native species.
- Maintain or improve the populations of endangered, threatened or sensitive species or communities.
- Manage the 5-mile (8 km) radius around Tippy Dam to benefit the Indiana bat.
- Restore and maintain savannahs, prairies, dry grasslands, mesic grasslands, shrub/scrub and oak-pine barrens in areas where they were known to previously occur, to provide for habitat diversity and to meet species viability needs.
- Utilize prescribed fire to meet management direction as appropriate for the ecosystems involved.
- Encourage cooperation and coordination with responsible government land and resource management agencies, tribes and partners in program management such as recreation; Wild and Scenic River and State Natural Rivers; minerals; air quality; law enforcement, fire; water quality; endangered, threatened, and sensitive species; non-native invasive species and insect and disease.

**Natural Resources (Continued):**

- Cooperate with individuals; organizations and local, state, Tribal and federal governments to promote ecosystem health and sustainability across landscapes.
- Manage riparian areas consistent with resource conditions, management objectives and designated water use. Reduce nonpoint pollution to the maximum extent feasible and protect the hydrologic functions of watersheds, including both surface and groundwater systems.
- Manage vegetation within the Streamside Management Zone for late seral stages through natural successional processes emphasizing the retention of a sufficient number of trees to protect water quality and provide a source of recruitment for large wood to the adjacent aquatic system.
- Monitor and measure effects at the 5<sup>th</sup> or 6<sup>th</sup> level watershed.
- Manage oligotrophic lakes with 100 percent of National Forest ownership so as not to change the trophic status; allow no more than a 10-percent decline in trophic status in other oligotrophic lakes and lakes with a mesotrophic status; lakes with a eutrophic status will maintain fishable and swimmable waters.
- In cooperation with permittees, favor selective treatment of vegetation in transmission line rights-of-way to improve wildlife forage.
- National Forest System lands will be available for non-surface-disturbing minerals exploration and extraction.
- Mineral exploration and development occurs and is consistent with management area direction and subject to valid existing rights. Appropriate restrictions are placed in leases to protect the environment.
- Protect the rights of the federal government, encourage inventory and development of federal minerals, respect state and private mineral rights, and ensure operators take reasonable and prudent measures to prevent unnecessary disturbance to the surface.
- Minimize or prevent the development of pest problems. Where pest problems are unavoidable, select the solution which provides the most benefits while meeting control objectives.
- Land adjustments (purchase or exchange) will consider only the interest needed to achieve land management objectives and must satisfy one or more of the following purposes: (1) accomplish objectives of public law or regulation; (2) obtain land needed to meet demands for National Forest System resources; (3) result in more efficient land ownership patterns as indicated by reduced resource management costs.
- The priority for land acquisition is to purchase lands or partial interests needed to protect endangered, threatened, and sensitive species and areas possessing unique natural environments or significant cultural resources.
- Reduce the net miles of roads on the Forests by emphasizing closures of roads determined to be non-essential for resource management.
- Locate administrative boundaries of recreation areas and place informative signs describing appropriate activities for the area.
- Cooperate with local communities when considering site-specific proposals that would provide access to services in the local communities.
- Provide for a combination of motorized and nonmotorized recreation opportunities.

### **Natural Resources (Continued):**

- Provide a variety of access opportunities for a range of user abilities consistent with management area direction and Standards and Guidelines.
- Design and manage trails for a primary seasonal use, to discourage conflicting uses. Prevent motorized and nonmotorized uses from occurring at the same time during any season of the year. Trails may also have secondary uses.
- Manage Off-Highway Vehicles, including snowmobiles, by designating trails or routes to minimize user conflicts and to provide for user satisfaction, resource protection and public health and safety.
- Emphasize levels 1, 2 and 3 facilities for developed and dispersed recreation.
- Manage National Recreation Trails, Byways, Rivers, and Wildernesses in accordance with the commitments associated with their designation.
- Integrate historical, environmental and cultural information into plans, assessments, analyses and decision documents, as appropriate.
- Emphasize and promote the use of carry-out methods of trash disposal.
- All management activities should meet or exceed the Scenic Integrity Objectives established for the Forests through the Scenery Management System.

### **Desired Future Condition:**

- All management activities provide for safe conditions for the public and employees.
- Recreation management provided is compatible with the Recreation Opportunity Spectrum objectives.
- The North County National Scenic Trail is constructed and administered as a premier hiking and backpacking trail. The trail will highlight significant scenic, historic, natural and cultural qualities.
- Designated National Wild, Scenic, and Recreation Rivers are managed according to the management plan for the individual river.
- The total of early successional habitat less than or equal to 15 years, and open-land habitat, such as agricultural, urban development and roads, should generally not exceed 66 percent of the area within any 6<sup>th</sup> level watershed on the forests. In most cases, 6<sup>th</sup> level watersheds have an area up to 40,000 acres associated with a creek and tributary.
- Areas with unique character are protected.
- Prairies, savannahs, and oak-pine barrens have been restored and maintained on approximately 10,000 acres within old-growth areas.
- Maintain favorable conditions of water flow and quality. Management practices will not result in a long-term decline in water quality conditions.
- Indiana bat, Karner blue butterfly, bald eagle, Kirtland's warbler, piping plover and Pitcher's thistle are managed according to their recovery plans.
- Severe and moderately eroding streambanks are restored.
- Habitat needs of riparian-dependent species are met and that habitat is maintained, especially habitat for threatened, endangered and sensitive species.

- The cumulative amount of streamside stabilization over time does not exceed five percent of the total shoreline length of a river system within National Forest System boundaries.
- In-stream large wood meets objectives stated in Table II-2.

**Table II-2. Desired Future Condition for Large Wood.**

Stream Order	Number of Large Wood Structures per 300 Feet of Stream
1-2	6-9 (108-160 per mile)
3-4	3-6 (54-108 per mile)

- Vegetation Composition objectives for the end of the first decade are displayed in Table II-3.

**Table II-3. Vegetation Composition Objectives (End of First Decade).**

Vegetation Class	Huron National Forest	Manistee National Forest
	Percent	Percent
Aspen/Birch	16-22	10-16
Barrens and Savannahs	1-3	2-5
High-Site Oaks	5-11	15-21
Lowland Conifers	2-8	0-5
Lowland Hardwoods	1-4	4-10
Long-Lived Conifers	15-21	17-23
Low-Site Oaks	12-18	13-19
Northern Hardwoods	2-8	8-14
Openings	4-9	4-10
Short-Lived Conifers	18-24	2-8

### **Forest-wide Standards and Guidelines:**

Standards and Guidelines define which management practices to follow to meet the intent of the various Management Prescriptions. The terms “Standards and Guidelines” are defined in the National Forest Management Act and implementing regulations. Standards are required actions to achieve goals, objectives and desired conditions; Guidelines are preferable or advisable actions to achieve goals, objectives and desired conditions.

The Standards and Guidelines provide the framework to guide activities on the Forests. Some Standards and Guidelines are detailed in nature and are subject to change as more information becomes available through implementation and monitoring. Chapter IV of this Forest Plan explains how the Forests will implement and monitor these requirements.

Standards and Guidelines for management activities in each Prescription Area follow the 19 major resource management categories. The numbering system corresponds to the Forest Service Manual system shown in Table II-4.

**Table II-4. Forest Service Manual Numbering System.**

<b>Forest Service Manual</b>	<b>Subject</b>
1600	Information Services
1900	Planning
2000	National Forest Resource Management (2080 Noxious Weed Management)
2100	Environmental Management
2200	Rangeland Management
2300	Recreation, Wilderness and Related Resource Management
2400	Timber Management
2500	Watershed and Air Management
2600	Wildlife, Fish and Sensitive Plant Habitat Management
2700	Special Uses Management
2800	Minerals and Geology
3400	Forest Pest Management
4000	Research and Development
5100	Fire Management
5300	Law Enforcement
5400	Landownership
7300	Buildings and Other Structures
7400	Public Health and Pollution Control Facilities
7700	Transportation System

The following Standards and Guidelines apply to all management areas on the Huron-Manistee National Forests. Additional Standards and Guidelines are displayed in Chapter III - Management Area Direction for individual management areas.

Standards are identified with an "S" and Guidelines are identified with a "G".

#### 1600 INFORMATION SERVICES

- I Develop interpretive presentations and media according to industry and professional guidelines for quality and appropriateness. G
- II Provide accessible interpretive presentations, publications, displays, web sites and visual aids. s

#### 1900 PLANNING

- I The Forest Supervisor may close areas and facilities immediately when motorized vehicles are causing or likely to cause considerable adverse effects or to address health and safety concerns. They will remain closed until those effects have been eliminated and measures implemented to prevent recurrence. G
- II Vegetation Management
  - A Regeneration and Maintenance of Vegetation
    - 1 When trees are cut to achieve timber production objectives, the timber cuttings shall be made in such a way as to assure that lands can be adequately restocked within five years after final harvest. s

- |  |   |   |
|--|---|---|
| 2  | Limit whole-tree removal to soils with sufficient nutrient content and nutrient storage capacity to support vegetation and to maintain soil productivity.   | S |
| 3  | Hardwood stands and prairies may be used as fuelbreaks.   | G |
| B  | Temporary openings created by the application of the even-aged silvicultural system will no longer be considered openings when the reestablished timber stand has reached a height that is greater than 20 percent of the height of surrounding vegetation. | G |
| III  | Research Natural Areas  |   |
| A  | Research Natural Areas will be managed according to Forest Service Manual 4063.3. "Protection and Management Standards."  | S |
| B  | Activities planned in areas adjoining a Research Natural Area will take into consideration the size, location and characteristics of the Research Natural Area so that adjacent activities would not have adverse effects on the Research Natural Area.     | G |
| IV   | Old Growth  |   |
| A  | Old growth will be managed primarily by allowing natural processes to occur except in those areas where natural processes have been altered by humans. Other Standards and Guidelines apply in management areas 8.2 and 9.1.                                | G |
| B  | Restoration treatments may include, but are not limited to, prescribed fire and mechanical treatments to meet the potential old-growth conditions, except in management area 5.1.   | G |
| 1  | A maximum of four restoration efforts will be allowed to create old-growth conditions.  | G |
| C  | Old growth may be maintained by practices that best meet the potential old-growth conditions. Practices may include, but are not limited to, prescribed fire and mechanical treatments.   | G |
| D  | Permit occasional collection of plants as sample/example specimens.   | G |
| E  | Roads, trails and utilities will use a minimal opening width necessary to allow safe passage and to meet design criteria.   | G |
| F  | Salvage operations in designated old-growth areas should only be considered when there is a major public safety or forest health threat.  | G |
| G  | Personal or commercial firewood permits will be prohibited in designated old-growth areas.  | S |
| 2000 NATIONAL FOREST RESOURCE MANAGEMENT (Non-native Invasive Species) |   |   |
| I  | Maintain a Forest-wide list of non-native invasive plant and animal species of concern.   | G |
| II   | Identify infestations of non-native invasive plant and animal   | G |

species at both project and Forest-wide levels.

- III Use integrated pest management practices for prevention and control of non-native invasive plant and animal species appropriate to the management area. G
- IV Prevention
  - A Require, where needed, vehicles and equipment likely to be transporting seed or propagules of noxious weeds and invasive species to be washed or cleaned before use on the Forests. G
  - B Encourage the use of certified weed-free forage and bedding for domestic animals brought on the Forests. G
  - C Maintain native plant communities as practical. When available, use local native species (genetically-appropriate) or nonpersistent non-native species in revegetation and restoration projects. G
  - D Inform public of known infestations by posting information at trailheads, developed sites or boat landings. G
- V Control:
  - A Treat non-native invasive plant and animal species infestations using permissible, appropriate and effective methods, including manual, mechanical, fire, chemical and biological control methods. G
- VI Utilize project materials including seed, mulch, soil and gravel that are free of seeds or other propagules of noxious weeds and invasive species. G

## 2100 ENVIRONMENTAL MANAGEMENT

- I Coordinate with the State of Michigan to control impacts of air pollution to implement strategies needed to mitigate Forests' resource management activities. S
- II Advise Regional Forester on potential effects of state redesignation proposals of airsheds. S
- III Equipment used in management activities will have approved air pollution control devices. S

## 2200 RANGELAND MANAGEMENT

- I Permit grazing when compatible with regulations and the management objectives for the area. G
- II Regulate livestock access to water. G
- III Permit hay cutting on existing forage areas when compatible with regulations and the management objectives for the area. G
- IV Permit grazing to enhance visual, wildlife or public safety conditions when compatible with regulations and the management objectives for the area. G

## 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

- I Recreation management will be compatible with the Recreation Opportunity Spectrum objective of the area. G
- II Post for designated uses and control access. G
- III Do not permit camping inside a zone extending 200 feet back from the water's edge of any lake or river except at designated sites. G
- IV Watercraft storage will be by permit only. S
- V Provide signs for visitor safety, orientation, and information and to display regulations in conformance with Management Area direction. G
- VI Recreation Construction
  - A Do not permit new recreation developments, other than reconstruction, within 660 feet of any seasonal or permanent residence. G
  - B Permit service access to recreation facilities, except in management areas 5.1, 8.2 and 9.1. G
  - C Sealed vault toilets will be the standard. Primitive toilets may be considered if environmentally feasible, except in management areas 5.1, 8.2 and 9.1 G
  - D The desired recreation development level on a scale of 1 = primitive to 5 = highly developed is shown in Table II-5. G

**Table II-5. Desired Recreation Development Level.**

Desired Recreation Development Level	Applicable Management Area
1 to 3	6.2, 8.4 (except for Lumbermen's Monument)
2 to 4	2.1, 4.2, 4.3, 7.1, 8.1
3 to 4	4.4
5	8.4 (only in Lumbermen's Monument)

- E Developed recreation sites and areas will avoid essential and critical habitat. S
- F Level 3 or higher recreational developments will not be constructed on National Forest System lands bordering lakes that have less than 50 percent National Forest System ownership except for trail or access purposes. G
- VII Operation and maintenance of developed recreation sites.
  - A To the extent practical, eliminate safety hazards and remove hazard trees. G
  - B Prepare vegetative management plans for each developed site open to public use to ensure a safe and aesthetically pleasing setting. This guideline does not apply to management areas 5.1, 8.2 and 9.1. G
    - 1 Complete such work to the approved standards described in the annual operation and maintenance plan. G

## VIII Trails (Other than North Country National Scenic Trail)

## A General Management

- 1 Avoid snowplowing of roads under Forest Service control from December 1 to March 31, when the road is part of a designated winter trail system. G
- 2 Allow snowplowing of roads across the designated trail system. G
- 3 Emphasize volunteer and cooperative agreements and grants to construct, maintain and administer trail systems. G
- 4 Emphasize the use of loop trails for all but the North Country National Scenic Trail, Michigan Shore-to-Shore Trail and the Michigan Cycle Conservation Trail. G
- 5 Discourage dogs on cross-country ski trails. G
- 6 Trails may be closed to address public safety, maintenance or specific resource needs. G
- 7 New motorized trails will not be constructed in old growth unless there are no other reasonable routes. G
- 8 Mountain bike use is allowed on all Forest Service roads and designated trails unless closed by Forest Supervisor's order. G
- 9 Where appropriate, designate selected areas and trails to provide areas for hike-in hunting only. G
- 10 Trail density, average number of miles of trail per square mile of National Forest System lands, is shown in Table II-6. G

**Table II-6. Trail Density on National Forest System Lands.**

Miles of Trail per Square mile by Type of Trail.	Applicable Management Area.
Motorized:	
0-1	4.3, 4.4, 6.2, 7.1
0-2	2.1, 4.2
Nonmotorized	
0-1	4.4
0-2	4.3, 6.2
0-3	2.1, 4.2, 5.1, 8.4 (except for Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary)
0-6	7.1

## B Operation and Maintenance

- 1 Maintain trails to the level appropriate for the use. G
- 2 All designated trails will have sufficient directional marking and will conform to the appropriate management area guidelines. G
- 3 Do not permit skidding of forest products along the tread of system trails. G

- |   |   |   |
|---|---|---|
| 4   | Permit skidding of forest products directly across the tread of system trails at specified locations that are at least 660 feet apart, when feasible.   | G |
| C Construction and Reconstruction             |   |   |
| 1   | Relocate system trails to address safety, resource or management concerns.  | G |
| D Off-Highway Vehicles, Including Snowmobiles |   |   |
| 1   | Restrict Off-Highway Vehicle travel, including, snowmobiles, to designated trails or areas unless otherwise provided for by law, regulation or by special area management objectives.   | G |
| 2   | Where possible, do not construct motorized trails within 660 feet of any seasonal or permanent residence.   | G |
| 3   | Where possible, motorized vehicle trails will be located a minimum of 1,000 feet from rivers, streams and lakes except at designated crossings.   | G |
| 4   | Do not permit motorized vehicles in essential habitats for endangered, threatened and sensitive species.  | G |
| 5   | Restrict snowmobile travel to designated trails or open unplowed roads unless otherwise prohibited by law, regulation or special management area objectives, such as deer wintering areas or threatened, endangered or sensitive species habitat. | G |
| 6   | Except for administrative purposes, do not allow motorized vehicles on horse, hiking or ski trails.   | G |
| 7   | Special Off-Highway Vehicle events must have prearranged schedules and be covered under permit from all governmental units having specific jurisdictions.   | S |
| 8   | Visitors can use motor vehicles only on roads, trails, or Areas that are designated open by vehicle class and by time of year.  | G |
| 9   | Do not permit motorized trails crossing frozen lakes or streams.  | S |
| 10  | Relocate or abandon snowmobile trails on roads when concurrence cannot be obtained from local road authorities to eliminate snowplowing.  | G |
| IX Heritage Resources                         |   |   |
| A Identification, Evaluation, and Management  |   |   |
| 1   | Conduct heritage resource activities to meet current national guidance, professional and Forest standards and Michigan State Historic Preservation Office agreements.   | S |
| 2   | Administer issues relating to human remains, funerary objects, sacred objects or objects of cultural patrimony in accordance with Native American Graves Protection   | S |

- and Repatriation Act requirements.
- 3 Conduct structural and non-structural stabilization, rehabilitation, restoration and maintenance of heritage properties in accordance with Forest-level heritage protection and management plans in consultation with appropriate state and tribal authorities, the Advisory Council on Historic Preservation and other interested parties and in accordance with the Secretary of the Interior's Standards and Guidelines for Historic Preservation. G
- 4 Evaluate properties against the National Register of Historic Places significance criteria and/or other criteria provided by State Historic Preservation Office agreement. Eligible properties may be nominated to the National Register of Historic Places. S
- B Interpretation
- 1 Interpretive programs will explain areas of special significance in a way designed to protect the area while informing the public of its value and relationship to other resources. G
- X The North Country National Scenic Trail Standards and Guidelines
- A Management of the North Country National Scenic Trail will be consistent with the National Trail Systems Act, the "North Country National Scenic Trail Comprehensive Plan for Management and Use" (USDI-National Park Service 9/1982, as amended and/or updated) and the Memorandum of Understanding between the USDI-National Park Service, the USDA-Forest Service and the North Country Trail Association. S
- B Management of the North Country National Scenic Trail will be in accordance with pertinent requirements and management policies such as the Huron-Manistee National Forests' North Country National Scenic Trail Implementation Guide. S
- C Minerals, Oil and Gas
- 1 Federal oil and gas leases will contain a no-surface-occupancy stipulation for areas within 300 feet, measured at a perpendicular, from each side of the North Country National Scenic Trail. S
- 2 For reserved or outstanding mineral rights, where reasonable and in cooperation with the mineral owner, surface occupancy will not be permitted within 300 feet, measured at a perpendicular, from each side of the North Country National Scenic Trail. S
- D The North Country National Scenic Trail is closed to motorized use. S
- E Possessing or using saddle, pack or draft horses is prohibited. Llamas are allowed on the trail. S

- F The scenic integrity level within the foreground distance zone of the North Country National Scenic Trail will not be lower than Moderate. S
- G The North Country National Scenic Trail is designed, managed and maintained primarily for hiking and backpacking. G
- H Vegetation management activities shall enhance and maintain the natural ecological processes along the trail and to the extent practicable limit road construction, timber harvesting and mechanized reforestation site preparation practices to periods of time throughout the year when conflict with trail users will be minimized. G
- I All special use activities will be reviewed and monitored to ensure consistency with the management objectives for the North Country National Scenic Trail. G
- XI Federal oil and gas leases will contain a no surface occupancy stipulation for areas within developed recreation sites. G
- XII Visual Management
- A All management activities should meet or exceed the Scenic Integrity Objectives established for the Forests through Scenery Management System outlined in "Agriculture Handbook 701, Landscape Aesthetics - A Handbook for Scenery Management." G
- B Assigned Scenic Integrity Objectives for the Forests are shown in Tables II-7 and II-8. G

**Table II-7. Sensitivity Level by Scenic Class by Management Area.**

Scenic Class	Management Area 2.1	Management Area 4.2	Management Area 4.3	Management Area 4.4
1	High	High	High	High
2	High	Moderate	High	Moderate
3	Moderate	Low	Moderate	Low
4	Low	Low	Low	Low
5	Low	Low	Low	Low
6	Low	Low	Low	Low
7	Low	Low	Low	Low

**Table II-8. Assigned Scenic Integrity Objectives.**

Management Area	Scenic Integrity Objective
5.1 Wilderness	Very High
6.2 Semiprimitive Motorized	Moderate
7.1 Developed Recreation Sites	High
8.1 Wild and Scenic Rivers	High
8.2 Research Natural Areas	1/
8.3 Experimental Forests	2/
8.4 Special Areas.	High
9.1 Candidate Research Natural Areas	Very High
9.2 Study Wild and Scenic Rivers	High
1/ Determined by establishment record for the Research Natural Area.	
2/ Managed the same as the management area it would be if it were not an Experimental Forest. Projects submitted to North Central Research Station for approval.	

2400 TIMBER MANAGEMENT (Note: See 1900, Vegetation Management for additional Standards and Guidelines)

I The following Standards and Guidelines apply to both even- and uneven-aged silvicultural systems.

A Uneven- and even-aged systems will be used. They will be consistent with management area objectives and the following restrictions:

- 1 Utilization standards for all timber sold or disposed of should conform to the tabulation below. A tree must contain at least one piece and meet the minimum standards found in the Forest Service Manual. G
- 2 Activity Fuel (Slash) Disposal (Note: See 2300, Visual Management for additional Standards and Guidelines)
  - a At a minimum, remove activity fuels or treat them to lie within 24 inches of the ground in areas within 25 feet of private land. G
  - b Build and disperse brush piles of activity fuels for wildlife purposes considering visual and fire management needs. G
  - c Table II-9 provides guidelines for activity fuel treatment concurrent with timber cutting immediately following this activity, or within one or two years after the management activity took place (Time of Treatment Column). Additional activity fuel treatment may be required for other resource needs. Treatment may vary depending on the "seen area," area seen by humans, which is influenced by topography, vegetative screening and time of treatment. G

**Table II-9. Activity Fuel (Slash) Treatment Guidelines for Aesthetics <sup>1/</sup>.**

Areas	Distance from Travelways (Feet)	Maximum Height of Activity Fuel (Inches)	Time of Treatment
High Integrity Level 1 <sup>2/</sup>			
Conifer	200	12	Within 1 year
Hardwood	200	12	Within 1 year
Moderate Integrity Level <sup>2/</sup>			
Conifer	200	18	Within 1 year
Hardwood	200	18	Within 1 year
Low Integrity Level <sup>2/</sup>			
Jack Pine Only	200	18	Within 2 years

<sup>1/</sup> Seen area is a key component of the visual system. The activity fuel treatment chart provides guidelines for treatment distance from travelways, maximum height of activity fuels and time of treatment, and are based on a "typical" area seen by humans. Effects of topographic or vegetative screening upon treatment distance and fuel height and timeliness of treatment may result in achieving the desired Integrity Level with less intensive treatment.

<sup>2/</sup> See Appendix F-Glossary for definition.

- II The following rotation ages, Table II-10, apply only to the even-aged silvicultural systems. Temporary openings will be created by the application of even-aged silvicultural systems. These guidelines will apply to determining culmination of mean annual increment. Exception to these guidelines may occur to meet other resource management objectives.

G

**Table II-10. Rotation Age Guidelines.**

Species	Rotation Age (Years)	
	Range	Expected
Jack pine	40-60	50
Red and white pine	70-120	100
Oak (low-site index -less than or equal to 55)	50-80	60
Oak (high-site index-greater than 55)	70-120	100
Aspen	40-60	50
Northern hardwood	70-120	100
Lowland hardwood	70-120	100
Lowland conifer	100-200	200

## 2500 WATERSHED MANAGEMENT

### I Water

#### A Guidelines for Management Activities

##### 1 Riparian Vegetation Management

- a If natural disturbance processes are not providing adequate habitat within the Streamside Management Zone for threatened, endangered, sensitive and other species with viability concerns, active management for early successional habitat may be implemented on a case-by-case basis.

G

- b Vegetation management within Streamside Management Zones will be consistent with the State of Michigan's Best Management Practices and the following specifications to protect water quality: G
- 1 Minimum Streamside Management Zone width should be 100 feet from each side of the stream or lake shore. Width should be increased with increases in slope percent as illustrated in Table II-11. G

**Table II-11. Streamside Management Zones.**

<b>Slope of Land Above Water Body or Stream (Percent)</b>	<b>Minimum Width of Streamside Management Zone (Feet)</b>
0-10	100
10-20	115
20-30	135
30-40	155
40-50	175
Greater than 50	200 - Activity may not be advisable due to erosion potential. Extreme care must be taken to prevent movement of soil.

- 2 In stream channels deficient of wood, placement of trees is a preferred method to fixed structures. Bioengineering is the preferred approach for all restoration projects and should be used where feasible. G
- 3 The source of trees used for aquatic large wood restoration will be, where practical, from outside old-growth areas unless removal will maintain or restore the old growth characteristics of the site. Preference will be given to sites where removal of some trees will accelerate movement towards potential old-growth characteristics, such as thinning of conifer plantations and restoration of old-growth barrens or savannahs. G
- 4 Minimize mechanical disturbance of the forest floor in Streamside Management Zones. G
- 5 Equipment may be used within the Streamside Management Zone. However, equipment should not be G

- operated within the Streamside Management Zone when soils are saturated or when rutting is likely to occur.
- 6 Temporary access routes for equipment use within the Streamside Management Zone should be obliterated, stabilized and restored to natural conditions immediately by using native vegetation appropriate to ecological landtype phases. Site scarification will take place prior to revegetation if compaction has occurred. **G**
- c Shade strips should be used to keep temperatures of surface waters within the habitat range for aquatic species of concern. Shade strip widths should vary according to vegetation, landform and stream conditions. Retain shade strips along the east, west and south aspects of perennial streams unless analysis of site and water conditions demonstrate that the aquatic species of concern would not be adversely affected. **G**
- d Where streamside trees are to be removed: **G**
- 1 Leave as much understory and ground cover as possible. **G**
  - 2 Use areas that provide natural topographic shading. **G**
  - 3 Do not drag logs from or across a stream. **G**
- e Vegetation adjacent to wetlands and bogs within sandy outwash plains may be managed for early successional habitat where it emulates natural disturbance processes. **G**
- 2 A determination of coastal zone consistency will be completed for all activities occurring within one-quarter mile from the Great Lakes high water mark. **S**
- 3 Oil and gas development
- a Federal oil and gas leases will contain a no-surface-occupancy stipulation for areas within 300 feet, measured at a perpendicular, from the normal high water mark of any river, stream or lake. **G**
  - b For reserved or outstanding mineral rights, where reasonable and in cooperation with the mineral owner, no surface occupancy will **G**

- be permitted within 300 feet, measured at a perpendicular, from the normal high water mark of any river, stream or lake.
- c Federal oil and gas leases will contain a no-surface-occupancy stipulation for wetlands. G
  - d Surface disturbance will be limited to that necessary for reasonable, safe and prudent extraction of the oil and gas. Measures will be implemented to minimize erosion and sedimentation. G
  - e Road and pipeline systems will be planned to eliminate stream crossings whenever practical. G
- 4 Aquatic Restoration
- a Aquatic habitat restoration will consider the needs of all riparian-dependent species. Restoration measures may include, but are not limited to, large wood placement, streambank stabilization gravel and cobble placement for spawning habitat and fine sediment removal. G
  - b Natural, in-stream or added wood—trees, shall be left undisturbed unless it constitutes a navigational hazard. If watercraft cannot go over, under or around wood, it constitutes a navigational hazard and may be cut only to the extent necessary for navigation. G
- 5 Sediment Removal
- a Sediment basins, both within the stream or, where appropriate, in the adjacent floodplain, may be used. This guideline does not apply in management areas 5.1, 8.2 and 9.1. G
  - b Sediment basins may only be used where the potential for downstream recovery exists, such as gravel and cobble substrates located in higher gradient reaches. This guideline does not apply in management areas 5.1, 8.2 and 9.1. G
  - c Disposal of sediment basin spoils will be done in a way to ensure that characteristics or hydrological and ecological functions of riparian areas or adjacent upland areas are not compromised: Dispose of sediment basin spoils outside floodplain. This guideline does not apply in management areas 5.1, 8.2 and 9.1. G
- 6 Water Quality - Monitor water quality for baseline conditions and when soil-disturbing activities occur in riparian areas. Do not permit management G

practices which seriously or adversely affect water conditions—surface and groundwater, or fish habitat. These include, but are not limited to detrimental changes in water temperature or chemical composition, blockages of water flow paths, and deposits of sediment. Streamside Management Zones, sediment basins and/or other management practices will be used to protect riparian areas from sedimentation.

- 7 Forest Management:
  - a Forest management activities will not degrade long-term stream water quality below state standards. S
  - b Forest management activities will not increase the trophic levels of lakes. G
  - c Apply management practices that will not significantly accelerate the aging or eutrophication of any lake or stream. Designated walleye fish rearing ponds, however, may be limed and/or fertilized as needed. G
- 8 Design management activities adjacent to lakes, streams and wetlands to maintain streambank and shoreline stability and riparian integrity. G
- 9 Rehabilitate and revegetate disturbed areas promptly after projects or project segments, in the case of large projects, are completed. G
- 10 Construct and rehabilitate structures and facilities to preserve the beneficial values of floodplains and wetlands, protect public safety, and be cost efficient. G

## II Soil

- A No vegetative manipulation or utilization practices shall cause average annual soil loss to exceed Natural Resource Conservation Service T-Values, T=soil loss tolerance factor. G
- B Use rehabilitation measures for management activities that mechanically displace or move soil, so that the productivity of the land is not adversely affected. G
- C All projects will be in accordance with the site's ability to sustain soil productivity. S
- D Control measures to mitigate erosion, and disturbances due to management activities, will be commensurate with the soil characteristics, expected use and management objectives of the area. Fertilization may be used in erosion control projects. G
- E Management activities are allowed in wetland areas when they will not cause a detrimental change to the soil characteristics or hydrologic function of the wetland area. G

- |   |  |   |
|---|--|---|
| F | Restore disturbed areas to meet the objectives of the management areas.  | G |
| 1 | Water bodies may be created when surface runoff and soil conditions permit.  | G |
| 2 | Areas of exposed mineral soil will be restored and revegetated within two years after operations cease.  | G |
| 3 | Slopes, not to exceed 30 percent, will be graded to a smooth contour fitting the lay and contour of the land.  | G |
| 4 | If topsoil is not saved, a minimum 1 inch topsoil over 75 percent of the area and one-half inch over 100 percent of the area will be applied upon final rehabilitation.                          | G |
| 5 | Lime, fertilizer, seed mixture and mulch will be applied as prescribed.  | G |
| G | Management activities within Streamside Management Zones will limit soil, nutrient and pesticide movement into aquatic ecosystems.   | G |
| H | Construct all roads, skid trails and landing areas outside Streamside Management Zones unless mitigative practices are used. This guideline does not apply in management areas 5.1, 8.2 and 9.1. | G |
| I | Skidding and other treatments of Streamside Management Zones will not result in:   | G |
| 1 | Exposing more than 5 percent of mineral soils.   | G |
| 2 | Any ruts more than 10 inches deep or any continuous ruts that concentrate flowing water.   | G |
| 3 | Increased mass movement of streambanks or lakeshores.  | G |
| 4 | Increased slash within aquatic ecosystems.   | G |
| 5 | Significant increase in fine inorganic material on streambottoms. Significance will vary depending on existing streambottom conditions and management objectives for the stream.                 | G |

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

### I General Management

- |   |  |   |
|---|--|---|
| A | Globally rare communities will be protected.   | G |
| B | Sparta soils series on the Manistee National Forest should be managed as prairies.   | G |
| C | Forested   |   |
| 1 | Snags, den trees, mast trees and down wood:  |   |
| a | Provide snags, den trees, mast trees and down wood to meet requirements of indicator species and to maintain viable vertebrate populations. Table II-12 displays numbers of snags, den trees, mast trees and down wood as per acre minimums and minimum size objectives. Size objectives are | G |

minimums, and the largest diameter trees practical should be used. These guidelines do not apply to management areas 5.1, 8.2, the following areas in 8.4 (Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary), and 9.1.

- b In regeneration harvests, leave den and mast trees in clumps, if available. G

**Table II-12. Wildlife Structure Prescriptions by Vegetative Treatment for All Management Areas Except 5.1, 8.2, 8.4 (Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary only), and 9.1.**

Structural Component	Regeneration Harvest		Intermediate Harvest		Uneven-age Harvest		Savannah/Barren Creation			
	Number <sup>1/</sup>	DBH <sup>2/</sup>	Number	DBH	Number	DBH	Deciduous		Coniferous	
							Number	DBH	Number	DBH
Snags	9	9	9	9	9	9	10	9	10	9
Mast/ Den Trees	4		4		4		2		2 per 5 acres	
Down Wood	3	10	3	10	6	10	3	10	3	10

<sup>1/</sup> Numbers are per acre minimums.  
<sup>2/</sup> DBH = Diameter at Breast Height (See Appendix F-Glossary). Minimum size objectives are displayed. The largest diameter trees practical should be used.

## II Endangered and Threatened Species and Their Management

(Species not addressed here are covered in individual management area sections in Chapter III)

- A Federally endangered, threatened and proposed species management will take precedent over old growth goals; objectives and Standards and Guidelines. G
- B Sensitive species management will take precedent over old growth goals; objectives and Standards and Guidelines only when there are no other opportunities to provide for the needs of these species elsewhere. G
- C Indiana bat (applies in all management areas within designated Indiana bat habitat except 5.1, 8.2, and 9.1, unless otherwise noted).
- 1 Appropriate protection measures for site-specific projects will be developed during biological evaluations. G  
 Exceptions to the project-specific measures include:
- a Allow initial thinning treatments in fully or over-stocked red pine plantations. G
- b Allow salvage harvest of small areas, less than 5 acres, of red pine. G
- c Allow removal of trees that pose a safety hazard in recreation, trails, special use, administrative sites and road rights-of-way that are not presently being used by Indiana bats. If a bat is present, consultation will occur with the U.S. Fish and Wildlife Service. G

- d Allow removal of trees less than six inches diameter at breast height. G
- e Allow removal of trees in areas surveyed for bats with U.S. Fish and Wildlife Service approved survey techniques where no bats or suitable habitat were found. G
- 2 Where vegetation management occurs, an average of nine high quality summer roost trees—snags or live trees greater than nine inches diameter at breast height, per acre will be maintained within the treated acres. Leave trees 16 inches diameter at breast height or greater, where available. If not available, leave trees 9 to 16 inches diameter at breast height. If necessary, leave trees 3 to 9 inches diameter at breast height. When selecting roost trees, emphasize the applicable selection criteria below: G
  - a As many standing snags greater than three inches diameter at breast height as practical within regeneration and timber management units. Retain live trees around larger snags to provide protection from wind throw; give preference to retaining oaks and hickories; if individual trees are a health or safety concern, consider grouping them or protect zones around them.
    - 1 Give preference to larger snags; retain all snags greater than 16 inches diameter at breast height. G
    - 2 Snags should be retained regardless of species. G
    - 3 Ensure that care is taken during site preparation, seeding, etc., to avoid damage or loss of retained snags. G
  - b Standing live trees greater than three inches diameter at breast height, with greater than 25 percent exfoliating bark, regardless of species. G
  - c Hollow, den and cavity trees greater than nine inches diameter at breast height as practical, regardless of species. G
  - d Shagbark and bitternut hickories, regardless of size, and regardless of whether dead or alive, if available. G
  - e When few snags are available or cannot be left, leave at least nine of the largest live trees on site, preferably greater than 26 inches diameter at breast height, in the Class I Category—oaks and hickories; other desirable species include eastern

- cottonwood, green and white ash and American and slippery elm.
- f Leave seed trees uncut in seed-tree harvest areas, particularly in areas of oaks and hickories. Retain the largest trees as seed trees in order to ensure a component of large, over-mature trees. G
- g In individual and group selection harvests: G
- 1 Ensure that a component of large, over-mature trees remains to provide suitable roosting habitat -- retaining at least three live trees per acre greater than 20 inches diameter at breast height. G
  - 2 If there are no trees greater than 20 inches diameter at breast height, retain 16 of the largest available trees per acre. G
  - 3 When available, trees left should be Class I type trees--oaks and hickories; other desirable species include eastern cottonwood, green and white ash and American and slippery elm. G
- h Regeneration units will be designed with irregular borders to provide edges for solar exposure of roost sites, interspersion of roosting and foraging habitat and travel corridors. G
- 3 Prohibit removal of standing dead trees for firewood between May 1 and August 31. The Forest will annually update the firewood cutting maps to identify areas that are off limits. S
- a Within the five-mile radius around Tippy Dam--Tippy Management Zone, firewood permits will be prohibited. S
- 4 Generally, prescribed burns are prohibited within designated Indiana bat habitat between May 1 and August 31 (applies in all management areas). G
- 5 Prescribed burns and vegetation management in the five-mile radius around Tippy Dam--Tippy Management Zone, are to be conducted, as feasible and prudent, outside the spring staging period from May 1 to June 15, and the fall swarming period from September 1 to October 20. G
- 6 In optimal summer maternity habitat, conduct vegetation management and prescribed fire, as feasible and prudent, outside summer maternity period from May 1 to August 31. G
- 7 In optimal summer maternity habitat, individual S

- projects may proceed during the summer maternity period if surveyed for Indiana bats, according to protocols established by the U.S. Fish and Wildlife Service, prior to project implementation.
- a If a reproductive female Indiana bat is found, postpone project activities that may affect Indiana bats until outside of the summer maternity period. s
  - b If no Indiana bats or only male bats or non-reproductive female bats are found, the project may proceed using the established conservation measures and operating procedures committed to in the biological assessment. Mist netting results are valid for a three-year period only. If a project has not been completed within this time frame, a new survey will be required. s
- 8 Protection zones will be established around maternity colonies where discovered. s
- 9 Upland water sources will be provided for the Indiana bat by:
- a Developing water holes in wildlife openings along the forest edge. s
  - b Utilize maintenance level 1 and decommissioned roads to provide upland water sources, where feasible. s
  - c Designing road construction and reconstruction projects to include small waterholes adjacent to the road, where feasible. s
- D Kirtland's Warbler
- 1 See 2600, Management Indicator Species and Chapter III, Management Area 4.2, for Standards and Guidelines. g
- E Great Lakes Piping Plover and Critical Habitat
- 1 See Chapter III, Management Areas 4.2, 4.3, 5.1 and 8.2 for Standards and Guidelines. g
- F Karner Blue Butterfly
- 1 Implement the Karner Blue Butterfly Recovery Plan (USDI-Fish and Wildlife Service 2003b, or current version). s
  - 2 Resource management activities, such as road and trail construction and vegetation management, will be designed to protect and improve potential Karner blue butterfly habitat. g
  - 3 Roads and trails may be relocated or decommissioned, as deemed necessary, to protect wild lupine. g
  - 4 The following applies to unoccupied potential habitat:
    - a Conduct pre-activity surveys to determine presence/absence of the species. If the s

- species is found, the Forests will follow the Standards and Guidelines for occupied habitat.
- 5 The following applies to occupied habitat areas:
- a Conduct pre-activity surveys. G
  - b Use woodland strips or brush piles along trails and roads to prohibit Off-Highway Vehicle use. G
  - c Direct camping to areas outside occupied habitat. G
  - d Camping will be prohibited in occupied areas where posted. s
  - e Oil and gas development will contain a no-surface-occupancy stipulation and will exclude road building. s
  - f The application and use of herbicides or pesticides is prohibited adjacent to occupied Karner blue butterfly habitat between April 1 and August 15, unless the following conditions are met: s
    - 1 The wind is not blowing toward the habitat and there is a minimum buffer of 100 feet between the habitat and the treatment area. s
  - g Maintain or restore occupied Karner blue butterfly sites by:
    - 1 Providing savannah-like conditions with 25 to 50 percent crown closure, or openings with an abundance of wild lupine. G
    - 2 Maintaining savannah-like conditions by removing woody encroachment. G
    - 3 Provide dispersal corridors in order to facilitate dispersal between occupied and unoccupied areas—suitable habitat sites. G
    - 4 Prohibiting the cutting of trees between March 15 and August 15. Cutting is restricted to a four-year frequency. Allow cutting of trees that pose a safety hazard. G
    - 5 Locating logging roads, skid trails and log yards to avoid or minimize impact to the habitat. G
    - 6 Cutting trees with equipment such as chainsaws is preferred. Other mechanized tree cutting equipment may be allowed by exception. G
    - 7 Piling slash not to exceed 20 percent G

- of an area, burning slash piles during the winter and avoiding piling slash in areas containing concentrations of wild lupine.
- 8 Mowing and/or brush hogging activities are prohibited between March 15 and August 15. **G**
- a Divide areas into at least two units, each of which supports lupine and nectar sources. At least one unit will remain untreated each season unless there is a colonization source within one-fourth mile that has the capability to recolonize this area. **G**
- b Leave cut vegetation on site that may contain eggs, unless the cut vegetation is collected and placed in another suitable habitat site. **G**
- h Prescribed burning will be conducted by:
- 1 Dividing sites into at least three burn units based on numbers of butterflies and burn no more than one-third of any site in any one year. If there are less than 10 individual butterflies during the first flight survey, then the entire site can be burned. **G**
- 2 Keeping unburned occupied patches within one-fourth mile of burned patches to aid recolonization. **G**
- 3 Designing burn areas with irregular shapes and small-scale unburned vegetation—skips. **G**
- 4 Having an approximate four-year burning frequency. **G**
- i Site scarification will be conducted by:
- 1 Exposing mineral soil to aid seeding of native nectar plants. **G**
- 2 Leaving 25 to 50 percent of the occupied area undisturbed. **G**
- 3 Protecting concentrations of wild lupine or other nectar plants. **G**
- 4 Treating areas will be prohibited between March 15 and August 15 and **G**

- on a four-year frequency.
- j Propagating nectar plants by using seeds with a locally based genotype when possible. If collected from the site, limit the collection to no more than 25 percent of available seeds and collect after July 1. G
- G Pitcher's Thistle
- 1 Prohibit new resource development and mining in occupied Pitcher's thistle habitat. G
  - 2 Prohibit surface occupancy within 300 feet of Lake Michigan, except for reserved and outstanding mineral rights. G
  - 3 Herbicide use will occur only when other methods of control for specific non-native invasive plant species are ineffective or cost-prohibitive. G
  - 4 Prohibit dune stabilization activities in Pitcher's thistle habitat. S
  - 5 Roads into Pitcher's thistle habitat on National Forest System lands will be closed when appropriate. G
  - 6 Limit the use of prescribed burning in dune habitat where Pitcher's thistle occurs. G
  - 7 Limit foot traffic within specific areas of the dune ecosystem where Pitcher's thistle occurs. G
- III Regional Forester Sensitive Species (See the individual management areas in Chapter III for other Regional Forester Sensitive Species).
- A Common Loon
- 1 Manage lakes with known loon populations to provide high quality nest areas and forage base with consistent water levels during the nesting season. Use artificial nesting rafts where appropriate. G
  - 2 To protect nesting loons, use closure orders during the breeding period where human disturbance is a concern. Prohibit motorized watercraft or create no-wake-areas where appropriate. G
  - 3 New developments will consider impacts on loons and should be placed one-fourth mile or more from nest sites on lakes with known loon populations. G
  - 4 On lakes with known loon populations, manage or remove species that compete with loons, such as mute swans, within existing authority and with cooperating agencies, where needed. G
  - 5 Fisheries management activities on lakes with known loon populations should ensure that loons are not harmed, caught or captured. G
- B Eastern Massasauga Rattlesnake
- 1 Implement the Management Recommendations G

- for the Eastern Massasauga Rattlesnake on the Huron-Manistee National Forests (USDA-Forest Service 2004, or current version).
- C Northern Goshawk and Red-Shouldered Hawk
- 1 Implement the Management Recommendations for the Northern Goshawk on the Huron-Manistee National Forests (USDA-Forest Service 1993, or current version). G
- D American Marten
- 1 Consider the American Marten Conservation Strategy for the Huron-Manistee National Forests (USDA-Forest Service 1996a, or current version). This Guideline does not apply in management areas 5.1, 8.2 and 9.1. G
- E Bald Eagle
- 1 Implement the Bald Eagle Management Plan for the Huron-Manistee National Forests (USDA-Forest Service 2006, or current version). S
- F Other
- 1 Where appropriate maintain or create small openings, less than one acre, in stands with known occurrences of ternate grapefern (*Botrychium rugulosum*) and maintain a protection zone of 66 feet with no mechanical equipment use and minimal soil disturbance around all known occurrences of ternate grapefern. Hand cutting is permitted. G
  - 2 Prohibit commercial or recreational harvesting of American ginseng. S
  - 3 In rare wetland communities where fire is a known disturbance, prescribed fire should be used to maintain these communities when feasible. G
  - 4 Timber harvesting in cedar swamps is excluded except for limited salvage of non-living trees after a catastrophic event, and single-tree, special products gathering administered under permit. G
  - 5 Except in management area 5.1, maintain hardwood and hardwood/conifer swamps according to the following: G
    - a Minimize disturbance of the forest floor in swamps. G
    - b Equipment may be used within swamps and sub-irrigated forests. However, equipment should not be operated within these areas when soils are saturated or when rutting is likely to occur. G
    - c Temporary access routes within swamps or sub-irrigated forests should be obliterated, G

- stabilized and restored to natural conditions immediately by using native vegetation appropriate to ecological land type phases.
- d Manage swamps and sub-irrigated forests with practices consistent with resource conditions and protect hydrologic function. G
- 6 Swales in oak and pine forests will be identified through project level surveys and protection measures developed through project-level analysis. G
- 7 Maintain a minimum of 60 percent canopy cover and do not allow mechanical disturbance within three tree-lengths of known occurrences of northern wild comfrey (*Cynoglossum boreale*). This does not apply to Management Area 5.1. G
- a Prescribed fire that does not reduce the overstory is allowed before the emergence of the plant's flowering stalk in the spring or after fruit dispersal in the fall. G
- 8 Management treatments in wet meadows with known occurrences of yellow nodding ladies-tresses (*Spiranthes ochroleuca*) should not affect soil moisture or soil structure within 66 feet of the known populations. If it is necessary to conduct maintenance activities to keep the community in a meadow state, treatment should be done using hand cutting or other non-soil disturbing management techniques. This does not apply to management area 5.1. G
- 9 Do not allow mechanical disturbance within 200 feet of known occurrences of pine drops (*Pterospora andromedea*). G
- IV Management Indicator Species
- A Bald Eagle
- 1 Habitat and Population Objectives: Habitat and population objectives are in accordance with the Northern States Bald Eagle Recovery Plan and the Bald Eagle Management Plan, Huron-Manistee National Forests. Habitat objectives include the protection of essential habitat, protection from environmental contamination and habitat acquisition. G
- 2 Conservation Activities: In accordance with the Bald Eagle Management Plan, conservation activities include: 1) protection of nesting territories; 2) developing management plans for each nesting territory; 3) protection of potential nesting territories/ and 4) protection of feeding, roosting and wintering areas. G
- 3 Monitoring: The population trend of the bald eagle G

will be monitored annually to determine the status and productivity of breeding areas.

- 4 Evaluation of Monitoring Results: Monitoring information will be evaluated every one to five years.

#### B Karner Blue Butterfly

- 1 Habitat and Population Objectives: Habitat and population objectives follow recommendations of the Karner Blue Butterfly Recovery Plan (USDI-Fish and Wildlife Service 2003b, or as updated). Three large viable populations—6,000 butterflies, and one viable population 3,000 butterflies, will be established and maintained on the Manistee National Forest. As such, 20,300 acres of barrens habitat will be developed and maintained in the four metapopulation areas and the essential Karner blue butterfly barren habitat on the Manistee National Forest. Information detailing locations and specific habitat requirements associated with Karner blue butterfly essential habitat can be found in the Biological Assessment for this Forest Plan, the Karner Blue Butterfly Recovery Plan (2003 or current version), the Karner Blue Butterfly Habitat Management Strategy and the Karner Blue Butterfly Species Viability Evaluation for the Huron-Manistee National Forests (2004 or current version). G
- 2 Conservation Activities: In accordance with the Karner Blue Butterfly Recovery Plan conservation activities include: G
  - a Protect and manage the Karner blue butterfly and its habitat to perpetuate viable metapopulations;
  - b Evaluate and implement translocation where appropriate;
  - c Develop range-wide and regional management guidelines;
  - d Develop and implement information and education programs;
  - e Collect important ecological data on Karner blue butterfly and associated habitats;
  - f Review and track recovery progress.
- 3 Monitoring: The population trend of the Karner blue butterfly and its relationship to habitat changes will be monitored on an annual basis. G
- 4 Evaluation of Monitoring Results: Monitoring information will be evaluated every 1 to 5 years. G

#### C Kirtland's Warbler

- 1 Habitat and Population Objectives: Habitat and population objectives are in accordance with the Kirtland's Warbler Recovery Plan (USDI-Fish and Wildlife Service 1985) and Strategy for Kirtland's G

- Warbler Habitat Management (USDA-Forest Service 2001).
- 2 Conservation Activities: Conservation activities are centered on: G
    - a ensuring the availability of breeding habitat;
    - b controlling human activity and disturbance within habitat during the breeding season; and
    - c reducing nest parasitism by the brown-headed cowbird.

These activities are incorporated into Chapter III, Management Area 4.2 of the Forest Plan Standards and Guidelines.
  - 3 Monitoring: The population trend of the Kirtland's warbler and its relationship to habitat changes will be monitored on an annual basis. G
  - 4 Evaluation of Monitoring Results: Monitoring information will be evaluated annually. G
- D Ruffed Grouse
- 1 Habitat and Population Objectives: The Forests will maintain a minimum of 750 breeding pairs on the Huron National Forest and 1,000 breeding pairs on the Manistee National Forest. Two and one-half acres of zero to nine year old aspen adjacent to mature aspen will be maintained per breeding pair for a total of 1,875 acres on the Huron National Forest and 2,500 acres on the Manistee National Forest. G
  - 2 Conservation Activities: Conservation activities will focus on: G
    - a Providing for an interspersed of young and older aged aspen stands to provide the proper combination of food and cover.
    - b Providing amounts of grouse habitat dispersed across the Forests.

These activities are incorporated into the Forest Plan composition objectives and rotation ages for the aspen forest type.
  - 3 Monitoring: The population trend of the ruffed grouse and its relationship to habitat changes will be monitored on an annual basis. G
  - 4 Evaluation of Monitoring Results: Monitoring information will be evaluated every 1 to 5 years. G
- E Brook Trout
- 1 Habitat and Population Objectives: The Forest Plan objective for this management indicator species is to maintain an average of 40 individuals, age 1+, per acre. G
  - 2 Conservation Activities: Stream habitat protection and restoration will be promoted through conservation practices such as maintenance of at least 34 percent of 6<sup>th</sup> level watersheds in a forested state—greater than 15 years in age, sediment G

- removal, erosion control–streambank stabilization and improvement of transportation systems, introduction of large wood for structural complexity, gravel placement for spawning habitat and the use of best management practices in riparian corridors and the Streamside Management Zone.
- 3 Monitoring: The population trend of the brook trout and its relationship to habitat change will be monitored on an annual basis. G
- 4 Evaluation of Monitoring Results: Monitoring information will be evaluated every one to five years. G
- F Mottled Sculpin
- 1 Habitat and Population Objectives: The Forest Plan objective is to maintain stable populations of the mottled sculpin–no statistically significant decline in population numbers. G
- 2 Conservation Activities: Same as for brook trout with more emphasis placed on the measures that prevent or reduce sediment levels in streams. G
- 3 Monitoring: The population trend of the mottled sculpin and its relationship to habitat change will be monitored on an annual basis. G
- 4 Evaluation of Monitoring Results: Monitoring information will be evaluated every one to five years. G
- V Managed Wildlife Openings
- A Do not manage wildlife openings within old growth. G
- B Favor native species of vegetation. This guideline does not apply in management areas 5.1, 8.2, and the following areas in 8.4 (Newaygo Prairie Ecological Study Area, Lumbermen’s Monument, and Loda Lake Wildflower Sanctuary), and 9.1. G
- C Allow chemical, mechanical and hand maintenance methods or prescribed fire. This guideline does not apply in management areas 5.1, 8.2, and the following areas in 8.4 (Newaygo Prairie Ecological Study Area, Lumbermen’s Monument, and Loda Lake Wildflower Sanctuary), and 9.1. G
- VI Wetlands/Riparian Areas
- A Existing spring seeps and other water areas critical to wintering wildlife will be protected. G
- B Fertilizers or soil enrichments may be used. G
- C Where needed to meet species viability concerns, provide shallow water emergent wetlands complexes of 250 acres or larger in Landtype Associations 2, 3, 4, 6 or 7. Manage patches 24 acres or larger which total at least 250 acres within a 640-acre area to provide this habitat. This guideline does not apply in management areas 5.1, 7.1, 8.2 and 9.1. G
- D Manage early successional shrub/scrub habitats in patches G

25 acres or larger within wetland/riparian areas on each Forest where the need to meet species viability has been determined on a case-by-case basis. Areas to be managed for early successional shrub/scrub habitat would be within areas where these vegetation types exist or existed but are succeeding to later seral stages and the need for meeting species viability is identified and analyzed. This guideline does not apply in management areas 5.1, 7.1, 8.2 and 9.1.

#### VII Other Species

- A Protect special habitats such as heron rookeries and raptor nests where they occur. G
- B Black-backed woodpecker habitat should be: G
  - 1 Fire-killed trees greater than 7-inch diameter at breast height less than four years post-burn. G
  - 2 Eighty acres or greater in size. G

#### VIII Fish

- A Vegetation canopy in and along streams will be managed to maintain water temperatures within the prescribed ranges for fisheries objectives. This guideline does not apply in management area 5.1. G
- B Do not block or prevent fish passage in streams unless prescribed by site-specific analysis. G
- C Protect state-classified trout streams. G
  - 1 Vegetation attractive to beaver would generally be discouraged within 200 feet of streams. G
- D Habitat management should minimize streambed sand loads. G

### 2700 SPECIAL USES MANAGEMENT

- I Issue permits only for uses compatible with the area's management direction. G
- II Decisions on applications for distribution systems crossing National Forest System lands will be made on an individual basis. G
- III Where reasonable alternatives exist, surface-disturbing activities will take place outside of old growth. G
- IV Permit those utility transmission corridors required to serve recreational or administrative facilities. Exceptions will be considered on an individual basis. G
  - A Bury utility lines if technically feasible. G
- V Do not allow utility lines in Management Areas 5.1, 8.2 and 9.1. G

### 2800 MINERALS AND GEOLOGY

#### I Minerals - General

- A Land management decisions will not preclude the ability of private mineral owners to make reasonable use of the surface as defined by deed and public law. (See 5400, Subsurface Ownership for additional Standards and Guidelines). S

- B Cooperate with the Bureau of Land Management and the State of Michigan to administer mineral activities on National Forest System lands. s
- 1 Department of Agriculture consent for leasing of Federal oil and gas on specific lands will be made following review/validation of the assumptions and analysis in the Forest Plan Environmental Impact Statement, verification that there are no changed conditions, and documentation of compliance with 36 CFR 228.102. The Forests' leasing recommendations to the Regional Office will include Standards and Guidelines as required lease stipulations/notices. s
  - 2 Federal oil and gas leases will contain a no-surface-occupancy stipulation for administrative sites. s
  - 3 The Forest Service will recommend nondevelopment for the leasing of State of Michigan oil and gas rights under National Forest System lands where federal leases would contain a no-surface-occupancy stipulation. Development will be recommended for all other areas. g
- C The spacing of oil and gas wells is established by the Michigan Department of Environmental Quality and is determined by the reservoir characteristics and the depth of the producing formation. Unless stated otherwise in Chapter III, development density for oil and gas wells will be in accordance with the Michigan Department of Environmental Quality spacing regulations. s
- D Producing wells shall not emit hydrogen sulfide gas to the atmosphere. Sour gas must be burned, incinerated or injected into an approved underground formation in accordance with Michigan's Oil and Gas Regulations (R324.1129, effective September 20, 1996). s
- II Old Growth
- A Where there are reasonable alternatives, surface-disturbing activities will take place outside of old growth. g
  - B For lands nominated for oil and gas leasing in old growth, the surface versus no-surface-occupancy decision will be made for each parcel prior to consenting to lease. The surface-occupancy determination will be based on the presence of reasonable access within old growth areas. s
- III Mineral Exploration and Development
- A General oil and gas development conditions:
    - 1 Living units, trailers, etc., will not be permitted on the drilling site after drilling and completion or plugging has been completed. s
    - 2 Pipelines and flowlines should be buried a minimum g

of three feet where practical and incorporate warning tape.

- 3 Flowlines follow the access road where practical. G
- 4 Electric and telephone service should be buried a minimum of two feet where practical and incorporate warning tape. G
- 5 If the well is productive, facilities that will remain on site should be painted earth tone colors. G
- 6 Producing wells shall not emit hydrogen sulfide gas to the atmosphere. Sour gas must be burned, incinerated or injected into an approved underground formation in accordance with Michigan's Oil and Gas Regulations. G

### 3400 FOREST PEST MANAGEMENT

- I Management practices to control forest pests will follow Integrated Pest Management guidelines, applicable laws, regulations and policy. S
  - A Pesticides may be used in vegetative management, fisheries management or to suppress insects and disease infestations when their use is cost efficient, biologically effective and environmentally acceptable. G
- II When necessary, establish untreated zones adjacent to water bodies and other sensitive areas. The zone distance will depend on the type of pesticide proposed for use, methods of application and the environmental sensitivity of the area. Minimum distance will be 100 feet. G
- III Use minimum pesticide dose rate and/or least persistent pesticide that will control the pest or undesired vegetation. S
- IV Use public information procedures to notify and inform affected people of a proposed pesticide use project. Notification includes type of pesticide, target pests, application dates, method of application and necessary safety precautions. G
- V As appropriate, post notice signs in treatment areas. G

### 5100 FIRE MANAGEMENT

- I Suppression
  - A Use techniques that least alter the landscape and minimize disturbance to the ground where practical. G
  - B Minimize use of tractor plows, retardant, constructed helispots and wheeled vehicles within old growth areas, known heritage sites and endangered, threatened and Regional Forester's Sensitive Species areas. G
  - C Utilize existing natural and human-made barriers such as roads, trails, streams and lakes instead of constructed firelines for suppression activities where practical and safe for firefighters, the public and the values at risk. G

- D All constructed firelines will have adequate erosion control measures implemented where necessary, such as water bars and rolling dips. **G**
- E Follow Best Management Practices on fireline location in riparian areas. **G**
- II Rehabilitation:
  - A Fire suppression activities will include rehabilitation of fire lines on National Forest system lands, roads, helispots and other disturbed areas where needed, such as steep slopes, erosive soils, and to reduce access and noxious weeds. **G**
  - B Stabilize and revegetate soils disturbed by fire suppression activity by encouraging growth of existing on-site native vegetation as soon as practical. Use locally native species—genetically appropriate, or non-persistent non-native species where needed. **G**
  - C Burned areas will be rehabilitated where needed, except management area 5.1. **G**
  - D A Burned Area Emergency Rehabilitation Plan will be prepared as needed. **S**
  - E Follow Best Management Practices on restoration practices in riparian areas. **G**
- III Fire Use and Fuels Treatment
  - A Follow Best Management Practices on fireline location and restoration activities. **S**
  - B Smoke management practices will ensure that prescribed fires will minimize adverse effects on public and firefighter health, public safety or visibility. **G**
  - C Mechanical fuels reduction projects are acceptable to reduce fire risk or impacts and to enhance resource objectives, except management areas 5.1, 8.2 and 9.1. **G**
  - D When possible, fuelbreaks will be located outside of old growth. **G**

#### 5400 LANDOWNERSHIP

- I Surface Ownership
  - A Land Adjustments
    - 1 No floodplains will be exchanged away without a flood hazard risk analysis and appropriate mitigative measures where needed to protect life and property. **S**
  - B Land-for-Land Exchange
    - 1 Exchange of all National Forest System lands will be coordinated with the State of Michigan, tribal governments and local units of government. There will be no land exchange in management area 5.1. **S**
- II Subsurface Ownership
  - A When any or all of the following conditions exist, acquisition **G**

of subsurface rights will be considered:

- 1 Conflicts between surface values and mineral activities cannot be mutually resolved.
- 2 The public benefits from the surface values exceed the cost of acquiring subsurface rights.
- 3 The cost is consistent with budget priorities.
- 4 Consolidation of surface and subsurface ownership to reduce resource conflicts.

#### 7400 PUBLIC HEALTH AND POLLUTION CONTROL ACTIVITIES

##### I Solid Waste

- |   |   |   |
|---|---|---|
| A | Provide sanitary facilities that meet federal and state regulations.  | s |
| B | Dispose of refuse generated or deposited on National Forest System lands through community or area-wide facilities that meet federal regulations.                             | s |
| C | Oil and gas development   |   |
| 1 | Sewage from the drilling sites will be disposed of through the use of sealed vault portable toilets or holding tanks and will be taken to an approved sewage treatment plant. | s |
| 2 | Garbage from the drilling site will be disposed of in commercial dumpsters and will be taken to an approved sanitary landfill.  | s |

##### II Water Supply

- |   |  |   |
|---|--|---|
| B | Provide drinking water that meets federal and state regulations, and protect it to ensure its continued quality. | s |
|---|--|---|

#### 7700 TRANSPORTATION SYSTEM

##### I General

- |   |  |   |
|---|--|---|
| A | Identify Forest Service existing roads and determine those needed for administration and public use. Roads not needed will be obliterated.   | g |
| B | All roads for oil and gas development will be located and built as designated by the Forest Service. This standard does not apply in management areas 5.1, 8.2 and 9.1.  | s |
| C | Clearing width will be kept to the minimum necessary.  | g |
| D | Roads to active well sites should be gated and upon abandonment will be obliterated. This guideline does not apply in management areas 5.1, 8.2 and 9.1.   | g |
| E | Collector and local roads will be designed and constructed to transport forest products, to accommodate planned motorized recreation use, and to accommodate administrative traffic. This guideline does not apply in management areas 5.1, 8.2 and 9.1. | g |
| F | All signs on roads open to public travel will meet the "Manual of Uniform Traffic Control Devices."  | s |

## II Provisions for Facilities

## A Transportation Facilities

- 1 Maximum average of road miles per square mile in all three road classes and average miles of roads per square mile by local, collector and arterial roads are shown in Table II-13. This does not include roads in densely developed areas such as towns, villages and residential development. G

**Table II-13. Maximum Average Miles of Roads per Square Mile by Type and Management Area.**

Average Miles of Roads	Applicable Management Area
Local Roads	
0-1	8.4 (except for Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary)
0-2	2.1, 4.2, 4.3, 4.4, 6.2
Collector Roads	
0-1	4.4
0-1	6.2
1-2	2.1, 4.2, 4.3
Arterial Roads	
0-0.7	2.1, 4.2, 4.3, 4.4, 6.2
All Roads:	
0-1	8.4 (except for Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary)
0-2	6.2
0-3	2.1, 4.2, 4.3, 4.4

- 2 Complete obliteration of temporary roads within one year after the need for them has ceased. This standard does not apply in management areas 5.1, 8.2 and 9.1. S
- 3 Special Restrictions for Water Quality. These guidelines do not apply in management areas 5.1, 8.2 and 9.1.
- a Locate roads on low gradient terrain and well-drained soils when possible. G
  - b Generally, do not locate roads within 100 feet of a lake or stream, except for stream-crossing approaches. G
  - c Water crossings will be of a permanent nature for long-term roads. G
  - d Select locations and design water crossings where aquatic organism passage will not be G

- restricted.
- e Design water crossings to minimize stream sedimentation. **G**
  - f Minimum culvert diameter will be 18 inches equivalent. **G**
  - g Provide for proper vertical and horizontal alignment of culverts. **G**
  - h Water crossing designs should not adversely impact the hydrologic characteristics of an area. **G**



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## Chapter III - Management Area Direction

### Introduction

This chapter describes the individual prescription areas located on the Huron-Manistee National Forests and their associated goals and objectives, desired future condition and Standards and Guidelines.

Standards and Guidelines from Chapter II apply to each of the following management areas as well as the individual management area direction. If there are conflicting Standards or Guidelines from Chapter II, the individual management area direction identified in this chapter takes precedent.

The following table provides a listing of the management areas located on the Huron-Manistee National Forests:

**Table III-1 - Huron-Manistee National Forests' Management Areas.**

Management Area	Title
2.1	Roaded Natural Rolling Plains and Morainal Hills
4.2	Roaded Natural Sandy Plains and Hills
4.3	Roaded Natural Wetlands
4.4	Rural
5.1	Wilderness
6.2	Semiprimitive Motorized Areas
7.1	Concentrated Recreation Areas
8.1	Wild and Scenic Rivers
8.2	Research Natural Areas
8.3	Experimental Forests
8.4	Special Areas
9.1	Candidate Research Natural Areas
9.2	Wild and Scenic Study Rivers

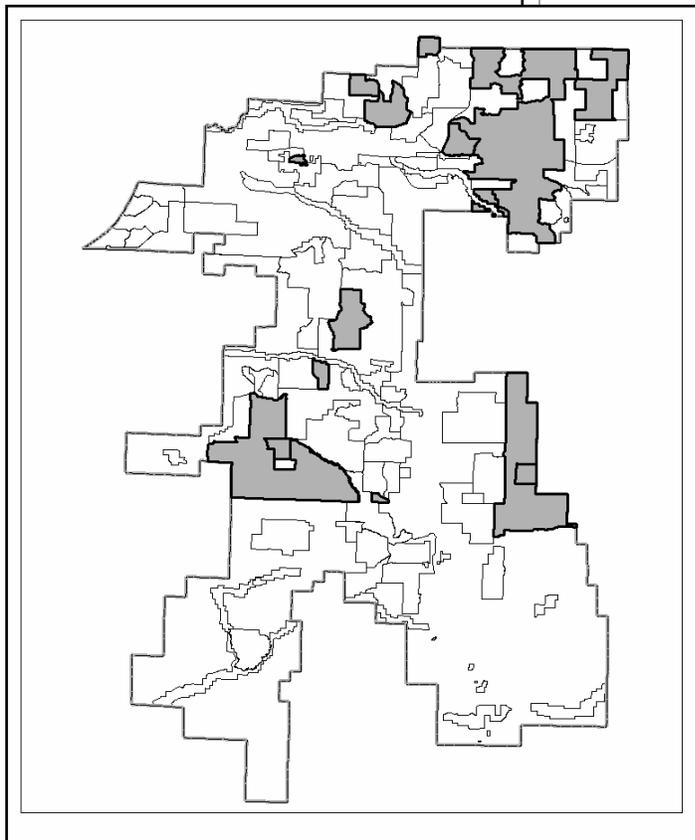
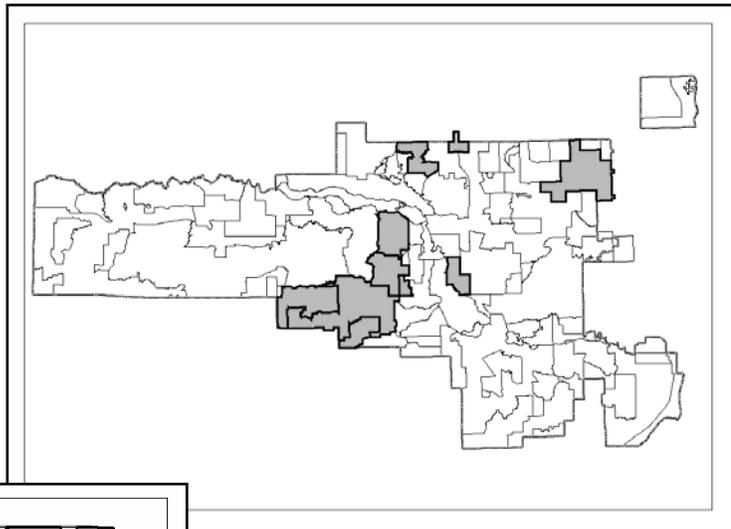


## Management Area 2.1 - Roaded Natural Rolling Plains and Morainal Hills

### Maps:

Shaded area depicts Management Area 2.1.

**Figure III-1. Management Area 2.1 on the Huron National Forest.**



**Figure III-2. Management Area 2.1 on the Manistee National Forest.**

**Purpose:**

Management activities provide high volumes of quality hardwood timber products and firewood with special consideration for enhancing wildlife habitats. Emphasis is given to managing deer, grouse and wildlife emphasis areas, and fish habitat. A broad variety of recreational opportunities is available and visual diversity is high.

**Landscape Description:**

This condition is found on morainal hills and gently rolling plains where soils support northern hardwoods, aspen and conifers.

This prescription area contains approximately 17 percent of all National Forest System lands on the Huron-Manistee National Forests.

Emphasis areas within Management Area 2.1 are displayed in Table III-2.

**Table III-2. Emphasis Areas Within Management Area 2.1.**

<b>Emphasis Area:</b>	<b>Approximate Acreage</b>	<b>Location</b>	<b>Objectives</b>
Grouse	30,000	6 areas on Manistee National Forest. 3 areas on Huron National Forest.	<ul style="list-style-type: none"> <li>• Manage intensively to provide quality grouse habitat.</li> <li>• Maintain or increase the acres of aspen/birch in grouse management areas.</li> </ul>
Wildlife - Highbanks-Condon Lakes Area	300	Manistee National Forest.	<ul style="list-style-type: none"> <li>• Manage long-lived oak in a “remote” setting as opportunities arise.</li> <li>• Manage for potential eagle nesting on one of the more secluded lakes in this area.</li> <li>• As the timber stands in this area mature, provide habitats for pileated woodpeckers, brown creepers, northern flying squirrels and other species associated with mature, over-mature and old-growth timber.</li> <li>• Continue to provide good habitats for the gray squirrel, scarlet tanager and other species associated with maturing deciduous and lake riparian habitats.</li> </ul>

### ***Goals and Objectives and Desired Future Condition:***

#### **Goals and Objectives:**

- Provide moderate amounts of motorized recreational opportunities.
- Provide moderate amounts of nonmotorized recreational opportunities and a moderate number of developed recreation sites.
- Provide a roaded natural recreational experience.
- Provide fish habitat improvements.
- Provide core mature mesic northern hardwood habitat necessary for species viability.
- Management will strive to increase utilization of wood residues and other currently non-merchantable material, when not needed for resource concerns such as soil productivity and wildlife habitat, for fuelwood and other special forest products.
- Quality sites and opportunities for intensive timber management practices will be identified commensurate with the site's ecological capabilities.
- Manage permanent openings and/or grasslands to meet species viability needs. Distribution of openings will recognize the contribution of adjacent private lands.
- Manage for mesic grassland habitats.
- Acquire, create and manage shallow water-emergent wetlands.
- Provide opportunities for mineral exploration and development.

#### **Desired Future Condition:**

Each prescription area usually contains more than 1,000 acres, and ownership is primarily National Forest System lands. Human activities are evident and interaction among users is moderate. There are restrictions and controls on the area's use. Users are aware of services provided, such as developed recreational sites, law enforcement and visitor information. Land management practices such as vegetation management, facilities, structures, utility corridors and mineral exploration and development are evident. The area will provide roads and trails appropriate for motorized and non-motorized uses. Road closures are evident.

Timber stands are dominated by red oak, sugar and red maples, beech, ash, black cherry and aspen, with conifer inclusions of red and white pines. The dominant trees in stands are the same age and about the same size. Stands differ in age and are irregular in size and shape, giving the landscape a mosaic appearance. Openings are interspersed throughout the area. There are approximately 13,300 acres of designated old growth in this management area.

### ***Standards and Guidelines:***

#### 2200 RANGELAND MANAGEMENT

- I Limit forage management to existing permanent openings where it is compatible with the desired character of the landscape. G

2300 RECREATION, WILDERNESS AND RELATED RESOURCE  
MANAGEMENT

I Recreation Construction

- A Level 3 or higher recreational developments will not be constructed on National Forest System lands bordering lakes that have less than 50 percent National Forest System ownership, except for trail or access purposes. G

II Trails (Other than North Country National Scenic Trail)

- A Off-Highway Vehicles, Including Snowmobiles
- 1 Allow competitive use of Off-Highway Vehicles where appropriate. G

III River Road National Scenic Byway

- A Federal oil and gas leases will contain a no-surface-occupancy stipulation within 300 feet along the River Road National Scenic Byway. G

2400 TIMBER MANAGEMENT

I The following Standards and Guidelines apply to both even- and uneven-aged silvicultural systems.

- A Uneven- and even-aged systems will be used. They will be consistent with area management objectives and the following restrictions:
- 1 Even-aged management will be the primary silvicultural system used. G
- 2 The uneven-aged system will normally be used only in northern hardwoods. G
- 3 Stand size in wildlife emphasis areas may be less than 10 acres. G
- 4 Seasonal restrictions on time of entry for timber harvests may be applied to protect other resources, activities and facilities. G
- 5 Standard cutting methods such as single-tree and group selection, shelterwood, seed-tree and clearcutting may be used. S
- 6 Major considerations of sale layout are logging system feasibility, road system adequacy and feasibility, adjacent landowners, visual aesthetics and resource protection, use and facilities. G
- 7 Silvicultural standards will incorporate genetic improvement principles, practices and programs. G
- 8 Regeneration activities:
- a Site preparation activities can include mechanical, prescribed fire, hand and chemical. G
- b For revegetation, use native vegetative species for timber production purposes. G

- Revegetation activities can include natural–preferred–artificial or seeding methods.
- c Fertilization may be used to establish vegetation on disturbed areas. Manage use of fertilizers or soil enrichments to prevent movement into lakes and streams. G
- II The following Standards and Guidelines apply only to the even-aged silvicultural system:
- A Temporary openings created by the application of the even-aged silvicultural system will be separated by a stand of at least 10 acres, except in wildlife emphasis areas. G
  - B Firewood gathering will be allowed except in old-growth areas. A permit is required. G
  - C In deer, grouse and wildlife emphasis areas, temporary openings created by even-aged management will generally not exceed 15 acres. However, they may be as large as 40 acres in major deer wintering or adjacent areas and 25 acres for golden-winged warbler habitat. G
  - D Intermediate treatment guidelines include:
    - 1 Using mechanical, chemical or hand release methods in all vegetative types. G
    - 2 Pruning for timber, visual improvement, safety and wildlife. G
    - 3 Thinning. G
    - 4 Using precommercial thinnings to maintain winter thermal cover for deer in lowland hardwood and conifer types. G
  - E Harvest guidelines include the following: (See Appendix B for a discussion of each harvest method):
    - 1 The clearcutting method may be used only for jack, red and white pines; oak; aspen; lowland conifers and northern hardwoods with adequate advanced regeneration; G
    - 2 The seed-tree cutting method may be used only for jack, red and white pines and lowland conifers; and G
    - 3 The shelterwood cutting method may be used only for jack, red and white pines; all oak; northern hardwoods; lowland conifers and lowland hardwoods. G
  - F Allow commercial thinning in all vegetative types. G  
 Precommercial thinning in all types is allowed if necessary to meet objectives of timber, wildlife and/or visual quality objectives.

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

## I General Management

## A Mesic Grasslands

- 1 Manage mesic grassland habitats as areas 250 acres or larger. G
- 2 If 250-acre areas are not attainable, provide multiple areas 75 acres or larger, which total at least 250 acres within a 640-acre area. G
- 3 Manage multiple habitat areas within one mile of each other to increase suitability if possible. G

## B Dry Grasslands

- 1 Manage dry grassland habitat, 250 acres or larger in Landtype Associations 1 and 2. G
- 2 Manage multiple areas as blocks when they are within one mile of each other to increase suitability. G

- C Provide for waterhole development or restoration when surface runoff and soil conditions permit. G

## II Endangered and Threatened Species and Regional Forester Sensitive Species

## A Standards and Guidelines for the management of Regional Forester Sensitive Species are:

- 1 Within core northern hardwood habitat areas:
  - a In 80 percent of the high-quality mesic northern hardwood (ginseng) habitat:
    - 1 Permit non-ground disturbing activities that mimic natural disturbance regimes common to this habitat. G
    - 2 Permit maintenance of existing improvements. G
  - b In the remaining 20 percent of the high-quality mesic northern hardwood habitat:
    - 1 Maintain 80 percent crown closure. G
- 2 Allow potential high-quality mesic northern hardwood forest habitat adjacent to core areas to convert to actual high-quality mesic northern hardwood forest habitat. G
- 3 New motorized trails will not be constructed in cedar swamps, hardwood conifer swamps and subirrigated forests unless there are no other reasonable routes. G

- B Manage wetlands identified as good and excellent sandhill crane nesting habitat to improve habitat conditions for this species. G

- C Develop and implement management direction for each osprey nesting area and great blue heron colony. G

## D Cerulean Warbler

- 1 Timber management and road construction activities should not occur in occupied G

habitat within 400 feet of a cerulean warbler nest tree, approximately a 10-acre area, during the breeding season.

### III Wildlife Emphasis Areas

#### A Condon Lakes

- 1 In selected oak stands, extend the rotation age to 120 years. G
- 2 Identify 25 to 35 percent of the stands in the area to be retained as over-mature. This should be concentrated around the isolated lakes, but there should also be stands identified for this throughout the area. G

#### B Deer Yards

- 1 Manage recognized deer yards outside old-growth areas to provide a sustained supply of winter thermal cover and associated browse. G

## 2700 SPECIAL USES MANAGEMENT

- I Decisions on applications for special uses involving National Forest System lands would be made on an individual basis. G
- II Adhere to the Federal Power Act Section 4(e) Forest Service Conditions on the eight hydro-electric projects licensed by the Federal Energy Regulatory Commission. S
- III Provide for utility transmission corridors. Emphasize the use of corridors when granting appropriate rights-of-way. G

## 2800 MINERALS AND GEOLOGY

### I Common Variety Minerals

- A Use of common variety mineral deposits will be considered with the following limitations: G
  - 1 Permit use of common variety mineral deposits subject to the environmental limitations of the site. G

## 5100 FIRE MANAGEMENT

### I Suppression

- A Use of tractor plows, retardant, constructed helispots and wheeled vehicles will be common. G

### II Fire Use and Fuels Treatment

- A Constructed fuel barriers will be no longer than eight miles in length and temporary or permanent openings will be limited to no more than 500 acres. G

- III Activity fuels—slash—will be treated to a level commensurate with the allowable fire intensity and rate of spread that meets resource objectives in established prescriptions. Treatment along highways and adjacent properties will meet applicable state laws. G

- IV Management action to address high fuel hazards may occur in old growth when public safety and property are at risk. G

## 7700 TRANSPORTATION SYSTEM

## I Oil and Gas

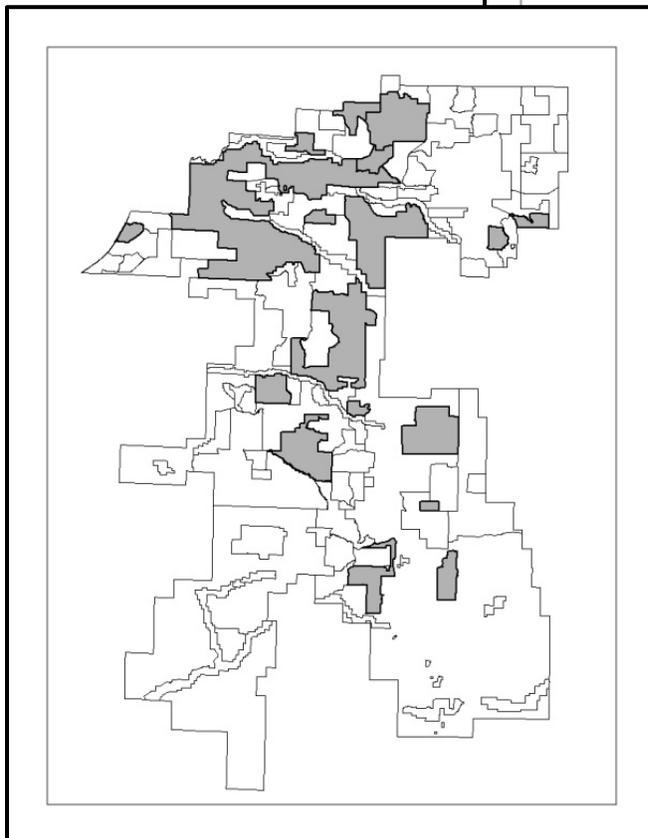
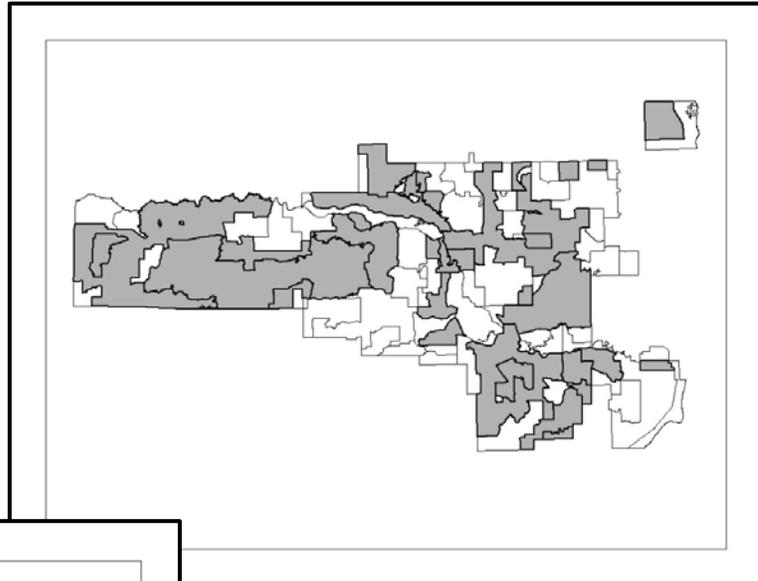
- A All temporary roads will be planned and constructed to be revegetated within one year of termination of contract, lease or permit. G
- B Arterial roads will be, as a minimum, designed and constructed to transport forest products and accommodate planned motorized recreation use, remain open and be maintained at level 3 standards or higher. G

## Management Area 4.2 - Roaded Natural Sandy Plains and Hills

### Maps:

Shaded area depicts Management Area 4.2.

**Figure III-3. Management Area 4.2 on the Huron National Forest.**



**Figure III-4. Management Area 4.2 on the Manistee National Forest.**

***Purpose:***

Management activities enhance and increase the variety of wildlife habitats with emphasis given to managing deer, grouse, wildlife and Kirtland's warbler essential habitat. High volumes of timber products are produced. Emphasis includes reducing life-threatening and property-damaging wildfire potential and providing a variety of recreational opportunities.

On the Huron National Forest, management activities maintain and develop essential nesting habitat for the Kirtland's warbler. Moderate to high volumes of softwood and low volumes of hardwood timber products are produced in Kirtland's warbler emphasis areas.

***Landscape Description:***

Dry, sandy plains and low, dry, sandy hills that support red and jack pines, oak, and aspen typify this area.

A considerable portion of the dry sand outwash plains on the Huron National Forest in Management Area 4.2 will be managed as essential habitat for the Kirtland's warbler. Management activities maintain and develop essential nesting habitat for the Kirtland's warbler in compliance with the provisions of Section 7 of the Endangered Species Act (P.L. 93-205) and as outlined in the Kirtland's Warbler Recovery Plan and the Strategy for Kirtland's Warbler Habitat Management.

This prescription area contains approximately 45 percent of all National Forest System lands on the Huron-Manistee National Forests, which includes approximately 136,000 acres of Kirtland's warbler emphasis areas.

Emphasis areas within Management Area 4.2 are displayed in Table III-3.

**Table III-3. Emphasis Areas Within Management Area 4.2.**

<b>Emphasis Area</b>	<b>Location</b>	<b>Objectives</b>
Kirtland's Warbler Management Areas	7 areas on the Huron National Forest.	<ul style="list-style-type: none"> <li>Maintain and develop essential nesting habitat for the Kirtland's warbler in compliance with the Kirtland's Warbler Recovery Plan.</li> <li>Create approximately 1,600 acres of essential breeding habitat each year. Approximately 15,960 acres of essential breeding habitat will be available at any one time into the foreseeable future. This will enable the Forests to provide for a minimum of 420 pairs of Kirtland's warblers.</li> </ul>
Grouse	Huron-Manistee National Forests	<ul style="list-style-type: none"> <li>Manage aspen intensively to provide quality grouse habitat.</li> </ul>

**Table III-3. Emphasis Areas Within Management Area 4.2 (Continued).**

<b>Emphasis Area</b>	<b>Location</b>	<b>Objectives</b>
Deer	Huron National Forest	<ul style="list-style-type: none"> <li>• Manage intensively to provide quality deer habitat with special emphasis on providing winter thermal cover.</li> </ul>
Wildlife Emphasis Areas: approximately 8,000 acres.		
Railroad Lake	Manistee National Forest	<ul style="list-style-type: none"> <li>• Manage for potential eagle territories.</li> </ul>
Red Bridge (East Portion)	Manistee National Forest	<ul style="list-style-type: none"> <li>• Manage for the American marten.</li> <li>• Manage for wildlife habitats.</li> </ul>
Red Bridge (West Portion)	Manistee National Forest	<ul style="list-style-type: none"> <li>• Manage for wildlife habitats.</li> </ul>
White River	Manistee National Forest	<ul style="list-style-type: none"> <li>• Encourage landowners to request the advice of state and federal biologists on any activities that may affect the bald eagle's nesting territory.</li> <li>• Manage for bald eagle territories and limited deer range.</li> </ul>
Alcona Pond	Huron National Forest	<ul style="list-style-type: none"> <li>• Manage for eagle territories.</li> </ul>
Sprinkler Lake	Huron National Forest	<ul style="list-style-type: none"> <li>• Manage for wildlife habitats; specifically loon, osprey, and bald eagle.</li> <li>• Manage for age class diversity throughout the area and retain some 25 to 30 percent of the oak as over-mature or old growth.</li> <li>• Maintain or develop permanent openings; five (5) percent of the area should ultimately be in grass/forb/shrub openings.</li> </ul>

### ***Goals and Objectives and Desired Future Condition:***

#### **Goals and Objectives:**

- Provide opportunities for dispersed recreational opportunities.
- Provide low amounts of developed recreational opportunities.
- Provide for water-related recreational opportunities.
- Provide a roaded natural recreational experience.
- Provide vegetative age diversity in all vegetation classes.
- Manage permanent openings and/or grasslands to meet species viability needs.  
Distribution of openings will recognize the contribution of adjacent private lands.
- Provide recreation opportunities consistent with essential habitat maintenance.
- Fulfill the Forests' responsibilities in the interagency effort outlined in the "Strategy for Kirtland's Warbler Habitat Management."

- Management will strive to increase utilization of wood residues and other currently non-merchantable material, when not needed for resource concerns such as soil productivity and wildlife habitat, for fuelwood and other special forest products.
- Quality sites and opportunities for intensive timber management practices will be identified commensurate with the site's ecological capabilities.
- Provide opportunities for mineral exploration and development.

### Desired Future Condition:

Each prescription area usually contains 1,000 acres or more and ownership is primarily National Forest. Human activities such as vegetative management, facilities, structures, utility corridors, mineral exploration and mineral development are evident. Users are aware of ecosystem processes, habitat management techniques, area closures, visitor information and other services provided. The area will provide roads and trails appropriate for motorized and non-motorized uses. Road closures are evident.

Timber stands are dominated by red, white and jack pines; red, white and black oaks; and aspen. The dominant trees in stands are the same age and about the same size. Stands differ in age and are irregular in size and shape, giving the landscape a mosaic appearance. Openings are interspersed throughout the area. There are approximately 43,386 acres of designated old growth in this management area.

### Standards and Guidelines:

#### 1900 PLANNING

##### I Vegetation Management

- A Native prairies—jack pine barrens—may be established where prairie plant species, such as rough fescue, pale agoseris, big and little bluestem, are abundant. G

#### 2200 RANGELAND MANAGEMENT

- I Grazing will not be permitted in essential Kirtland's warbler habitat. G

#### 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

##### I Kirtland's warbler:

- A Occupied Kirtland's warbler habitats will be closed to public entry during the breeding and nesting seasons, except for approved tours. G

- B Closed areas and roads will be posted. Where necessary, roads will be gated. G

- II Provide for dispersed recreational opportunities consistent with essential habitat maintenance. G

##### III Trails

- A General Management

- 1 Do not construct new trails in Kirtland's warbler essential habitat. G
- 2 Off-Highway Vehicles and motorcycle trails in essential habitat will be relocated to areas outside of essential habitat where possible. G
- 3 Kirtland's warbler nesting habitat will not be developed within 100 feet of Off-Highway Vehicle and motorcycle trails that cannot be relocated outside of essential habitat. G
- B Off-Highway Vehicles, Including Snowmobiles
  - 1 Allow competitive use of Off-Highway Vehicles where appropriate. G
- IV River Road National Scenic Byway
  - A Federal oil and gas leases will contain a no-surface-occupancy stipulation within 300 feet along the River Road National Scenic Byway. G

#### 2400 TIMBER MANAGEMENT

- I The following Standards and Guidelines apply to both even-aged and uneven-aged silvicultural systems.
  - A Uneven- and even-aged systems will be used. They will be consistent with area management objectives and the following restrictions:
    - 1 Even-aged management will be the primary silvicultural system used. G
    - 2 The uneven-aged system will normally be used only in northern hardwoods. G
    - 3 Stand size in wildlife emphasis areas may be less than 10 acres. G
    - 4 Seasonal restrictions on time of entry for timber harvests may be applied to protect other resources, activities and facilities. G
    - 5 Standard cutting methods such as single-tree and group selection, shelterwood, seed-tree and clearcutting may be used. S
    - 6 Major considerations of sale layout are logging system feasibility; road system adequacy and feasibility; adjacent landowners; visual aesthetics and resource protection, use and facilities. G
    - 7 Silvicultural standards will incorporate genetic improvement principles, practices and programs. G
    - 8 Regeneration activities:
      - a Site preparation activities can include mechanical, prescribed fire, hand and chemical. G
      - b For revegetation, use native vegetative G

- species for timber production purposes.  
Revegetation activities can include natural–preferred–artificial or seeding methods.
- c Fertilization may be used to establish vegetation on disturbed areas. Manage use of fertilizers or soil enrichments to prevent movement into lakes and streams. G
- II The following Standards and Guidelines apply only to the even-aged silvicultural system:
- A Temporary openings created by the application of the even-aged silvicultural system:
- 1 Will be separated by a stand of at least 10 acres, except in wildlife emphasis areas. G
  - 2 Regeneration harvests will be 40 acres or less, except in Kirtland’s Warbler Management Areas. G
  - 3 In deer, grouse and wildlife emphasis areas, temporary openings created by even-aged management will generally not exceed 15 acres. They may be as large as 40 acres in major deer wintering or adjacent areas, or for golden-winged warbler may be 25 acres. G
- B Firewood gathering will be allowed except in old growth areas. A permit is required. G
- C Intermediate treatment guidelines include:
- 1 Using mechanical, chemical or hand release methods in all vegetative types. G
  - 2 Pruning for timber visual improvement, safety and wildlife. G
  - 3 Thinning. G
  - 4 Using precommercial thinnings to maintain winter thermal cover for deer in lowland hardwood and conifer types. G
- D Harvest guidelines include the following: (See Appendix B for a discussion of each harvest method):
- 1 The clearcutting method may be used only for jack, red and white pines; oak; aspen; lowland conifers and northern hardwoods with adequate advanced regeneration; G
  - 2 The seed-tree cutting method may be used only for jack, red and white pines and lowland conifers; and G
  - 3 The shelterwood cutting method may be used only for jack, red and white pines; all oak; northern hardwoods; lowland conifers and lowland hardwoods. G
- E Allow commercial thinning in all vegetative types. G  
Precommercial thinning in all types is allowed if necessary to meet objectives of timber, wildlife and/or visual quality objectives.

## 2600 WILDLIFE, FISH AND SENSITIVE PLAN HABITAT MANAGEMENT

## I General Management

## A Mesic Grasslands

- 1 Manage mesic grassland habitats as areas 250 acres or larger. G
- 2 If 250-acre areas are not attainable, provide multiple patches 75 acres or larger, which total at least 250 acres within a 640-acre area. G
- 3 Manage multiple habitat areas within one mile of each other to increase suitability if possible. G

## B Dry Grasslands

- 1 Manage dry grassland habitat, 250 acres or larger in Landtype Associations 1 and 2. Manage multiple habitats as blocks when they are within one mile of each other to increase suitability. G

- C Provide for waterhole development or restoration where surface runoff and soil conditions permit. G

## II Endangered and Threatened Species and Their Management

## A Kirtland's Warbler

- 1 Management of essential habitat will be consistent with the Strategy for Kirtland's Warbler Habitat Management, the Kirtland's Warbler Recover Plan and the guidelines below. G
- 2 Develop Kirtland's warbler breeding habitat by designing and configuring treatment blocks that mimic the regeneration effects of wildfire. G
- 3 Prepare treatment blocks for regeneration by clearcutting. G
- 4 Treatment blocks will be no greater than 550 acres unless reviewed by the Regional Forester. G
- 5 If temporary openings created by adjacent treatment blocks exceed 550 acres, one block will be stocked before the other is sold. G
- 6 Harvesting of immature stands is permitted to create large treatment blocks. G
- 7 Provide 15 to 25 snags per acre in treatment blocks. Table III-4 displays wildlife structure and forage prescriptions for Management Area 4.2KW. G

**Table III-4. Wildlife Structure and Forage Prescriptions by Vegetative Treatment for Management Area 4.2KW.**

Structural Component	Regeneration Harvest		Intermediate Harvest	
	Number <u>1/</u>	DBH <u>2/</u>	Number	DBH
Snags	15-25	> 6	9	9
Mast/Den Trees (All Except)	4		4	
Down Wood	3	10	3	10
<u>1/</u> Numbers are per acre minimums. <u>2/</u> Diameter Breast Height (DBH) = Minimum size objectives are displayed. Diameters should be representative of the largest trees in the stand.				

- 8 The target jack pine seedling density is 1,452 or more trees per acre—5 x 6 spacing over 75 percent of the treatment block—excluding planned openings. G
- 9 Create openings in plantation and in treatment blocks that have regenerated naturally. Openings will be from 0.1 to .25 acre in size, and well distributed over 25 percent of the treatment block. G

**B Piping Plover**

- 1 Active nest sites and areas used for raising young will be protected from human disturbance and pets. Pets will be required to be on a leash between April 1 and August 31, and at any time near an active nest. s
- 2 The following access restrictions will apply from April 1 to August 31 and any time around active nest sites: s
  - a Except for emergency administrative use, vehicle traffic will be prohibited along the beach. Efforts will be made to coordinate emergency administrative use with individuals knowledgeable of nest sites. s
  - b Trail management and construction will direct the public away from active nest sites. s
  - c Pedestrians will be prohibited from leaving trails and entering nest site areas. s
  - d Kite flying will be prohibited within 650 feet of active nest site areas. s
- 3 Signing and symbolic fencing, such as two strands of twine tied between posts, will be allowed to keep human activity at least 134 feet away from predator exclosures. If needed, a larger protection area may be designated. Fencing and signing will be installed using current acceptable procedures. G
- 4 Where necessary, nesting and feeding areas will be G

protected from predators through predator exclosures and other proven devices and methods. Exclosures will be as follows: 5 feet between the nest and the predator exclosure, and 134 feet between predator exclosure and the psychological/ symbolic fencing. Construction will occur at a time that does not subject the eggs to adverse weather during absence of adults. Fencing and signing will be installed using current acceptable procedures.

- C Pitcher's Thistle
  - 1 See Chapter II, 2600 for Standards and Guidelines. G
- IV Regional Forester Sensitive Species
  - A Standards and Guidelines for the management of Regional Forester Sensitive Species are:
    - 1 Within core northern hardwood habitat areas:
      - a In 80 percent of the high-quality mesic northern hardwood (ginseng) habitat:
        - 1 Permit non-ground disturbing activities that mimic natural disturbance regimes common to this habitat. G
        - 2 Permit maintenance of existing improvements. G
      - b In the remaining 20 percent of the high-quality mesic northern hardwood habitat:
        - 1 Maintain 80 percent crown closure. G
    - 2 Allow potential high-quality mesic northern hardwood forest habitat adjacent to core areas to convert to actual high-quality mesic northern hardwood forest habitat. G
    - 3 New motorized trails will not be constructed in cedar swamps, hardwood conifer swamps and subirrigated forests unless there are no other reasonable routes. G
  - B Manage wetlands identified as good and excellent sandhill crane nesting habitat to improve habitat conditions for this species. G
  - C Develop and implement management direction for each osprey nesting area and great blue heron colony. G
  - D Cerulean Warbler
    - 1 Timber management and road construction activities should not occur in occupied habitat within 400 feet of a cerulean warbler nest tree, approximately a 10-acre area, during the breeding season. G
- III Wildlife Emphasis Areas
  - A Condon Lakes
    - 1 In 25 to 35 percent of selected oak stands, extend the G

- rotation age to 120 years.
- 2 Identify 25 to 35 percent of the stands in the area to be retained as over-mature. This should be concentrated around the isolated lakes, but there should also be stands identified for this throughout the area. G
- B Railroad Lake**
- 1 Identify potential bald eagle nest and roost sites, and protect these from development and other activities. G
- C Red Bridge (East and West)**
- 1 Continue cooperative efforts with Consumers Energy to protect bald eagle that will:
- a Maintain the designated buffer zones around the bald eagle nest. G
- b Identify areas of potential nest sites and protect from development or alteration. G
- c Where necessary, establish seasonal closures of areas and roads. G
- d Coordinate fish management activities for Tippy Dam Pond to protect and maintain an adequate food resource for eagles. G
- e Maintain at least 60 percent of the territory in 60 plus age class. G
- f Identify 25 percent of the stands in the area to be retained as over-mature or old growth. G
- D White River**
- 1 Continue or develop cooperative efforts with private landowners that will:
- a Establish and maintain protective zones around bald eagle nests. G
- b Avoid and discourage disturbances during critical periods. G
- 2 Identify areas of potential nest sites and protect these from alteration or development on National Forest System lands. G
- 3 Management for other wildlife habitats should not conflict with the management and protection of potential bald eagle habitat elements. G
- E Alcona Pond**
- 1 Maintain the bald eagle nest sites and any other potential sites that now exist in their present undisturbed condition. G
- a Where feasible, all roads and trails on these parcels would be closed and obliterated. G
- b The only developments or alterations on these tracts that would be permitted would be those that would enhance the nesting G

ability of the eagles. If recreational activities became a disruption, seasonal closures may be necessary to protect the nest site.

#### F Sprinkler Lake

- 1 Continue cooperative efforts to protect bald eagle that will: **G**
  - a Maintain the designated buffer zones around the bald eagle nest. **G**
  - b Identify areas of potential nest sites and protect from development or alteration. **G**
  - c Where necessary, establish seasonal closures of areas and roads. **G**
  - d Maintain at least 60 percent of the territory in 60 plus age class. **G**
  - e Identify 25 percent of the stands in the area to be retained as over-mature or old growth. **G**
- 2 Maintain the aspen type and age class diversity through coordinated regeneration cuts. **G**
- 3 Develop age class diversity in the oak types through regeneration cuts and extend the rotation age of 25 percent of the oak type to produce over-mature or old-growth stands. **G**
- 4 Maintain the walk-in only boat access on the lake and ban motors, except for electric motors. **G**
- 5 Do not increase road density in the area. **G**
- 6 Maintain loon closures. **G**

#### G Deer Yards

- 1 Manage recognized deer yards outside old-growth areas to provide a sustained supply of winter thermal cover and associated browse. **G**

### 2700 SPECIAL USES MANAGEMENT

- I Decisions on applications for special uses involving National Forest System lands will be made on an individual basis. **G**
- II Adhere to the Federal Power Act Section 4(e) Forest Service Conditions on the eight hydro-electric projects licensed by the Federal Energy Regulatory Commission. **S**
- III Provide for utility transmission corridors. Emphasize the use of corridors when granting appropriate rights of way. Except, discourage utility transmission corridors in Kirtland's Warbler Management Areas. **G**

### 2800 MINERALS AND GEOLOGY

#### I Endangered, Threatened and Sensitive Wildlife

##### A Kirtland's warbler

- 1 The following stipulations will be incorporated into federal oil and gas leases and recommended to be **S**

incorporated into state oil and gas leases on National Forest System lands and shall apply to any operation for which this lease is a part.

- a Kirtland's warbler essential habitat will be available for limited oil and gas development as shown in table III-5:

**Table III-5. Oil and Gas Development Density.**

<b>Age of Essential Habitat</b>	<b>Maximum Development Density</b>
0 to 25 years	1 surface location per 640 acres
26 to 40 years	1 surface location per 160 acres
Older than 40 years	1 surface location per 640 acres

- b Surface operation location priorities are:
  - 1 First priority for surface operation location will be stands (or inclusions of stands) that are not biologically appropriate for the development of breeding habitat for the Kirtland's warbler.
  - 2 Second priority for surface operation location will be stands within essential habitat that are greater than 26 years old.
  - 3 Third priority for surface operation location will be stands within essential habitat that are 0 to 25 years old.
- c Exceptions may be granted through consultation with the Forest Service and the U.S. Fish and Wildlife Service.
- 2 Common variety mineral deposits will not be developed in areas of essential Kirtland's warbler habitat. s
- 3 The following conditions of approval would be attached to any permit for exploration and development. s
  - a No drilling, exploration, construction or maintenance involving the use of heavy equipment shall take place within one-half mile of or create noise greater than 85 decibels in occupied habitat, between May 1 and September 30. s
  - b In occupied habitat, proven wells can be operated between October 1 and April 30, but between May 1 and September 30 only if they are flowing or operated by a bottom-hole pump and: s
    - 1 the product is transported by buried pipeline; s
    - 2 collection and storage facilities are g

- located off essential habitat where reasonable;
- 3 noise from production operations will be less than 85 decibels at 100 feet; s
  - 4 access is limited to routine monitoring of the well. s
  - 4 In all essential habitat, oil and gas development shall be done in such a manner that the management of this habitat through the use of prescribed burning and planting is not precluded. G
  - 5 All access roads will be gated and locked. s
  - 6 Location of well sites, roads, facilities and pipelines will be approved by the Forest Line Officer in charge prior to construction. s
  - 7 A reclamation plan for all wells, pipelines, production facilities and access routes must be submitted to the Forest Line Officer in charge for approval. These plans will detail the replanting and restoration of these areas. Disturbed areas will be restored after completion of drilling and/or production operations. s
    - a Those areas not scheduled for reforestation and all areas disturbed prior to reforestation will receive treatments to establish permanent vegetative cover. The permanent vegetative cover will consist of a mixture of native warm season grasses; such as Big Bluestem, Little Bluestem, Indian grass and a variety of annual forbs and legumes. These will be scheduled for establishment just prior to the next growing season, generally late April, May or early June. If an activity is completed before this timeframe, an annual cover crop with adequate soil nutrients is required. s
    - b All soil disturbance actions associated with the oil and gas exploration and development activity will receive similar treatments. s
  - 8 Upon the establishment of economically producible reserves, a general hydrocarbon development plan must be submitted. This plan will detail future oil and/or gas development of the newly established field. s
  - 9 Access to oil and gas development is by low standard road with minimum clearing. The access road should be obliterated upon abandonment of the site. G
- B Karner Blue Butterfly
- 1 Federal oil and gas leases will contain a lease notice that the lands are identified as Karner blue butterfly s

- metapopulation areas and occupancy is subject to more restrictive controls than routine areas.
- 2 Access to oil and gas development is by low standard road with minimum clearing. These roads are gated. The access road should be obliterated upon abandonment of the site. **G**
- II Wildlife Emphasis Areas
- A Federal oil and gas leases will contain a lease notice that the lands are being managed as wildlife emphasis areas and occupancy is subject to more restrictive controls than routine areas. **S**
- B Access to oil and gas development is by low standard road with minimum clearing. These roads are gated. The access road should be obliterated upon abandonment of the site. **G**
- III Common Variety Minerals
- A Use of common variety mineral deposits will be considered with the following limitations: **G**
- 1 Permit use of common variety mineral deposits subject to the environmental limitations of the site. **G**
- 3400 FOREST PEST MANAGEMENT
- I In the Kirtland's Warbler Management Areas, pesticides will be used only after consultation and coordination with the U.S. Fish and Wildlife Service. **S**
- II Control of predators and parasites, such as cowbirds, will be completed within the scope of the Recovery Plan and coordinated through the U.S. Fish and Wildlife Service and the Kirtland's Warbler Recovery Team. **G**
- 5100 FIRE MANAGEMENT
- I Suppression
- A Use of tractor plows, retardant, constructed helispots and wheeled vehicles will be common. **G**
- II Fire Use and Fuels Treatment
- A Constructed fuel barriers will be no longer than eight miles in length, and temporary or permanent openings will be limited to no more than 500 acres. **G**
- III Activity fuels (slash) will be treated to a level commensurate with the allowable fire intensity and rate of spread that meets resource objectives in established prescriptions. Treatment along highways and adjacent properties will meet applicable state laws. **G**
- IV Management action to address high fuel hazards may occur in old growth when public safety and property are at risk. **G**

## 7700 TRANSPORTATION SYSTEM

## I Kirtland's Warbler/Bald Eagle

- A Close roads under National Forest jurisdiction in occupied Kirtland's warbler and bald eagle habitats to public entry during the breeding and nesting seasons, where necessary. G

## II Oil and Gas

- A All temporary roads will be planned and constructed to be revegetated within one year of termination of the contract, lease or permit. G
- B Arterial roads will be, as a minimum, designed and constructed to transport forest products and accommodate planned motorized recreation use, remain open and be maintained at level 3 standards or higher. G

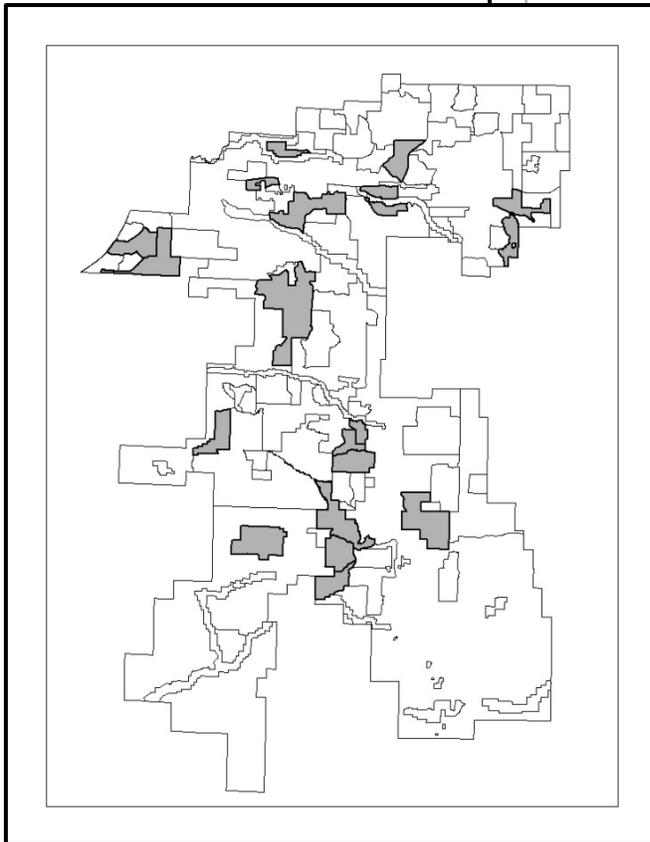
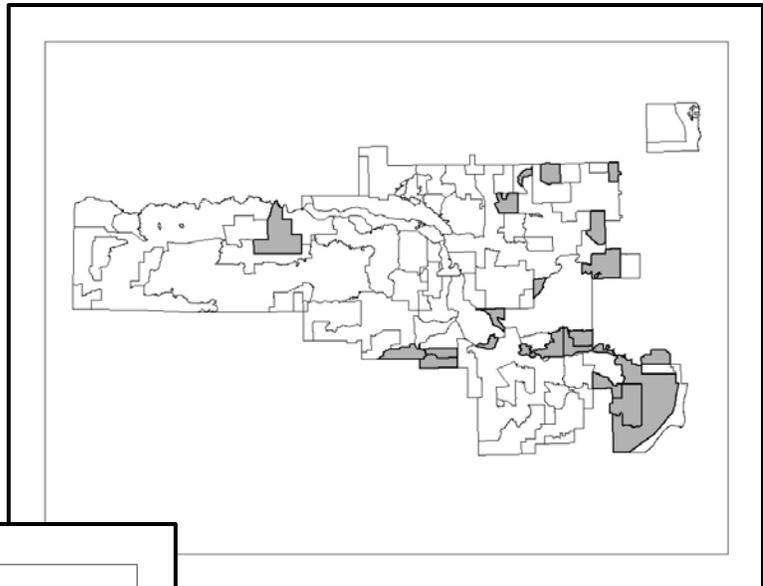


## Management Area 4.3 - Roaded Natural Wetlands

### Maps:

Shaded area depicts Management Area 4.3.

**Figure III-5. Management Area 4.3 on the Huron National Forest.**



**Figure III-6. Management Area 4.3 on the Manistee National Forest.**

**Purpose:**

Management activities in these areas provide a variety of forest views and scenes and recreational experiences in a primarily motorized recreational environment. Fish and wildlife are abundant, and efforts are made to increase and enhance various habitats. Emphasis is given to managing deer, grouse and wildlife emphasis areas.

**Landscape Description:**

These areas are predominately maturing lowland hardwoods and conifer types, aspen, and wetlands. Rivers, lakes and associated riparian zones are common.

This prescription area contains approximately twelve percent of all National Forest System lands on the Huron-Manistee National Forests.

Emphasis areas within Management Area 4.3 are displayed in Table III-6.

**Table III-6. Emphasis Areas Within Management Area 4.3.**

<b>Emphasis Area</b>	<b>Approximate Acreage</b>	<b>Location</b>	<b>Objectives</b>
Grouse	14,100	Huron-Manistee National Forests	<ul style="list-style-type: none"> <li>• Manage intensively to provide quality grouse habitat.</li> </ul>
Deer	14,900	Huron-Manistee National Forests	<ul style="list-style-type: none"> <li>• Manage intensively to provide quality deer habitat with special emphasis on providing winter thermal cover.</li> </ul>
Wildlife Emphasis Areas: Approximately 24,800 acres			
Blockhouse Swamp		Huron National Forest	<ul style="list-style-type: none"> <li>• Identify the thermal cover and use only those treatments that improve and sustain thermal quality.</li> <li>• Identify and schedule cuts, commercial or non-commercial, that will develop and sustain age class diversity or winter browse conditions in the area.</li> <li>• Maintain existing permanent openings outside of designated old growth.</li> </ul>

**Table III-6. Emphasis Areas Within Management Area 4.3 (Continued).**

<b>Emphasis Area</b>	<b>Approximate Acreage</b>	<b>Location</b>	<b>Objectives</b>
Huron Shores		Huron National Forest	<ul style="list-style-type: none"> <li>• Maintain the beach tracts in their current undeveloped condition.</li> <li>• Identify those portions of the area to be managed through regeneration cuts to provide desired age class diversity for food and cover conditions for various species.</li> <li>• Maintain existing openings outside of designated old growth.</li> <li>• Develop limited access to key habitat management areas.</li> <li>• Consolidate key tracts through acquisition.</li> </ul>
Tuttle Marsh		Huron National Forest	<ul style="list-style-type: none"> <li>• Provide opportunities for various habitat improvement projects within the complex of wetlands.</li> <li>• Provide winter deer range.</li> <li>• Provide habitats in open water and deep marshes for a variety of wildlife species.</li> </ul>
Cooke Dam		Huron National Forest	<ul style="list-style-type: none"> <li>• Obtain cooperation of private landowners to protect potential or existing nest sites and/or acquire conservation easement or fee title to any lands that become available within the territory.</li> <li>• Schedule regeneration cuts to improve winter deer range.</li> </ul>
South Branch River		Huron National Forest	<ul style="list-style-type: none"> <li>• Maintain up to 5 percent of the area as permanent openings outside of designated old growth to provide wildlife forage.</li> <li>• Maintain the integrity of the identified potential eagle nest sites and remoteness of the lakes.</li> <li>• Acquire water frontage lands that become available in this area.</li> </ul>
Mio Pond		Huron National Forest	<ul style="list-style-type: none"> <li>• Acquire private lands within the eagle territory, where possible.</li> <li>• Where possible, reduce road density or close roads.</li> </ul>

**Table III-6. Emphasis Areas Within Management Area 4.3 (Continued).**

<b>Emphasis Area</b>	<b>Approximate Acreage</b>	<b>Location</b>	<b>Objectives</b>
Jenks Lake		Manistee National Forest	<ul style="list-style-type: none"> <li>• Provide habitat for potential eagle territories.</li> <li>• Acquire key tracts as they become available.</li> </ul>
Otterman Lake		Manistee National Forest	<ul style="list-style-type: none"> <li>• Provide thermal cover for deer in the winter deer range within the lowland conifer areas.</li> <li>• Manage to improve browse conditions in intermingled deciduous stands.</li> </ul>
Oxford Swamp (North and South Portions)		Manistee National Forest	<ul style="list-style-type: none"> <li>• Where feasible, maintain isolation of the wetlands.</li> <li>• Maintain or develop grassy openings outside designated old growth—5 acres or larger when possible.</li> <li>• Improve wetlands through brush removal to favor herbaceous plant communities.</li> <li>• Develop a long-range treatment schedule for the timber stands within the area that will maintain present species composition or favor the short lived types adjacent to lowland conifer and ultimately provide a “balance” of age classes throughout the area. This would include: <ul style="list-style-type: none"> <li>○ Making regeneration cuts in 15 percent or more of the upland and lowland hardwood stands each decade.</li> <li>○ Maintaining and improving the lowland conifer stands for thermal cover. Stands of this type should be held as long as possible, but they will have to eventually be regenerated.</li> <li>○ Identifying stands, 20 to 80 percent of the forested area, that will become over-mature, preferably within close proximity to open wetlands.</li> </ul> </li> </ul>

**Table III-6. Emphasis Areas Within Management Area 4.3 (Continued).**

Emphasis Area	Approximate Acreage	Location	Objectives
Olga Lake		Manistee National Forest	<ul style="list-style-type: none"> <li>• Develop and improve non-forested wetlands by increasing open water areas, providing more nesting structures and enhancing the quality of wetland vegetation.</li> <li>• Maintain and improve lowland conifer stands for thermal cover.</li> <li>• Identify stands for regeneration cuts to improve age class diversity and provide habitat for grazers, browsers and early succession species, and to provide horizontal diversity and low cover; including conversion of pine to other timber types or to grass/shrub openings.</li> <li>• Maintain or develop openings outside of designated old growth to enhance production of forage in the area and provide nesting or feeding areas for species such as bluebirds, vesper sparrows, voles, waterfowl, snapping turtles and sandhill cranes.</li> <li>• Manage the American marten in cooperation with the Michigan Department of Natural Resources, university researchers and volunteers in monitoring movements and reproduction success.</li> </ul>
Walkinshaw Wetlands		Manistee National Forest	<ul style="list-style-type: none"> <li>• Manage the wetlands to provide desired water and vegetation conditions.</li> <li>• Continue vegetation management through grazing and grass-land improvement that will maintain desired conditions for sandhill crane and other species associated with the wetland/ grassland communities.</li> <li>• Maintain or develop dispersed grassy openings, outside designated old growth, in the west area.</li> </ul>

### **Goals and Objectives and Desired Future Condition:**

#### **Goals and Objectives:**

- Provides high amounts of dispersed recreational activities such as hunting, fishing, viewing scenery, bird watching, canoeing, with limited Off-Highway Vehicle use.
- Provides low to moderate amounts of recreational facilities such as canoe landings, campgrounds and picnic areas.
- Provides low volumes of timber products.
- Management will strive to increase utilization of wood residues and other currently non-merchantable material, when not needed for resource concerns such as soil productivity and wildlife habitat, for fuelwood and other special forest products.
- Quality sites and opportunities for intensive timber management practices will be identified commensurate with the site's ecological capabilities.
- Manage permanent openings and/or grasslands to meet species viability needs. Distribution of openings will recognize the contribution of adjacent private lands.
- Manage for mesic grassland habitats.
- Provide opportunities for mineral exploration and development.

#### **Desired Future Condition:**

Each prescription area usually contains more than 1,000 acres, and ownership is primarily National Forest System lands. Human activities are evident and interaction among users is moderate. The area will provide roads and trails appropriate for motorized and non-motorized uses. A net reduction of road miles is noticeable.

Extensive stands of softwood and hardwood species occur throughout the area and create a natural forest appearance. The dominant tree species are aspen, cedar, hemlock, red maple, elm, black ash and paper birch. There are approximately 29,100 acres of designated old growth in this management area. Openings are interspersed throughout the area.

### **Standards and Guidelines:**

#### 2200 RANGELAND MANAGEMENT

- I Allow grazing only to maintain specific wildlife habitats. G

#### 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

- I Trails (Other than North Country National Scenic Trail)
- A Off-Highway Vehicles, Including Snowmobiles
- 1 Allow competitive use of Off-Highway Vehicles G  
where appropriate.
- II River Road National Scenic Byway
- A Federal oil and gas leases will contain a no surface G

occupancy stipulation within 300 feet along the River Road National Scenic Byway.

## 2400 TIMBER MANAGEMENT

I The following Standards and Guidelines apply to both even- and uneven-aged silvicultural systems.

A Uneven- and even-aged systems will be used. They will be consistent with area management objectives and the following restrictions:

- 1 Even-aged management will be the primary silvicultural system used. G
- 2 The uneven-aged system will normally be used only in northern hardwoods. G
- 3 Stand size in wildlife emphasis areas may be less than 10 acres. G
- 4 Seasonal restrictions on time of entry for timber harvests may be applied to protect other resources, activities and facilities. G
- 5 Standard cutting methods such as single-tree and group selection, shelterwood, seed-tree and clearcutting may be used. S
- 6 Major considerations of sale layout are logging system feasibility, road system adequacy and feasibility, adjacent landowners, visual aesthetics and resource protection, use and facilities. G
- 7 Silvicultural standards will incorporate genetic improvement principles, practices and programs. G
- 8 Regeneration activities:
  - a Site preparation activities can include mechanical, prescribed fire, hand and chemical. G
  - b For revegetation, use native vegetative species for timber production purposes. Revegetation activities can include natural-preferred-artificial or seeding methods. G
  - c Fertilization may be used to establish vegetation on disturbed areas. Manage use of fertilizers or soil enrichments to prevent movement into lakes and streams. G

II The following Standards and Guidelines apply only to the even-aged silvicultural system:

A Temporary openings created by the application of the even-aged silvicultural system:

- 1 Will be separated by a stand of at least 10 acres, except in wildlife emphasis areas. G
- 2 In deer, grouse and wildlife emphasis areas, temporary G

- openings created by even-aged management will generally not exceed 15 acres. They may be as large as 40 acres in major deer wintering or adjacent areas, or for golden-winged warbler they may be 25 acres.
- B Firewood gathering will be allowed except in old growth areas. A permit is required. G
- C Intermediate treatment guidelines include:
- 1 Using mechanical, chemical, or hand release methods in all vegetative types. G
  - 2 Pruning for timber–crop trees–visual improvement, safety and wildlife–fruit trees. G
  - 3 Thinning. G
  - 4 Using precommercial thinnings to maintain winter thermal cover for deer in lowland hardwood and conifer types. G
- D Harvest guidelines include the following: (See Appendix B for a discussion of each harvest method):
- 1 The clearcutting method may be used only for jack, red and white pines; oak; aspen; lowland conifers and northern hardwoods with adequate advanced regeneration. G
  - 2 The seed-tree cutting method may be used only for jack, red and white pines and lowland conifers. G
  - 3 The shelterwood cutting method may be used only for jack, red and white pines; all oak, northern hardwoods; lowland conifers and lowland hardwoods. G
- E Allow commercial thinning in all vegetative types. G  
Precommercial thinning in all types is allowed if necessary to meet objectives of timber, wildlife and/or visual quality objectives.

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

### I General Management

#### A Mesic Grasslands

- 1 Manage mesic grassland habitats as areas 250 acres or larger. G
- 2 If 250-acre areas are not attainable, provide multiple patches 75 acres or larger, which total at least 250 acres within a 640-acre area. G
- 3 Manage multiple habitat areas within one mile of each other to increase suitability if possible. G

#### B Dry Grasslands

- 1 Manage dry grassland habitat, 250 acres or larger in Landtype Associations 1 and 2. Manage multiple habitats as blocks when they are within one mile of each other to increase suitability. G

## II Endangered and Threatened Species and Their Habitat Management

## A Piping Plover

- 1 Active nest sites and areas used for raising young will be protected from human disturbance and pets. Pets will be required to be on a leash between April 1 and August 31 and at anytime near an active nest. s
- 2 The following access restrictions will apply from April 1 to August 31 and any time around active nest sites: s
  - a Except for emergency, administrative use, vehicle traffic will be prohibited along the beach. Efforts will be made to coordinate emergency, administrative use with individuals knowledgeable of nest sites. s
  - b Trail management and construction will direct the public away from active nest sites. s
  - c Pedestrians will be prohibited from leaving trails and entering nest site areas. s
  - d Kite flying will be prohibited within 650 feet of active nest site areas. s
- 3 Signing and psychological/symbolic fencing, such as 2 strands of twine tied between posts, will be allowed to keep human activity at least 134 feet away from predator exclosures. If needed, a larger protection area may be designated. Fencing and signing will be installed using current acceptable procedures. G
- 4 Where necessary, nesting and feeding areas will be protected from predators through predator exclosures and other proven devices and methods. Exclosures will be as follows: 5 feet between the nest and the predator exclosure, and 134 feet between predator exclosure and the psychological/symbolic fencing. Construction will occur at a time that does not subject the eggs to adverse weather during absence of adults. Fencing and signing will be installed using current acceptable procedures. G

## B Piping Plover Critical Habitat

- 1 Human disturbance, including pets, will be kept at a low level from April 1 through July 1 by prohibiting the following: G
  - a Pets, unless on a leash. G
  - b Loud noise. G
  - c Off-Highway Vehicles. G
  - d Beach fires within 400 feet of the shoreline. G

- e Collecting of driftwood, dunewood, root masses and dead shrubs. G
- 2 Prohibit sand mining and oil and gas leasing and development in critical habitat, except for reserved and outstanding mineral rights. S
- 3 Beach stabilization and vegetation planting for artificial dune stabilization will not be allowed if they impair natural processes. S
- 4 Management activities related to treatment of Lombardy poplar are prohibited between April 1 and July 1, or whenever piping plover are present. S
- 5 Between April 1 and July 1, prescribed burning activities will be limited to conditions when smoke will not drift into critical habitat areas or whenever piping plover are present. G
- 6 The following apply for the protection, restoration and maintenance of piping plover critical habitat containing primary constituent elements: G
  - a No new trail construction will occur. G
  - b Existing trails will be relocated where necessary. G
  - c Non-native woody vegetation–non-native invasive species–will be controlled. G
  - d Surveying will be conducted for the presence of active nest sites. G
- C Pitcher's Thistle
  - 1 See Chapter II, 2600 for Standards and Guidelines. G
- III Regional Forester Sensitive Species
  - A Standards and Guidelines for the management of Regional Forester Sensitive Species are:
    - 1 Within core northern hardwood habitat areas:
      - a In 80 percent of the high-quality mesic northern hardwood (ginseng) habitat:
        - 1 Permit non-ground disturbing activities that mimic natural disturbance regimes common to this habitat. G
        - 2 Permit maintenance of existing improvements. G
      - b In the remaining 20 percent of the high-quality mesic northern hardwood habitat:
        - 1 Maintain 80 percent crown closure. G
    - 2 Allow potential high-quality mesic northern hardwood forest habitat adjacent to core areas to convert to actual high-quality mesic northern hardwood forest habitat. G
    - 3 New motorized trails will not be constructed in G

- cedar swamps, hardwood conifer swamps and sub-irrigated forests unless there are no other reasonable routes.
- B Manage wetlands identified as good and excellent sandhill crane nesting habitat to improve habitat conditions for this species. G
  - C Develop and implement management direction for each osprey nesting area and great blue heron colony. G
  - D Cerulean Warbler
    - 1 Timber management and road construction activities should not occur in occupied habitat within 400 feet of a cerulean warbler nest tree—approximately a 10-acre area—during the breeding season. G
- IV Wildlife Emphasis Areas
- A Blockhouse Swamp
    - 1 Maintain low road density within the area. Any roads constructed to facilitate management activities should be closed when the activity ceases. G
  - B Huron Shores
    - 1 Identify and protect potential bald eagle nest sites. G
    - 2 Identify thermal cover and apply only those management treatments that improve and sustain cover quality. G
  - C Cooke Dam
    - 1 Establish the required buffer zones around bald eagle nest(s). G
    - 2 Identify perch trees and potential nest areas and protect from development or alterations. G
    - 3 Reduce the potential of disturbance by closing trails where necessary and feasible. G
  - D South Branch River
    - 1 Identify and protect potential bald eagle nest sites. G
    - 2 Maintain a low road and trail density and do not improve or develop access to the lakes within the area. G
    - 3 Identify the thermal cover areas used by deer and use only treatments that are needed to improve or sustain thermal qualities. G
    - 4 Identify those stands that are to be managed through regeneration cuts to increase and sustain winter browse conditions for deer. Such cuts should favor regeneration of short-lived types. G
  - E Mio Pond
    - 1 Identify and maintain the protection zone around bald eagle nests. G
    - 2 Identify and protect potential bald eagle nest sites. G

- F Jenks Lake
  - 1 Identify potential bald eagle nest and roost sites and protect these from development and other activities. G
- G Otterman Lake
  - 1 Treatment in lowland conifers will be made only to improve thermal cover conditions. G
  - 2 Regeneration cuts will be scheduled to improve and sustain browse conditions in locations strategic to thermal cover. Short lived types will be favored. G
  - 3 Openings outside of designated old growth will be maintained or developed to enhance forage production. G
  - 4 Where feasible, new roads or roads improved to facilitate management should be closed when not being used. G
- H Oxford Swamp (North Portion and South Portion)
  - 1 Over-mature stands within close proximity to open wetlands should be greater than 50 years old and should not be thinned to less than 80 square feet of basal area to attempt to produce a "park like" structure. G
  - 2 Stands to be maintained or developed as grassy openings should be 5 acres or larger. G
  - 3 Regeneration cuts should be made in 15 percent or more of the upland and lowland stands each decade. G
- I Olga Lake
  - 1 Conduct periodic drawdowns of Olga Lake to improve aquatic and emergent vegetation within the flooding. G
  - 2 Manipulate vegetation to improve habitat for important prey species without infringing upon essential habitat needs of the American marten. G
- J Walkinshaw Wetlands
  - 1 Provide habitat diversity within the forested types through periodic regeneration cuts. In areas adjacent to thermal cover, short-lived types will be favored. G
- K Deer Yards
  - 1 Manage recognized deer yards outside old growth areas to provide a sustained supply of winter thermal cover and associated browse. G

#### 2700 SPECIAL USES MANAGEMENT

- I Decisions on applications for special uses involving National Forest System lands would be made on an individual basis. G
- II Adhere to the Federal Power Act Section 4(e) Forest Service Conditions on the eight hydro-electric projects licensed by the Federal Energy Regulatory Commission. S
- III Provide for utility transmission corridors. Emphasize the use of G

corridors when granting appropriate rights of way.

## 2800 MINERALS AND GEOLOGY

### I Wildlife Emphasis Areas

- A Federal oil and gas leases will contain a lease notice that the lands are being managed as Wildlife Emphasis Areas and occupancy is subject to more restrictive controls than routine areas. S
- B Access to oil and gas development is by low standard road with minimum clearing. These roads are gated. The access road should be obliterated upon abandonment of the site. G

### II Common Variety Minerals

- A Use of common variety mineral deposits will be considered with the following limitations: G
  - 1 Permit use of common variety mineral deposits subject to the environmental limitations of the site. G

## 5100 FIRE MANAGEMENT

### I Suppression

- A Use of tractor plows, retardant, constructed helispots and wheeled vehicles will be common. G

### II Fire Use and Fuels Treatment

- A Constructed fuel barriers will be no longer than eight miles in length, and temporary or permanent openings will be limited to no more than 500 acres. G

- III Activity fuels—slash—will be treated to a level commensurate with the allowable fire intensity and rate of spread that meets resource objectives in established prescriptions. Treatment along highways and adjacent properties will meet applicable state laws. G

- IV Management action to address high fuel hazards may occur in old growth when public safety and property are at risk. G

## 7700 TRANSPORTATION SYSTEM

### I Oil and Gas

- A All temporary roads will be planned and constructed to be revegetated within one year of termination of contract, lease or permit. G
- B Arterial roads will be, as a minimum, designed and constructed to transport forest products and accommodate planned motorized recreation use, remain open, and, be maintained at level 3 standards or higher. G

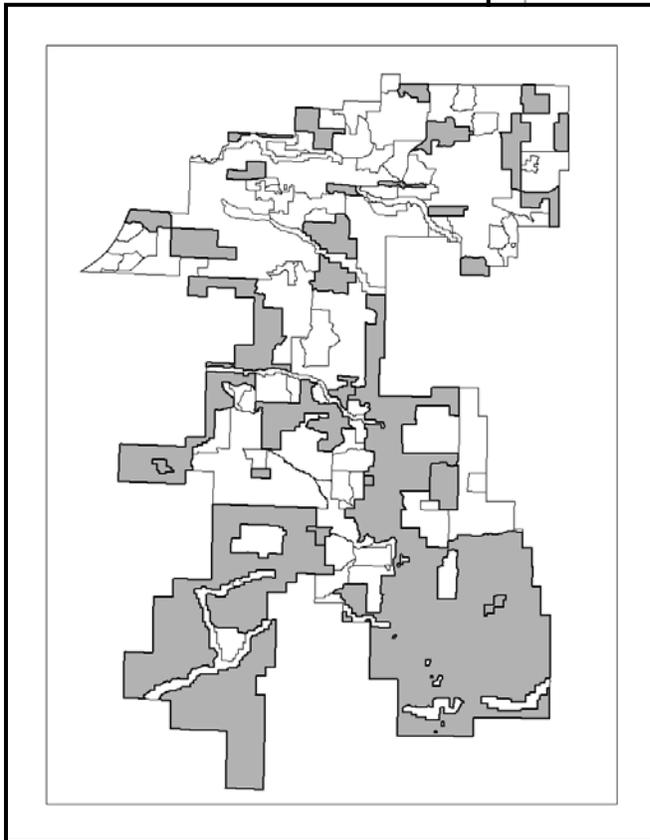
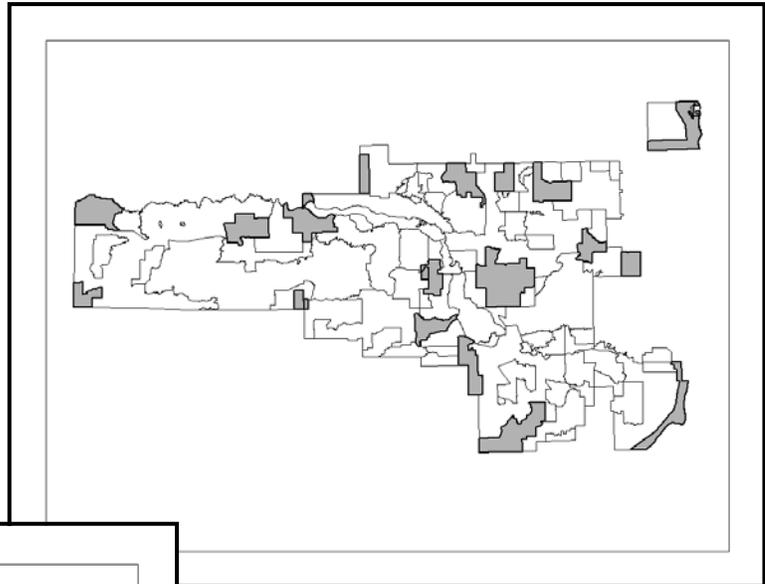


## Management Area 4.4 - Rural

### Maps:

Shaded area depicts Management Area 4.4.

**Figure III-7. Management Area 4.4 on the Huron National Forest.**



**Figure III-8. Management Area 4.4 on the Manistee National Forest.**

**Purpose:**

Management activities provide recreational opportunities, sources of firewood close to users, and moderate to high volumes of softwood timber products. Emphasis includes reducing life-threatening and property-damaging wildfire potential. Wildlife management is coordinated with adjacent non-National Forest land management with emphasis on deer, grouse and wildlife management. Some small blocks will be managed to protect isolated, essential areas for endangered, threatened or sensitive species.

**Landscape Description:**

This rural condition encompasses a broad spectrum of landforms that includes sandy plains, morainal hills and riparian areas. This condition exists where National Forest ownership is scattered and human activities have altered the landscape.

This prescription area contains approximately 13 percent of all National Forest System lands on the Huron-Manistee National Forests.

Emphasis areas within Management Area 4.4 are displayed in Table III-7.

**Table III-7. Emphasis Areas Within Management Area 4.4.**

<b>Emphasis Area:</b>	<b>Approximate Acreage</b>	<b>Location</b>	<b>Objectives</b>
Grouse	4,900	4 areas on Manistee National Forest 3 areas on Huron National Forest.	<ul style="list-style-type: none"> <li>• Manage intensively to provide quality grouse habitat.</li> <li>• Maintain or increase the acres of aspen/birch in grouse management areas.</li> </ul>
Wildlife	700	2 areas on Manistee National Forest.	<ul style="list-style-type: none"> <li>• Manage for long-lived oak in a “remote” setting.</li> <li>• Manage for eagle nesting on one of the more secluded lakes in this area.</li> <li>• Provide habitats for pileated woodpeckers, brown creepers, northern flying squirrels and other species associated with mature, over-mature and old-growth timber.</li> </ul>

**Goals and Objectives and Desired Future Condition:****Goals and Objectives:**

- Maintain or increase wildlife habitat diversity.

- Emphasize hazardous fuels treatment in wildland urban interface and intermix areas.
- Provide recreational facilities for camping or picnicking.
- Provide improvements for fish habitat.
- Intensively manage grouse emphasis areas to provide quality grouse habitat and manage aspen intensively.
- Management will strive to increase utilization of wood residues and other currently non-merchantable material, when not needed for resource concerns, such as soil productivity and wildlife habitat, for fuelwood and other special forest products.
- Quality sites and opportunities for intensive timber management practices will be identified commensurate with the site's ecological capabilities.
- Manage permanent openings and/or grasslands to meet species viability needs. Distribution of openings will recognize the contribution of adjacent private lands.
- Manage for mesic grassland habitats.
- Create dry prairie habitat on Sparta soils series.
- Emphasize placement of utilities corridors in this area. Corridors are common in this management area.
- Acquire, create and manage shallow water-emergent wetlands.
- Provide opportunities for mineral exploration and development.

### **Desired Future Condition:**

The ownership pattern of National Forest System land within this management area is often scattered. It is often a mixture of agricultural land, private lots and wooded National Forest System land that creates a rural environment. Human activities such as vegetation management, facilities, structures, utility corridors, mineral exploration and development are evident and harmonize with the surrounding environment. Interaction between users is frequent and users are aware of services provided, such as visitor information and law enforcement. There are few opportunities to test primitive outdoor skills. The area will provide roads and trails appropriate for motorized and non-motorized uses.

Red, white and jack pine are the dominant tree species, although aspen and other hardwoods are present. The trees within each stand are about the same age and size. The scattered openings on private land are agricultural fields, idle land, borrow pits and roads. Openings are interspersed throughout the area.

There are approximately 6,900 acres of designated old growth in this management area.

### **Standards and Guidelines:**

#### 2200 RANGELAND MANAGEMENT

- I Limit forage management to existing permanent openings where it is compatible with the desired character of the landscape. G

2300 RECREATION, WILDERNESS AND RELATED RESOURCE  
MANAGEMENT

- I Provide for dispersed recreational opportunities consistent with essential habitat maintenance. G
- II Trails
  - A Off-Highway Vehicles, Including Snowmobiles
    - 1 Allow competitive use of Off-Highway Vehicles where appropriate. G

2400 TIMBER MANAGEMENT

- I The following Standards and Guidelines apply to both even- and uneven-aged silvicultural systems.
  - A Uneven- and even-aged systems will be used. They will be consistent with area management objectives and the following restrictions:
    - 1 Even-aged management will be the primary silvicultural system used. G
    - 2 The uneven-aged system will normally be used only in northern hardwoods. G
    - 3 Stand size in wildlife emphasis areas may be less than 10 acres. G
    - 4 Seasonal restrictions on time of entry for timber harvests may be applied to protect other resources, activities and facilities. G
    - 5 Standard cutting methods such as single-tree and group selection, shelterwood, seed-tree and clearcutting may be used. S
    - 6 Major considerations of sale layout are logging system feasibility, road system adequacy and feasibility, adjacent landowners, visual aesthetics and resource protection, use and facilities. G
    - 7 Silvicultural standards will incorporate genetic improvement principles, practices and programs. G
    - 8 Regeneration activities:
      - a Site preparation activities can include mechanical, prescribed fire, hand and chemical. G
      - b For revegetation, use native vegetative species for timber production purposes. Revegetation activities can include natural-preferred-artificial or seeding methods. G
      - c Fertilization may be used to establish vegetation on disturbed areas. Manage use of fertilizers or soil enrichments to prevent movement into lakes and streams. G

- II The following Standards and Guidelines apply only to the even-aged

silvicultural system:

- A Temporary openings created by the application of the even-aged silvicultural system will be separated by a stand of at least 10 acres, except in wildlife emphasis areas. G
- B Firewood gathering will be allowed except in old growth areas. A permit is required. G
- C Intermediate treatment guidelines include:
  - 1 Using mechanical, chemical or hand release methods in all vegetative types. G
  - 2 Pruning for timber, visual improvement, safety and wildlife. G
  - 3 Thinning. G
  - 4 Using precommercial thinnings to maintain winter thermal cover for deer in lowland hardwood and conifer types. G
- D Harvest guidelines include the following:
  - 1 The clearcutting method may be used only for jack, red and white pines; oak; aspen; lowland conifers and northern hardwoods with adequate advanced regeneration. G
  - 2 The seed-tree cutting method may be used only for jack, red and white pines and lowland conifers. G
  - 3 The shelterwood cutting method may be used only for jack, red and white pines; all oak; northern hardwoods; lowland conifers and lowland hardwoods. G
- E Allow commercial thinning in all vegetative types. G  
Precommercial thinning in all types is allowed if necessary to meet objectives of timber, wildlife and/or visual quality objectives.

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

### I General Management

- A Forested
  - 1 Using pruning for safety and wildlife. G
- B Mesic Grasslands
  - 1 Manage mesic grassland habitats as areas 250 acres or larger. G
  - 2 If 250-acre areas are not attainable, provide multiple patches 75 acres or larger, which total at least 250 acres within a 640-acre area. G
  - 3 Manage multiple habitat areas within one mile of each other to increase suitability if possible. G
- C Dry Grasslands G
  - 1 Manage dry grassland habitat, 250 acres or larger in Landtype Associations 1 and 2. Manage multiple habitats as blocks when they are within one mile of each other to G

- increase suitability.
- D Provide for waterhole development or restoration when surface runoff and soil conditions permit. G
- II Endangered and Threatened Species
- A See Chapter II 2600 for Standards and Guidelines.
- III Regional Forester Sensitive Species
- A Standards and Guidelines for the management of Regional Forester Sensitive Species are:
- 1 Within core northern hardwood habitat areas:
    - a In 80 percent of the high-quality mesic northern hardwood (ginseng) habitat:
      - 1 Permit non-ground disturbing activities that mimic natural disturbance regimes common to this habitat. G
      - 2 Permit maintenance of existing improvements. G
    - b In the remaining 20 percent of the high-quality mesic northern hardwood habitat:
      - 1 Maintain at least 80 percent crown closure. G
  - 2 Allow potential high-quality mesic northern hardwood forest habitat adjacent to core areas to convert to actual high-quality mesic northern hardwood forest habitat. G
  - 3 New motorized trails will not be constructed in cedar swamps, hardwood conifer swamps and subirrigated forests unless there are no other reasonable routes. G
- B Manage wetlands identified as good and excellent sandhill crane nesting habitat to improve habitat conditions for this species. G
- C Develop and implement management direction for each osprey nesting area and great blue heron colony. G
- D Cerulean Warbler
- 1 Timber management and road construction activities should not occur in occupied habitat within 400 feet of a cerulean warbler nest tree, approximately a 10-acre area, during the breeding season. G
- IV Emphasis Areas
- A Deer Yards
- 1 Manage recognized deer yards outside old growth areas to provide a sustained supply of winter thermal cover and associated browse. G

#### 2700 SPECIAL USES MANAGEMENT

- I Decisions on applications for special uses involving National Forest System lands would be made on an individual basis. G

- II Adhere to the Federal Power Act Section 4(e) Forest Service Conditions on the eight hydro-electric projects licensed by the Federal Energy Regulatory Commission. s
- III Provide for utility transmission corridors. Emphasize the use of corridors when granting appropriate rights of way. G

## 2800 MINERALS AND GEOLOGY

- I Endangered, Threatened and Sensitive Wildlife
  - A Karner Blue Butterfly
    - 1 Federal oil and gas leases will contain a lease notice that the lands are identified as Karner blue butterfly metapopulation areas and occupancy is subject to more restrictive controls than routine areas. No surface occupancy or road construction will be permitted in occupied habitat. s
    - 2 Access to oil and gas development is by low standard road with minimum clearing. These roads are gated. The access road should be obliterated upon abandonment of the site. G
  - II Common Variety Minerals
    - A Use of common variety mineral deposits will be considered with the following limitations: G
      - 1 Permit use of common variety mineral deposits subject to the environmental limitations of the site. G

## 5100 FIRE MANAGEMENT

- I Suppression
  - A Use of tractor plows, retardant, constructed helispots, and wheeled vehicles will be common. G
- II Fire Use and Fuels Treatment
  - A Constructed fuel barriers will be no longer than eight miles in length, and temporary or permanent openings will be limited to no more than 500 acres. G
- III Activity fuels, slash, will be treated to a level commensurate with the allowable fire intensity and rate of spread that meets resource objectives in established prescriptions. Treatment along highways and adjacent properties will meet applicable state laws. G
- IV Management action to address high fuel hazards may occur in old growth when public safety and property are at risk. G

## 7700 TRANSPORTATION SYSTEM

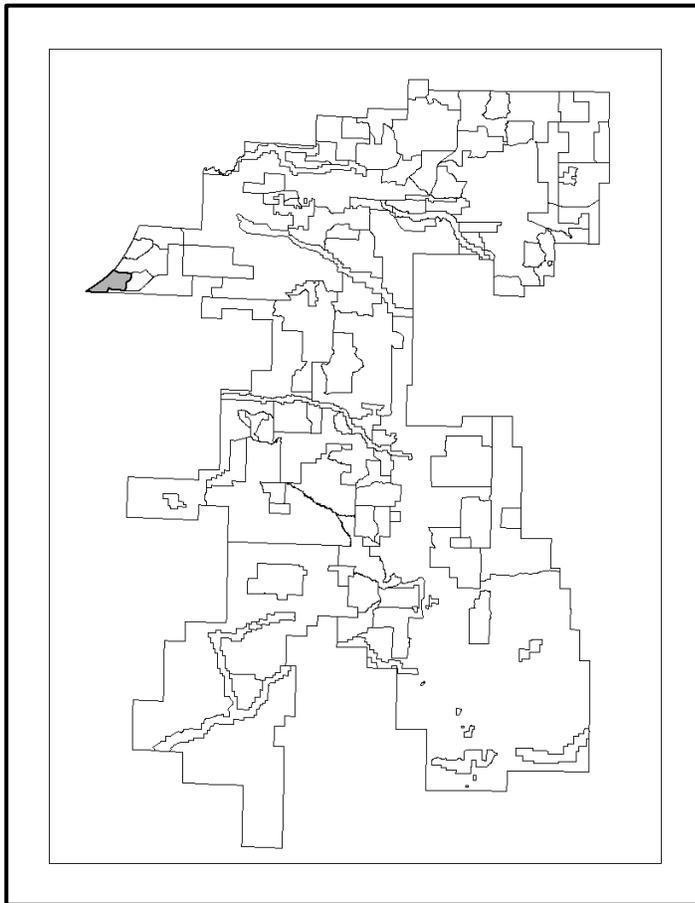
- I Oil and Gas
  - A All temporary roads will be planned and constructed to be revegetated within one year of termination of contract, lease or permit. G
  - B Arterial roads will be, as a minimum, designed and G

constructed to transport forest products and accommodate planned motorized recreation use, remain open, and, be maintained at level 3 standards or higher.

## Management Area 5.1 - Wilderness

### **Map:**

Shaded area depicts Management Area 5.1. There are no Management Area 5.1 areas on the Huron National Forest.



**Figure III-9. Management Area 5.1 on the Manistee National Forest.**

### **Purpose:**

Management activities of Congressionally designated Wilderness provide for the protection and enhancement of wilderness characteristics and values. Semiprimitive, non-mechanized recreational opportunities occur in a natural environment emphasizing solitude. Recreational opportunities include backpacking, hiking, camping, canoeing, hunting, fishing, cross-country skiing, snowshoeing and other nonmotorized activities.

### **Landscape Description:**

Designated Wilderness areas could occur anywhere from morainal hills to low, wet areas. Wilderness areas probably will include a variety of habitats and landforms.

The Congressionally designated areas generally will be 5,000 contiguous acres or larger in size. The Nordhouse Dunes Wilderness is the only Congressionally designated Wilderness on the Forests.

This prescription area contains less than 1 percent of all National Forest System lands on the Huron-Manistee National Forests.

### ***Goals and Objectives and Desired Future Condition:***

#### **Goals and Objectives:**

- Provides habitat for wildlife species that avoid human activities.
- Allow natural ecological succession to operate to the extent feasible to promote, perpetuate and restore the wilderness character of the land - 36 CFR 293.2(a).
- Provide semiprimitive, non-mechanical recreational opportunities to meet identified needs and demands.
- Provide a mixture of primitive and semiprimitive non-mechanized recreational opportunities to meet identified needs and demands.
- Trails will be designed for the wilderness experience.
- Provide for the special needs of wildlife species requiring isolation consistent with the Act establishing the Wilderness.
- Use Minimum Impact Suppression Tactic Guidelines.
- Surface and subsurface ownership, National Forest System or other government entity, is desirable.
- Emphasize "no trace" camping.

#### **Desired Future Condition:**

These areas have a natural appearance with old growth and large trees dominating the forested stands. Timber management activities will not occur in these areas and no developed facilities or services will be provided. Little evidence of human presence will be apparent, and interaction between users will be infrequent.

Nonmotorized trails access Wilderness areas. There will be no open roads within the Wilderness area. Hunting, fishing, semiprimitive camping and other activities may occur throughout the area. Recreation experiences here are quiet, secluded, and occur in a natural forest environment. Surface and subsurface mineral rights generally will be in public ownership to adequately coordinate management.

### ***Standards and Guidelines:***

#### 1900 PLANNING

##### I Vegetation Management

- A Manage vegetation only to protect Wilderness values or to protect adjacent property from fire or pests. s
- B Do not allow gathering of fuelwood or other special forest products. g

## 2100 ENVIRONMENTAL MANAGEMENT

- I The Regional Forester will be advised when redesignation to Class I airshed is necessary to protect Wilderness or other unique National Forest System lands. s

## 2200 RANGELAND MANAGEMENT

- I Grazing was not authorized by the Act establishing the Wilderness. s

## 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

## I Special Areas

## A Wilderness

- 1 The following are prohibited: s
  - a Camping in the Wilderness within 400 feet from the Wilderness boundary (the Lake Michigan waterline, Nurenberg Road, Green Road, and Forest trails, to include the entire boundary). s
  - b Camping within 100 feet from established trails. s
  - c Groups in excess of 10 people. s
  - d Building, maintaining, attending, or using a campfire within 400 feet from the Lake Michigan waterline, beach area. s
  - e Possession or use of mechanical equipment including motorized vehicles, wagons or carts. s
  - f Building, maintaining, attending or using a campfire within 200 feet from the Nordhouse Lake waterline. s
  - g Storing equipment, personal property or supplies, includes geocaching. s
  - h Possessing or transporting any motor or mechanical device capable of propelling a watercraft through the water by any means. s
  - i Possession or use of saddle, pack or draft animals. s
  - j Gathering of dead wood in the open dunes. s

## II Recreation Construction

- A Provide access parking outside the periphery of the area at a rate of up to five vehicles per 1,000 acres in the area. G

## 2500 WATERSHED MANAGEMENT

## I Water

## A Guidelines for Management Activities

- 1 Limit watershed improvement projects to correcting human-caused problems and natural disasters G

threatening public health and safety downstream, and to maintain environmental values to protect public health and safety.

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

### I Endangered and Threatened Species

#### A Piping Plover

- 1 Active nest sites and areas used for raising young will be protected from human disturbance and pets. Pets will be required to be on a leash between April 1 and August 31 and at anytime near an active nest. s
- 2 The following access restrictions will apply from April 1 to August 31 and any time around active nest sites: s
  - a Except for emergency, administrative use, vehicle traffic will be prohibited along the beach. Efforts will be made to coordinate emergency, administrative use with individuals knowledgeable of nest sites. s
  - b Trail management and construction will direct the public away from active nest sites. s
  - c Pedestrians will be prohibited from leaving trails and entering nest site areas. s
  - d Kite flying will be prohibited within 650 feet of active nest site areas. s
- 3 Signing and psychological/symbolic fencing, such as two strands of twine tied between posts, will be allowed to keep human activity at least 134 feet away from predator exclosures. If needed, a larger protection area may be designated. Fencing and signing will be installed using current acceptable procedures. G
- 4 Where necessary, nesting and feeding areas will be protected from predators through predator exclosures and other proven devices and methods. Exclosures will be as follows: 5 feet between the nest and the predator exclosure, and 134 feet between predator exclosure and the psychological/symbolic fencing. Construction will occur at a time that does not subject the eggs to adverse weather during absence of adults. Fencing and signing will be installed using current acceptable procedures. G

#### B Piping Plover Critical Habitat

- 1 Human disturbance, including pets, will be kept at a low level from April 1 through July 1 by prohibiting G

the following:

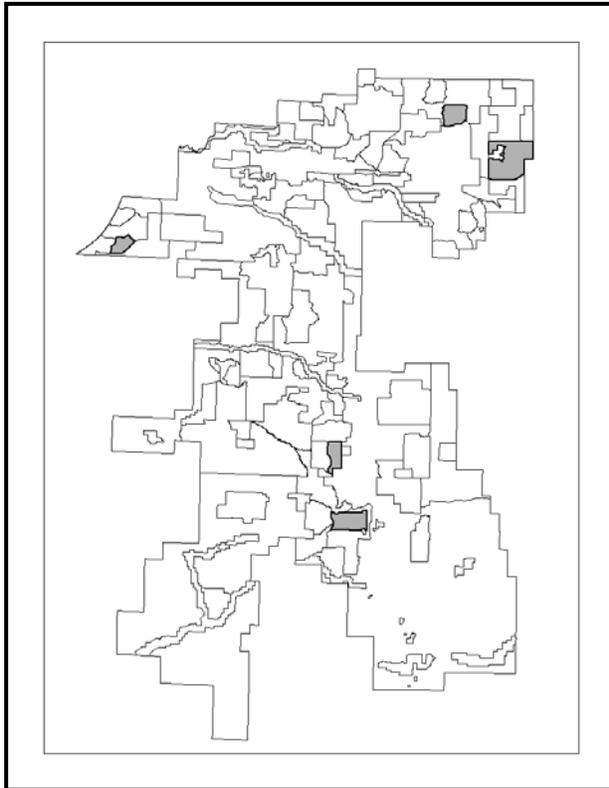
- a Pets, unless on a leash. G
      - b Loud noise. G
    - 2 Beach stabilization and vegetation planting for artificial dune stabilization will not be allowed if they impair natural processes. S
    - 3 Management activities related to treatment of Lombardy poplar are prohibited between April 1 and July 1 or whenever piping plover are present. S
    - 4 Between April 1 and July 1, prescribed burning activities will be limited to conditions when smoke will not drift into critical habitat areas or whenever piping plover are present. G
    - 5 The following apply for the protection, restoration, and maintenance of piping plover critical habitat containing primary constituent elements: G
      - a No new trail construction will occur. G
      - b Existing trails will be relocated where necessary. G
      - c Non-native woody vegetation–non-native invasive species–will be controlled. G
      - d Surveying will be conducted for the presence of active nest sites. G
  - C Pitcher's Thistle
    - 1 Herbicide use will occur only when other methods of control for specific non-native invasive plant species are ineffective. G
  - II Fish
    - A Provide for fish management and research in Wilderness areas consistent with the Act establishing the Wilderness. S
- 2700 SPECIAL USES MANAGEMENT
- I No utility transmission corridors for reservoirs, water conservation works, power projects, transmission lines and other facilities will be authorized except as authorized by the Act establishing the Wilderness. G
  - II Do not permit organizational camps. G
- 2800 MINERALS AND GEOLOGY
- I Minerals-General
    - A Under the Michigan Wilderness Act of 1987, federal mineral rights are withdrawn from future application of the Mineral Leasing Acts of 1920 and 1947. S
  - II Mineral Exploration and Development
    - A Provide for the consideration of the extraction of those minerals for which rights were established prior to December 31, 1983. S

- B Provide for mineral exploration and development subject to valid existing rights, public law, and to the extent that the area will continue to meet wilderness classification standards. s
- C Acquisition of mineral interest on a willing-seller basis will be an alternative considered for development proposals with surface occupancy. s
- III Common Variety Minerals
  - A These will not be developed or extracted except as authorized by the Act establishing the Wilderness area. s
- 3400 FOREST PEST MANAGEMENT
  - I Obtain the Regional Forester's approval for all pesticide applications in Wilderness areas and other pesticides if specific approval authority is required. s
- 5100 FIRE MANAGEMENT
  - I Suppression
    - A Use minimum impact suppression tactics. s
  - II Rehabilitation
    - A Burned areas will be rehabilitated using Wilderness guidelines. G
- 7300 BUILDINGS AND STRUCTURES
  - I Construct no buildings or structures except as authorized by the Act establishing the Wilderness area. Existing buildings or structures not authorized by the Act will be obliterated and the site returned to a near-natural condition. s
- 7400 PUBLIC HEALTH AND POLLUTION CONTROL ACTIVITIES
  - I Water Supply
    - A Do not provide drinking water or develop drinking water sources. s
- 7700 TRANSPORTATION SYSTEM
  - I General
    - A Allow no Forest Service roads except those authorized by the Act establishing the Wilderness. s

## Management Area 6.2 - Semiprimitive Motorized Areas

### **Map:**

Shaded area depicts Management Area 6.2. There are no Management Area 6.2 areas on the Huron National Forest.



**Figure III-10. Management Area 6.2 on the Manistee National Forest.**

### **Purpose:**

Management activities provide for semiprimitive, motorized recreational experiences. These areas provide high visual diversity, enhance and increase wildlife habitats, will reduce damaging wildfire potential, and provide moderate amounts of quality timber products from appropriate areas.

### **Landscape Description:**

This prescription area occurs throughout the Manistee National Forest on well-drained, sandy plains; low, sandy hills; morainal hills and plains and low, wet areas. Rivers, lakes and their associated riparian zones also are found within this management area.

This prescription area contains approximately 2 percent of all National Forest System lands on the Huron-Manistee National Forests.

Table III-8 displays emphasis areas within Management Area 6.2.

**Table III-8. Emphasis Areas Within Management Area 6.2.**

Emphasis Area	Approximate Acreage	Location	Objectives
Deer	5,200	Huron-Manistee National Forests.	<ul style="list-style-type: none"> <li>Manage intensively to provide quality deer habitat with special emphasis on providing winter thermal cover.</li> </ul>

Table III-9 displays semiprimitive motorized areas within Management Area 6.2.

**Table III-9. Semiprimitive Motorized Areas on the Huron-Manistee National Forests.**

Semiprimitive Motorized Area	Approximate Acreage	Location	Objectives
Briar Hills (southern block)	2,900	Manistee National Forest.	<ul style="list-style-type: none"> <li>Provide opportunities for hunting, camping, driving for pleasure, gathering forest products and hiking.</li> </ul>
Loda Lake	4,000	Manistee National Forest.	<ul style="list-style-type: none"> <li>Provide for Karner blue butterfly habitat.</li> <li>Provide opportunities for hunting, camping, driving for pleasure, gathering forest products, hiking, mountain biking and Off-Highway Vehicle use.</li> </ul>
Nordhouse	2,200	Manistee National Forest.	<ul style="list-style-type: none"> <li>Provide opportunities for hunting, camping, fishing, driving for pleasure, gathering forest products and hiking.</li> </ul>
Condon Lakes East	2,900	Manistee National Forest.	<ul style="list-style-type: none"> <li>Provide opportunities for hunting, camping, fishing, driving for pleasure, gathering forest products and hiking.</li> </ul>
Brandybrook	5,200	Manistee National Forest.	<ul style="list-style-type: none"> <li>Provide for deer emphasis and wetland management.</li> <li>Provide black bear habitat.</li> </ul>

### **Goals and Objectives and Desired Future Condition:**

#### **Goals and Objectives:**

- Provide high visual variety by providing vegetative diversity.
- Provide low to moderate volumes of forest products.
- Develop recreation facilities to separate competing users.
- Provide roads and trails for a semiprimitive, motorized experience.
- Provide habitat suitable for species requiring an old-growth environment.
- Provide high amounts of dispersed recreational activities such as hunting, fishing, viewing scenery, bird watching and canoeing.

- Provide low to moderate amounts of developed recreational facilities, such as campgrounds and picnic areas.
- Designated areas, roads and trails may be limited to specific kinds of uses.
- Management will strive to increase utilization of wood residues and other currently non-merchantable material, when not needed for resource concerns such as soil productivity and wildlife habitat, for fuelwood and other special forest products.
- Manage permanent openings and/or grasslands to meet species viability needs. Distribution of openings will recognize the contribution of adjacent private lands.
- Federal or state ownership of surface and subsurface is desirable.
- Provide opportunities for mineral exploration and development on a limited density.

### **Desired Future Condition:**

The desired future condition of these management areas will be characterized by a predominantly natural or natural-appearing environment. Each area usually contains more than 2,500 acres and ownership is almost entirely National Forest.

Human activities are evident but user interaction is infrequent. Users may be aware of controls, restrictions and services provided. Visitor services such as informational signs and orientation are provided. Facilities, utility corridors and mineral exploration usually are not evident unless viewed on-site. Low use roads are closed but evident. Some roads are converted to Off-Highway Vehicle trails. Roads needed for administrative purposes are gated. Other public agency roads may be present. Improvements on these roads are infrequent, and roads are maintained to minimal standards necessary for health and safety needs.

Dominant forest types are variable depending on the area and will range from northern hardwoods on morainal hills and plains to aspen, oaks, and red and white pines on dry sandy plains. Low, wet areas will be characterized by aspen, black ash, cedar, fir and hemlock. Stand distribution by age and size, across the landscape, is natural in appearance and dominated by old-growth characteristics.

Low, wet areas are key habitats for wildlife species. They provide thermal cover for deer and habitat for fish and water-related wildlife species.

Federal or state ownership of all surface and subsurface is desirable.

There are approximately 11,000 acres of designated old growth in this management area.

### **Standards and Guidelines:**

#### 1900 PLANNING

##### I Vegetation Management

- A Limit vegetation management to improving visual quality; reducing hazard fuels, pest management and fuelbreaks, or maintaining diversity of wildlife habitats.

G

## 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

## I Recreation Construction Sites

- A Hike-in camping units will be at least 100 feet from any adjacent camping units. G

## 2400 TIMBER MANAGEMENT

## I The following Standards and Guidelines apply to both even-aged and uneven-aged silvicultural systems.

- A Uneven-aged- and even-aged systems will be used. They will be consistent with area management objectives and the following restrictions:

- 1 Even-aged management will be the primary silvicultural system used. G
- 2 Allow thinning red pine plantations. G
- 3 The uneven-aged system will normally be used only in northern hardwoods. G
- 4 Seasonal restrictions on time of entry for timber harvests may be applied to protect other resources, activities and facilities. G
- 5 Standard cutting methods such as single-tree and group selection, shelterwood, seed-tree and clearcutting may be used. S
- 6 Silvicultural standards will incorporate genetic improvement principles, practices and programs. G
- 7 Regeneration activities:
  - a Site preparation activities can include mechanical, prescribed fire, hand and chemical. G
  - b For revegetation, use native vegetative species for timber production purposes. Revegetation activities can include natural-preferred-artificial or seeding methods. G
  - c Fertilization may be used to establish vegetation on disturbed areas. Manage use of fertilizers or soil enrichments to prevent movement into lakes and streams. G

## II The following Standards and Guidelines apply only to the even-aged silvicultural system:

- A Temporary openings created by the application of the even-aged silvicultural system:

- 1 Will be separated by a stand of at least 10 acres, except in wildlife emphasis areas. G
- 2 Generally should be 20 acres or less. G
- 3 In deer emphasis areas, temporary openings created by even-aged management will generally not exceed 15 acres, except they may be as large as 40 acres in G

- major deer wintering or adjacent areas, or for golden-winged warbler they may be 25 acres.
- B Firewood gathering may be allowed except in old growth areas. A permit is required. G
- C Intermediate treatment guidelines include:
- 1 Using mechanical, chemical or hand release methods in all vegetative types. G
  - 2 Pruning for timber, visual improvement, safety and wildlife. G
  - 3 Thinning. G
  - 4 Using precommercial thinning to maintain winter thermal cover for deer in lowland hardwood and conifer types. G
- D Harvest guidelines include the following: (See Appendix B for a discussion of each harvest method):
- 1 The clearcutting method may be used only for jack, red and white pines; oak; aspen; lowland conifers and northern hardwoods with adequate advanced regeneration. G
  - 2 The seed-tree cutting method may be used only for jack, red and white pines and lowland conifers; and G
  - 3 The shelterwood cutting method may be used only for jack, red and white pines; all oak; northern hardwoods; lowland conifers and lowland hardwoods. G
- E Allow commercial thinning in all vegetative types. Precommercial thinning in all types is allowed if necessary to meet objectives of timber, wildlife and/or visual quality objectives. G

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

- I General Management
- A Dry Grasslands G
- 1 Manage dry grassland habitat, 250 acres or larger in landtype associations 1 and 2. Manage multiple habitats as blocks when they are within one mile of each other to increase suitability. G
- B Provide for waterhole development or restoration when surface runoff and soil conditions permit. G
- II Endangered and Threatened Species
- A See Chapter II, 2600 for Standards and Guidelines.
- III Regional Forester Sensitive Species
- A Standards and Guidelines for the management of Regional Forester Sensitive Species are:
- 1 Within core northern hardwood habitat areas:
    - a In 80 percent of the high-quality mesic northern hardwood (ginseng) habitat:
      - 1 Permit non-ground disturbing G

- activities that mimic natural disturbance regimes common to this habitat.
- 2 Permit maintenance of existing improvements. G
  - b In the remaining 20 percent of the high-quality mesic northern hardwood habitat: G
    - 1 Maintain 80 percent crown closure. G
    - 2 Allow potential high-quality mesic northern hardwood forest habitat adjacent to core areas to convert to actual high-quality mesic northern hardwood forest habitat. G
    - 3 New motorized trails will not be constructed in cedar swamps, hardwood conifer swamps and subirrigated forests unless there are no other reasonable routes. G
  - B Manage wetlands identified as good and excellent sandhill crane nesting habitat to improve habitat conditions for this species. G
  - C Develop and implement management direction for each osprey nesting area and great blue heron colony. G
  - D Cerulean Warbler G
    - 1 Timber management and road construction activities should not occur in occupied habitat within 400 feet of a cerulean warbler nest tree, approximately a 10-acre area, during the breeding season. G
- IV Wildlife Emphasis Areas G
- A Manage recognized deer yards outside old growth areas to provide a sustained supply of winter thermal cover and associated browse. G
- 2700 SPECIAL USES MANAGEMENT G
- I Decisions for special uses involving National Forest System lands will be made on an individual basis. G
  - II Adhere to the Federal Power Act Section 4(e) Forest Service Conditions on the eight hydro-electric projects licensed by the Federal Energy Regulatory Commission. S
  - III Do not allow developed organizational camps. G
  - IV Discourage utility transmission corridors. Exceptions will be considered on an individual basis. G
- 2800 MINERALS AND GEOLOGY G
- I Endangered, Threatened and Sensitive Wildlife G
    - B Karner Blue Butterfly S
      - 1 Federal oil and gas leases will contain a lease notice that the lands are identified as Karner blue butterfly metapopulation areas and occupancy is subject to

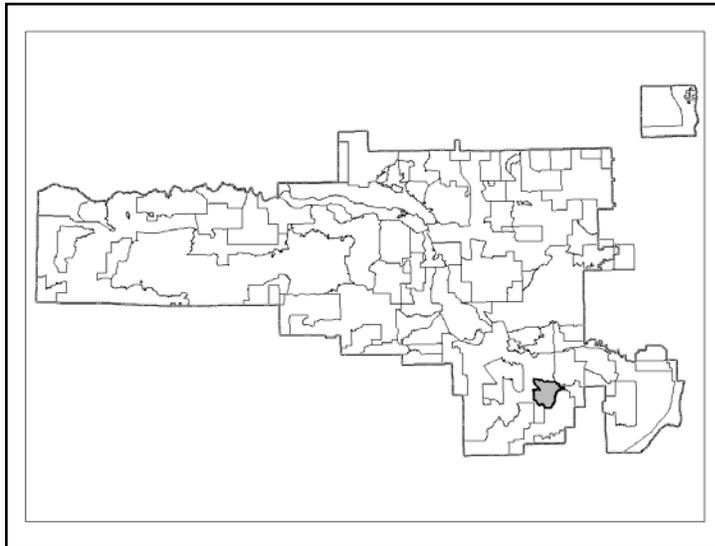
- more restrictive controls than routine areas.
- 2 Access to oil and gas development is by low standard road with minimum clearing. These roads are gated. The access road should be obliterated upon abandonment of the site. G
- II Mineral Exploration and Development
- A General oil and gas development conditions:
- 1 Production facilities are outside the area when reasonable. G
- 2 Needed pumps are run by electric motors or equipped to minimize noise. G
- III Common Variety Minerals
- A Use of common variety mineral deposits will be considered with the following limitations: G
- 1 Restricted to isolated, well-screened areas, subject to the environmental limitations of the site. G
- IV Federal oil and gas leases will contain a controlled surface use stipulation with a maximum surface development density of 1 surface location per 160 acres. G
- 5100 FIRE MANAGEMENT
- I Suppression
- A Minimize use of tractor plows, retardant, constructed helispots and wheeled vehicles. G
- II Fire Use and Fuels Treatment
- A Constructed fuel barriers will be no longer than eight miles in length and temporary or permanent openings will be limited to no more than 500 acres. G
- III Activity fuels—slash—will be treated to a level commensurate with the allowable fire intensity and rate of spread that meets resource objectives in established prescriptions. Treatment along highways and adjacent properties will meet applicable state laws. G
- IV Management action to address high fuel hazards may occur in old growth when public safety and property are at risk. G
- 7700 TRANSPORTATION SYSTEM
- I Forest Service roads may be closed to motorized vehicles to retain the semiprimitive character of the area or for emergency conditions, seasonal closures, resource protection or public safety. G
- II Oil and Gas
- A All temporary roads will be planned and constructed to be revegetated within one year of termination of contract, lease or permit. G
- B Roads will be designed and constructed to transport forest products and accommodate planned motorized recreation use. G



## Management Area 7.1 - Concentrated Recreation Areas

### **Map:**

Shaded area depicts Management Area 7.1. There are no Management Area 7.1 areas on the Manistee National Forest.



**Figure III-13. Management Area 7.1 on the Huron National Forest.**

### **Purpose:**

Management activities will provide for a variety of high density nonmotorized recreational experiences.

### **Landscape Description:**

There is one high density recreational use area. The Corsair Recreation Area is located on the Huron National Forest.

This area contains less than 1 percent of all National Forest System lands on the Huron-Manistee National Forests.

### **Goals and Objectives and Desired Future Condition:**

#### **Goals and Objectives:**

- Vegetative management activities will enhance old-growth character; protect public health and safety, and the soil and water resource.

- Provide habitat suitable for species requiring an old-growth environment.
- Provide moderate to high amounts of recreational facilities, such as trails; dispersed and developed camping and picnic areas.
- Provide for recreational activities such as skiing, hunting, fishing, viewing scenery and other recreational opportunities.

### **Desired Future Condition:**

The desired future condition of this management area will be characterized by a predominantly natural or natural-appearing environment. Concentration and interaction between users is high. There is often evidence of other users. The area is managed in such a way that on-site controls and restrictions may be present but are subtle.

Nonmotorized use is emphasized, providing primarily hiking, cross-country skiing, and equestrian travel. Roads and a dense trail system are present. They will be designed to accommodate the high-density recreation use and related activities associated with the area.

Utility corridors and other special uses may be present, provided they are compatible with the character of the area. Mineral exploration may occur where geologic studies suggest special needs for subsurface information.

There are approximately 3,100 acres of designated old growth in this management area.

Some roads are present, but they are gated to provide access only for administrative or other permitted purposes. Other public agency roads may be present. Improvements on these roads may be frequent and are maintained to minimal standards necessary for health and safety needs.

### **Standards and Guidelines:**

#### 1900 PLANNING

##### I Vegetation Management

- A Limit vegetation management to improving visual quality; reducing hazard fuels, managing pests, creating fuelbreaks or maintaining diversity of wildlife habitats. G

#### 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

##### I Recreation Construction

- A Hike-in camping site will be at least 100 feet from any adjacent camping unit. G

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

## I Regional Forester Sensitive Species and their Management

## A Standards and Guidelines for the management of Regional Forester Sensitive Species are:

## 1 Cerulean Warbler

- a Timber management and road construction activities should not occur in occupied habitat within 400 feet of a cerulean warbler nest tree—approximately a 10-acre area—during the breeding season. G

## 2700 SPECIAL USES MANAGEMENT

- I Allow only those facilities required to serve recreational or administrative facilities. Exceptions will be considered on an individual basis supported by a documented environmental analysis. G
- II Decisions on special uses involving National Forest System lands will be made on an individual basis. G
- III Do not permit special-use motorized recreation events. G
- IV Do not allow developed organizational camps. G
- V Provide for utility transmission corridors. Emphasize the use of corridors when granting appropriate rights of way. G

## 2800 MINERALS AND GEOLOGY

## I Mineral Exploration and Development

## A General oil and gas development conditions:

- 1 Production facilities are outside the area when practical. G
- 2 Needed pumps are run by electric motors or equipped to minimize noise. G

## II Common Variety Minerals

## A Use of common variety mineral deposits will be considered with the following limitations: G

- 1 Permitted only for use within the management prescription area. G

- III Federal oil and gas leases will contain a controlled surface use stipulation with a maximum surface development density of 1 surface location per 640 acres. G

## 5100 FIRE MANAGEMENT

## I Suppression

## A Minimize use of tractor plows, retardant, constructed helispots, and wheeled vehicles. G

- II Activity fuels (slash) will be treated to a level commensurate with the allowable fire intensity and rate of spread that meets resource objectives in established prescriptions. Treatment along highways and adjacent properties will meet applicable state laws. G

- III Management action to address high fuel hazards may occur in old G

growth when public safety and property are at risk.

#### 7700 TRANSPORTATION SYSTEM

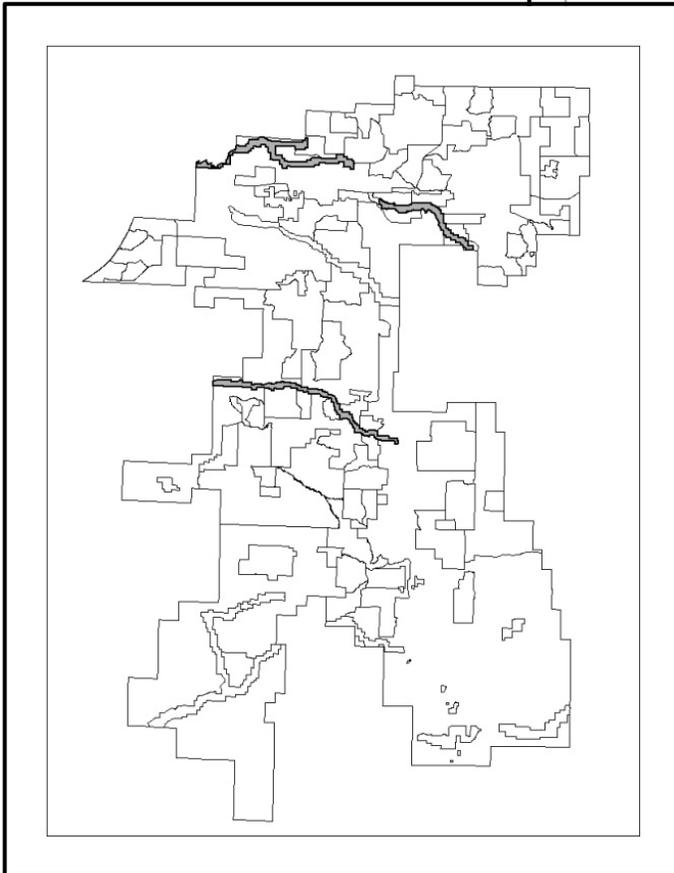
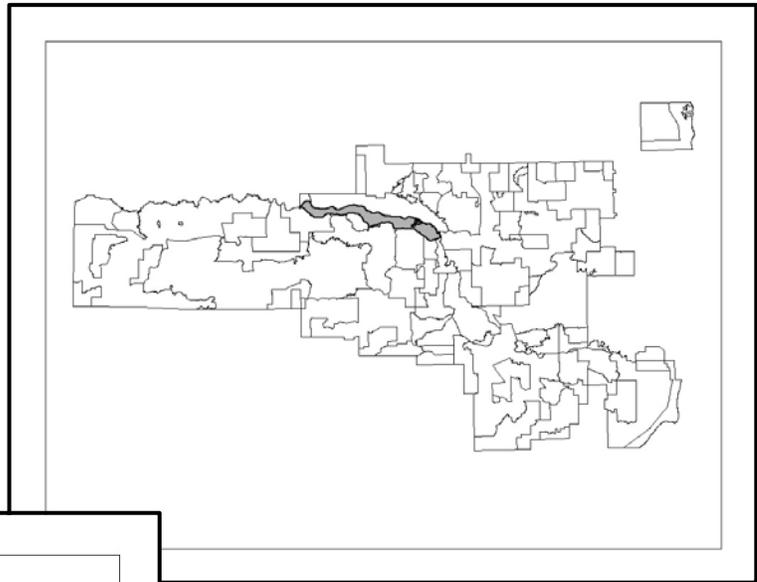
- I No new permanent roads will be constructed to manage the surface resources on National Forest System lands. Roads may be constructed, on an approved location, to provide access to private inholdings or for development of mineral rights. G
- II Oil and Gas
  - A All temporary roads will be planned and constructed to be revegetated within one year of termination of contract, lease or permit. G
  - B Roads must use existing transportation corridors when compatible, feasible and practical. G

## Management Area 8.1 - Wild and Scenic Rivers

### **Maps:**

Shaded area depicts Management Area 8.1.

**Figure III-12. Management Area 8.1 on the Huron National Forest.**



**Figure III-13. Management Area 8.1 on the Manistee National Forest.**

**Purpose:**

Management of the Congressionally-designated wild and scenic river corridors will protect unique areas that have outstandingly remarkable values such as scientific, biological, geological, historical or recreational characteristics of local, regional or national significance.

**Landscape Description:**

This prescription area contains approximately two percent of all National Forest System lands on the Huron-Manistee National Forests. These prescription areas may contain National Forest System lands outside the Congressionally-designated Wild and Scenic River corridors.

Wild and Scenic Rivers occur throughout the Huron-Manistee National Forests and are listed in Table III-10.

**Table III-10. Wild and Scenic Rivers on the Huron-Manistee National Forests.**

<b>River</b>	<b>Description</b>	<b>Location</b>
Pere Marquette National Scenic River	<p>In November 1978, 66 miles of the river were classified a National Scenic River. The management zone contains 13,054 acres, of which 2,882 are in federal ownership.</p> <p>Direction for the Pere Marquette National Scenic River (designated by Act of Congress in 1978, P.L. 90-542, as amended by P.L. 95-625), Standards and Guidelines, and possible projects are contained in the Pere Marquette National Scenic River Management Plan, revised April 2, 1990, or as updated.</p>	Manistee National Forest
Pine National Scenic River	<p>In March 1992, 26 miles of the river were classified as a National Scenic River. The classified segment is located in the northern part of the Manistee National Forest, 20 miles southwest of Cadillac, from Lincoln Bridge to Stronach Pond. The National Scenic River Management Plan also includes a segment of the Pine River from the terminus of the designated section to Low Bridge, (2.5 miles of river. There are 4,632 acres in the river corridor.</p> <p>Direction for the Pine National Scenic River (designated by Act of Congress in 1991, P.L. 102-249), Standards and Guidelines and possible projects are contained in the Pine River Management Plan, dated September 1, 1995, or as updated.</p>	Manistee National Forest

**Table III-10. Wild and Scenic Rivers on the Huron-Manistee National Forests (Continued).**

River	Description	Location
Au Sable National Scenic River	<p>In October 1984, 23 miles of the river were classified as a National Scenic River. The classified segment is from the boundary of the Mio Pond project downstream to the boundary of the Alcona Pond project, Forest Service bridge. Currently there are 6,210 acres in the river corridor.</p> <p>Direction for the Au Sable National Scenic River (designated by Act of Congress in 1984, P.L. 98-444), Standards and Guidelines and possible projects are contained in Management Direction for the Au Sable National Scenic River, dated July 27, 1988, or as updated.</p>	Huron National Forest
Manistee National Recreation River and Bear Creek National Scenic River	<p>In March 1992, 26 miles of the Manistee River were classified as a National Recreation River and 6.5 miles of Bear Creek were classified as a National Scenic River. The classified segment of the Manistee River is located from Tippy Dam to the Michigan State Highway 55 Bridge. The classified segment of Bear Creek is located from Coates Highway to the Manistee River. There are 8,285 acres in the Manistee River corridor and 2,020 acres in the Bear Creek corridor.</p> <p>Direction for the Manistee National Recreational River and Bear Creek National Scenic River (designated by Act of Congress in 1991, P.L. 102-249), Standards and Guidelines, and possible projects area contained in the Manistee National Recreational River and Bear Creek National Scenic River Management Plan, dated 1996, or as updated.</p>	Manistee National Forest

***Goals and Objectives and Desired Future Condition:*****Goals and Objectives:**

- Maintain the outstandingly remarkable values of each river for which they were designated under the Wild and Scenic Rivers Act.
- Management direction is established by each river's management plan.
- Manage Kirtland's warbler essential habitat consistent with the Kirtland's Warbler Recovery Plan.

**Desired Future Condition:**

Management direction will follow approved management plans for designated Wild and Scenic Rivers protecting the unique features of the rivers.

Dominant forest types are variable depending on the area and will range from northern hardwoods on morainal hills and plains to aspen, oaks, and red and white pines on dry sandy plains. Low, wet areas will be characterized by aspen, black ash, cedar, fir and hemlock. Stand distribution by age and size, across the landscape, is natural in appearance and dominated by old growth characteristics.

Federal or state ownership of all surface and subsurface mineral rights is desirable.

There are approximately 17,100 acres of designated old growth in this management area.

**Standards and Guidelines:**

## 1900 PLANNING

## I Old Growth

- |   |  |   |
|---|--|---|
| A | Flooding of wetlands may also occur in accordance to existing license articles for operations of hydroelectric projects on the Manistee, Muskegon and Au Sable Rivers. | G |
|---|--|---|

## 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

- |   |  |   |
|---|--|---|
| I | Camping within Wild and Scenic River corridors is permitted at designated sites. | G |
|---|--|---|

## 2800 MINERALS AND GEOLOGY

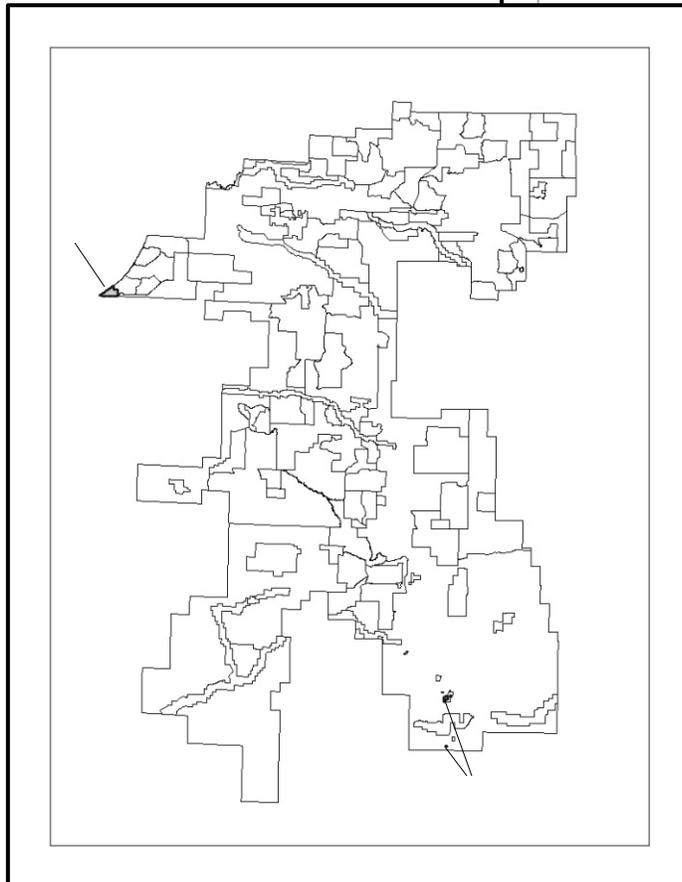
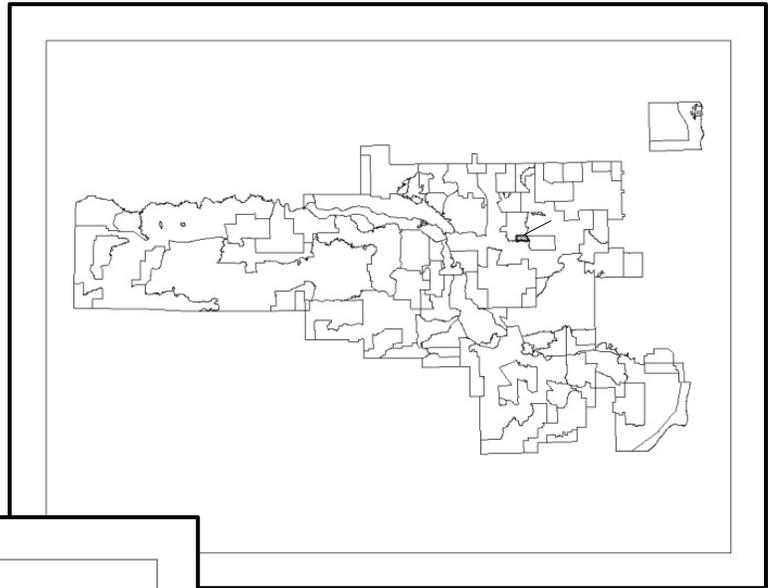
- |   |  |   |
|---|--|---|
| I | Federal oil and gas leases within Wild and Scenic River corridors will contain a no-surface-occupancy stipulation. | S |
|---|--|---|

## Management Area 8.2 - Research Natural Areas

### Maps:

Shaded area depicts Management Area 8.2.

**Figure III-14. Management Area 8.2 on the Huron National Forest.**



**Figure III-15. Management Area 8.2 on the Manistee National Forest.**

**Purpose:**

Management of designated Research Natural Areas will protect unique areas that have scientific, biological, geological or historical characteristics of local, regional or national significance.

**Landscape Description:**

This area contains less than 1 percent of all National Forest System lands on the Huron-Manistee National Forests.

Research Natural Areas occur throughout the Huron-Manistee National Forests and are listed in Table III-11.

**Table III-11. Research Natural Areas on the Huron-Manistee National Forests.**

<b>Established Research Natural Area</b>	<b>Description</b>	<b>Location</b>
Hayes Tower	388 acres.  On December 19, 1997, the Regional Forester established the Hayes Tower Research Natural Area.	Huron National Forest
Newaygo Prairies, including West Tract Prairie and Finger Prairie	180 acres.  On June 10, 1988, the Chief of the Forest Service established the Newaygo Prairies Research Natural Area.	Manistee National Forest - partially contained in experimental forest
Nordhouse Dunes Research Natural Area	795 acres.  On December 8, 1987, the Chief of the Forest Service designated Nordhouse Dunes/Sensibar Tract as the Nordhouse Dunes Research Natural Area.	Manistee National Forest - within Nordhouse Dunes Wilderness

**Goals and Objectives and Desired Future Condition:****Goals and Objectives:**

- Maintain the characteristics of each Research Natural Area for which they were designated.
- Management direction is provided in each area's establishment record.
- Recreation in the area such as hiking, hunting, camping and fishing will not be encouraged.

- Research and monitoring that aids the protection and management of populations of endangered, threatened, sensitive or rare species will be encouraged.
- The Huron-Manistee National Forests and North Central Research Station shall encourage appropriate use of Research Natural Areas by scientists, educators and managers.

### Desired Future Condition:

Management direction will follow approved establishment records for designated Research Natural Areas protecting the unique features of the areas.

Federal or state ownership of all lands and surface and subsurface is desirable.

There are approximately 400 acres of designated old growth in this management area.

### Standards and Guidelines:

#### 1900 PLANNING

##### I Vegetation Management

- |   |   |   |
|---|---|---|
| A | Timber harvesting or wood gathering will not be allowed.  | G |
| B | Removal of exotic species or encroaching vegetation will be permitted if the presence of such threatens the special values of Research Natural Areas. | G |
| C | Cutting, but not removal, of trees that are safety hazards along roadsides will be permitted.   | G |
| D | Do not allow fuelwood or other special forest products gathering.   | G |

#### 2000 NATIONAL FOREST RESOURCE MANAGEMENT

##### I Control:

- |   |   |   |
|---|---|---|
| A | Infestations of non-native invasive plant and animal species that threaten Research Natural Area values will be controlled using appropriate integrated pest management techniques. | S |
|---|---|---|

#### 2200 RANGELAND MANAGEMENT

- |   |                                |   |
|---|--------------------------------|---|
| I | Grazing will not be permitted. | S |
|---|--------------------------------|---|

#### 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

- |     |   |   |
|-----|---|---|
| I   | Use of motorized vehicles or bicycles will not be allowed. (Exceptions will be described in the Research Natural Area Establishment Record and Management Plan).                    | G |
| II  | Use of the area by saddle, draft and pack animals is prohibited.  | G |
| III | Removal or use of live or dead vegetation will not be permitted.  | G |
| IV  | No new trails will be established in the Research Natural Area. Existing trails may be utilized as described in the Research Natural Area Establishment Record and Management Plan. | G |

- A A recreation monitoring plan will be developed in cooperation with the Director of the North Central Research Station (Station Director) to track the impacts to Research Natural Areas. s
- B Archaeological activities, including limited excavation, will be allowed. g
- C Significant and unevaluated heritage cultural resources will be protected through dispersal control and limits on public use. g

## 2600 WILDLIFE, FISH, AND SENSITIVE PLANT HABITAT MANAGEMENT

## I General Management

- A Prescribed fire in fire dependent ecosystems is permitted where fire suppression has interrupted natural processes. g

## II Endangered and Threatened Species

- A Reintroduction of extirpated species is permitted. g
- B If endangered or threatened species are found, they will be protected and recovery plans will be implemented. s  
Consultation will be made with the Fish and Wildlife Service and the Station Director regarding the appropriate course of action to take.

## C Piping Plover

- 1 Active nest sites and areas used for raising young will be protected from human disturbance and pets. Pets will be required to be on a leash between April 1 and August 31, and at anytime near an active nest. s
- 2 The following access restrictions will apply from April 1 to August 31 and any time around active nest sites: s
  - a Except for emergency administrative use, vehicle traffic will be prohibited along the beach. Efforts will be made to coordinate emergency, administrative use with individuals knowledgeable of nest sites. s
  - b Trail management and construction will direct the public away from active nest sites. s
  - c Pedestrians will be prohibited from leaving trails and entering nest site areas. s
  - d Kite flying will be prohibited within 650 feet of active nest site areas. s
- 3 Signing and symbolic fencing, such as two strands of twine tied between posts, will be allowed to keep human activity at least 134 feet away from predator exclosures. If needed, a larger protection area may be designated. Fencing and signing will be installed using current acceptable g

- procedures.
- 4 Where necessary, nesting and feeding areas will be protected from predators through predator exclosures and other proven devices and methods. Exclosures will be as follows: five feet between the nest and the predator exclosure, and 134 feet between predator exclosure and the psychological/symbolic fencing. Construction will occur at a time that does not subject the eggs to adverse weather during absence of adults. Fencing and signing will be installed using current acceptable procedures. G
- D Piping Plover Critical Habitat
- 1 Human disturbance, including pets, will be kept at a low level from April 1 through July 1 by prohibiting the following: G
- a Pets, unless on a leash. G
  - b Loud noise. G
  - c Off-Highway Vehicles. G
  - d Beach fires within 400 feet of the shoreline. G
  - e Collecting of driftwood, dunewood, root masses and dead shrubs. G
- 2 Prohibit sand mining and oil and gas leasing and development in critical habitat, except for reserved and outstanding mineral rights. S
- 3 Beach stabilization and vegetation planting for artificial dune stabilization will not be allowed if they impair natural processes. S
- 4 Management activities related to treatment of Lombardy poplar are prohibited between April 1 and July 1, or whenever piping plover are present. S
- 5 Between April 1 and July 1, prescribed burning activities will be limited to conditions when smoke will not drift into critical habitat areas or whenever piping plover are present. G
- 6 The following apply for the protection, restoration and maintenance of piping plover critical habitat containing primary constituent elements: G
- a No new trail construction will occur. G
  - b Existing trails will be relocated where necessary. G
  - c Non-native woody vegetation–non-native invasive species–will be controlled. G
  - d Surveying will be conducted for the presence of active nest sites. G

## E Pitcher's Thistle

- 1 See Chapter II, 2600 for Standards and Guidelines. G

## 2700 SPECIAL USES MANAGEMENT

- I Do not allow developed organizational camps. G
- II New facilities and new corridors for utility rights-of-way will not be established. Existing special uses may be allowed as described in the Research Natural Area Establishment Record and Management Plan. G

## 2800 MINERALS AND GEOLOGY

- I Federal oil and gas leases will contain a no-surface-occupancy stipulation. S
- II For State of Michigan minerals, an Internal Agreement for nondevelopment will be implemented. S
- III Reasonable access to private mineral rights will be permitted. S

## 3400 FOREST PEST MANAGEMENT

- I Protection from introduced and endemic insects, diseases, plants and animals will be allowed only when the special values of the Research Natural Area are threatened. S
- II Protection will follow existing Integrated Pest Management guidelines. G

## 4000 RESEARCH

- I The Director of the North Central Research Station will be responsible for any studies or research conducted in the area.

## 5100 FIRE MANAGEMENT

- I Suppression
- A Use minimum impact suppression tactics.
- B Follow suppression guidelines in Special Area Management Guides and Research Natural Area establishment records. G

## 7300 BUILDINGS AND STRUCTURES

- I No new facilities of any kind will be allowed within Research Natural Areas. S

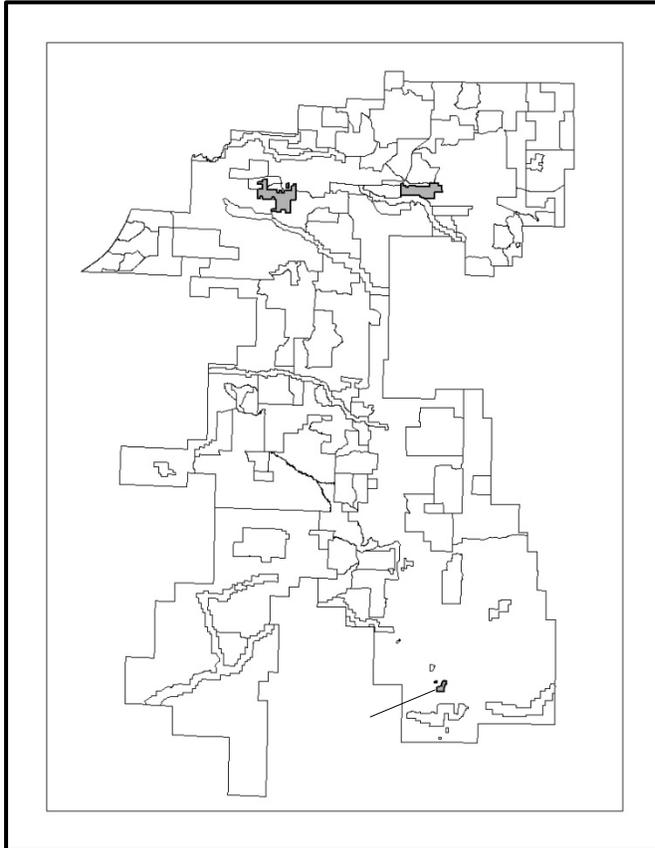
## 7700 TRANSPORTATION SYSTEM

- I No new roads will be established. S

## Management Area 8.3 - Experimental Forests

### **Map:**

Shaded area depicts Management Area 8.3. There are no Management Area 8.3 areas on the Huron National Forest.



**Figure III-16. Management Area 8.3 on the Manistee National Forest**

### **Purpose:**

Management of designated Experimental Forests will provide a land base for research activities.

### **Landscape Description:**

This prescription area contains approximately 1 percent of all National Forest System lands on the Huron-Manistee National Forests.

Table III-12 identifies Experimental Forests on the Huron-Manistee National Forests.

**Table III-12. Experimental Forests on the Huron-Manistee National Forests.**

<b>Experimental Forest</b>	<b>Description</b>	<b>Location</b>
Udell Experimental Forest	This 3,845-acre unit was established in June 1961. This area provides a land base for long-range watershed management research.	Manistee National Forest
Newaygo Experimental Forest	This 460-acre unit was established in 1960. This area provides a land base for research studies.	Manistee National Forest
Pine River Experimental Forest	This 2,785-acre unit was established in December 1954. This area provides a land base for research to study various timber management techniques	Manistee National Forest

### ***Goals and Objectives and Desired Future Condition:***

#### **Goals and Objectives:**

- The experimental forests will be managed as a roaded natural setting.
- The Huron-Manistee National Forests and North Central Research Station shall encourage appropriate use of experimental forests by scientists, educators and managers.
- Provide a variety of management activities so that research opportunities exist to evaluate the effects of management practices.

#### **Desired Future Condition:**

Management direction for Experimental Forests is established by the North Central Research Station, St. Paul, MN.

There are approximately 2,200 acres of designated old growth in this management area.

### ***Standards and Guidelines:***

#### 2400 TIMBER MANAGEMENT

I The following Standards and Guidelines apply to both even- and uneven-aged silvicultural systems.

A Uneven- and even-aged systems will be used. They will be consistent with area management objectives and the following restrictions:

- 1 Even-aged management will be the primary silvicultural system used. G
- 2 The uneven-aged system will normally be used only in northern hardwoods. G
- 3 Seasonal restrictions on time of entry for timber harvests may be applied to protect other resources, G

- activities and facilities.
- 4 Standard cutting methods such as single-tree and group selection, shelterwood, seed-tree and clearcutting may be used. S
  - 5 Silvicultural standards will incorporate genetic improvement principles, practices and programs. G
  - 6 Regeneration activities:
    - a Site preparation activities can include mechanical, prescribed fire, hand and chemical. G
    - b For revegetation, use native vegetative species for timber production purposes. Revegetation activities can include natural–preferred–artificial or seeding methods. G
    - c Fertilization may be used to establish vegetation on disturbed areas. Manage use of fertilizers or soil enrichments to prevent movement into lakes and streams. G
- II The following Standards and Guidelines apply only to the even-aged silvicultural system:
- A Temporary openings created by the application of the even-aged silvicultural system will be separated by a stand of at least 10 acres, except in wildlife emphasis areas. G
  - B Firewood gathering will be allowed except in old growth areas. A permit is required. G
  - C Intermediate treatment guidelines include:
    - 1 Using mechanical, chemical or hand release methods in all vegetative types. G
    - 2 Pruning for timber, visual improvement, safety and wildlife. G
    - 3 Thinning. G
    - 4 Using precommercial thinning to maintain winter thermal cover for deer in lowland hardwood and conifer types. G
  - D Harvest guidelines include the following:
    - 1 The clearcutting method may be used only for jack, red and white pines; oak; aspen; lowland conifers and northern hardwoods with adequate advanced regeneration. G
    - 2 The seed-tree cutting method may be used only for jack, red and white pines and lowland conifers. G
    - 3 The shelterwood cutting method may be used only for jack, red and white pines; all oak; northern hardwoods; lowland conifers and lowland hardwoods. G
  - E Allow commercial thinning in all vegetative types. G  
Precommercial thinning in all types is allowed if necessary

to meet objectives of timber, wildlife and/or visual quality objectives.

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

### I Regional Forester Sensitive Species and their Management

#### A Standards and Guidelines for the management of Regional Forester Sensitive Species are:

##### 1 Cerulean Warbler

a Timber management and road construction activities should not occur in occupied habitat within 400 feet of a cerulean warbler nest tree—approximately a 10-acre area—during the breeding season. G

##### 2 Within core northern hardwood habitat areas:

a In 80 percent of the high-quality mesic northern hardwood (ginseng) habitat: G

1 Permit non-ground disturbing activities that mimic natural disturbance regimes common to this habitat. G

2 Permit maintenance of existing improvements. G

3 In the remaining 20 percent of the high-quality mesic northern hardwood habitat, maintain 80 percent crown closure. G

4 Allow potential high-quality mesic northern hardwood forest habitat adjacent to core areas to convert to actual high-quality mesic northern hardwood forest habitat. G

5 New motorized trails will not be constructed in cedar swamps, hardwood conifer swamps and subirrigated forests unless there are no other reasonable routes. G

B Manage wetlands identified as good and excellent sandhill crane nesting habitat to improve habitat conditions for this species. G

C Develop and implement management direction for each osprey nesting area and great blue heron colony. G

## 2700 SPECIAL USES MANAGEMENT

I Decisions on special uses involving National Forest System lands will be made on an individual basis. G

II Do not allow developed organizational camps. G

## 2800 MINERALS AND GEOLOGY

I Federal oil and gas leases within experimental forests will contain a no-surface-occupancy stipulation. S

## 5100 FIRE MANAGEMENT

## I Suppression

- A Minimize use of tractor plows, retardant, constructed helispots and wheeled vehicles. **G**

## 7700 TRANSPORTATION SYSTEM

## I Oil and Gas

- A All temporary roads will be planned and constructed to be revegetated within one year of termination of contract, lease or permit. **G**

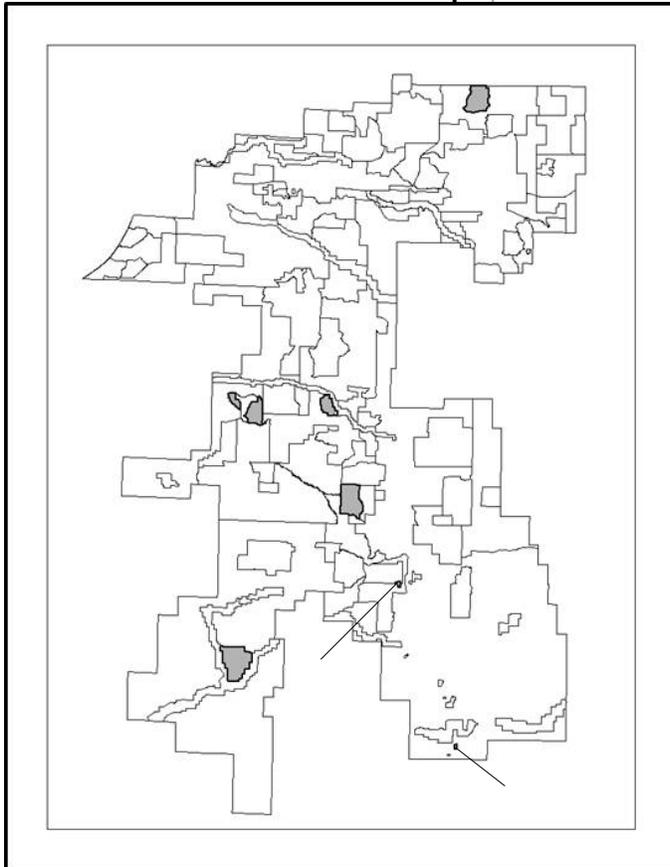
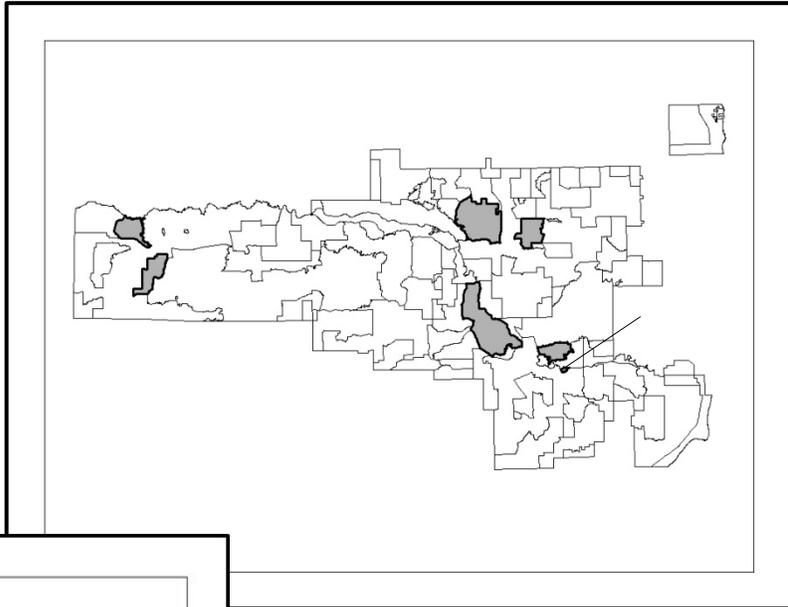


## Management Area 8.4 - Special Areas

### Maps:

Shaded area depicts Management Area 8.4.

**Figure III-17. Management Area 8.4 on the Huron National Forest.**



**Figure III-18. Management Area 8.4 on the Manistee National Forest**

***Purpose:***

Management of special areas will protect areas that have scientific, biological, geological, historical, social, or recreational characteristics of local, regional, or national significance.

Newaygo Prairie Ecological Study Area and Loda Lake Wildflower Sanctuary were identified for their unique biological characteristics.

Lumbermen's Monument was identified for its unique historical nature.

Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River were identified for their special recreational characteristics.

***Landscape Description:***

Management Area 8.4 is scattered throughout the Forests on well-drained, sandy plains, low, sandy hills, morainal hills and plains, and low, wet areas. Rivers, lakes and their associated riparian zones also are found within this management area. Together, these areas contain approximately 5 percent of all National Forest System lands on the Huron-Manistee National Forests.

Individual areas within Management Area 8.4 are displayed in Table III-13 and Table III-14.

**Table III-13. Special Biological or Historic Areas on the Huron-Manistee National Forests.**

Area	Description	Location
Newaygo Prairie Ecological Study Area	<p>An 80-acre unit designated by the Forest Supervisor in 1968.</p> <p>This area will be managed to retain its prairie-like condition to facilitate studies of prairie ecosystems.</p> <p>This is a small remnant of dry grass prairie that is in an early successional stage of recovery to a natural prairie condition. This type of habitat typically benefits some grassland wildlife species with small home ranges such as vesper sparrow, prairie deer mouse, and plant species associated with prairie ecosystems, such as big and little bluestem and Indian grass. The prairie type is not of sufficient size to benefit grassland species having large home ranges or which occur in large colonies.</p> <p>The study area will be managed as a roaded natural Recreation Opportunity Spectrum area.</p>	Manistee National Forest
Lumbermen's Monument	<p>Of 135 acres, a 7.2-acre site was designated by the Secretary of Agriculture in 1932 for historical and educational uses.</p> <p>Management direction for the site is established in "Lumbermen's Monument Visitor Information Center Plan," Huron National Forest, April 1979, as amended in 1993.</p>	Huron National Forest
Loda Lake Wildflower Sanctuary	<p>Of 130 acres, a 72-acre site was designated by the Regional Forester in 1949 to provide examples of native plants and native plant communities that once covered much of Michigan.</p> <p>Management direction for the site is established in "Management Plan for the Loda Lake Wildflower Sanctuary," USDA-Forest Service, Manistee National Forest, 1949. This is a small area that will have over-mature or old growth conditions and provides benefits to those associated species.</p> <p>The sanctuary will be managed as a roaded natural Recreation Opportunity Spectrum area.</p>	Manistee National Forest.

**Table III-14. Special Recreational Areas on the Huron-Manistee National Forests.**

Area	Approximate Acreage	Location	Objectives
Au Sable	10,400	Huron National Forest	<ul style="list-style-type: none"> <li>• Provide canoeing, fishing, hunting, horseback riding and camping.</li> <li>• Manage the Shore-to-Shore Riding and Hiking Trail.</li> <li>• Continue management of South Branch Trail Camp and Thompson's Landing Canoe access.</li> <li>• Recreation Opportunity Spectrum: Roaded Natural – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>
Bowman Lake	1,100	Manistee National Forest	<ul style="list-style-type: none"> <li>• Provide hiking and cross-country ski trails.</li> <li>• Develop 3 to 5 miles of nonmotorized trails in addition to the North Country National Scenic Trail and other existing trails.</li> <li>• Use trail corridors to improve potential or connect occupied Karner blue butterfly habitat.</li> <li>• Recreation Opportunity Spectrum: Roaded Natural – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>
Briar Hills (Northern Block)	3,400	Manistee National Forest	<ul style="list-style-type: none"> <li>• Provide opportunities for mushroom picking, hunting, cross-country skiing and dispersed camping.</li> <li>• Consider development of a nonmotorized trail system.</li> <li>• Recreation Opportunity Spectrum: Semiprimitive Motorized – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>
Condon Lakes West	3,300	Manistee National Forest	<ul style="list-style-type: none"> <li>• Provide opportunities for mushroom and berry picking, hunting, fishing and dispersed camping.</li> <li>• Recreation Opportunity Spectrum: Semiprimitive Motorized – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>

**Table III-14. Special Recreational Areas on the Huron-Manistee National Forests (Continued).**

<b>Area</b>	<b>Approximate Acreage</b>	<b>Location</b>	<b>Objectives</b>
Cooke (North of River)	2,400	Huron National Forest	<ul style="list-style-type: none"> <li>• Provide opportunities for more secluded, less-roaded experiences.</li> <li>• Recreation Opportunity Spectrum: Semiprimitive Motorized – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>
Hoist Lakes	9,700	Huron National Forest	<ul style="list-style-type: none"> <li>• Provide hiking, cross-country skiing, primitive camping, fishing and hunting opportunities.</li> <li>• Recreation Opportunity Spectrum: Semiprimitive Motorized – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>
South Branch Au Sable	4,000	Huron National Forest	<ul style="list-style-type: none"> <li>• Provide hunting and limited brook trout fishing.</li> <li>• Recreation Opportunity Spectrum: Semiprimitive Motorized – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>
Wakeley Lake	2,100	Huron National Forest	<ul style="list-style-type: none"> <li>• Provide fish and sensitive wildlife habitats.</li> <li>• Recreation Opportunity Spectrum: Semiprimitive Motorized – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>
Whalen Lake	2,800	Manistee National Forest	<ul style="list-style-type: none"> <li>• Provide primitive canoeing, fishing and camping areas.</li> <li>• Develop a nonmotorized trail system.</li> <li>• Use trail corridors to improve potential or connect occupied Karner blue butterfly habitat.</li> <li>• Recreation Opportunity Spectrum: Roaded Natural – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>
White River	6,900	Manistee National Forest	<ul style="list-style-type: none"> <li>• Provide primitive canoeing, fishing and camping areas.</li> <li>• Develop a nonmotorized trail system.</li> <li>• Use trail corridors to improve potential or connect occupied Karner blue butterfly habitat.</li> <li>• Recreation Opportunity Spectrum: Semiprimitive Motorized – managed to provide a more secluded, less-roaded recreation experience.</li> </ul>

**Goals and Objectives and Desired Future Condition:****Goals and Objectives:**

Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary:

- Maintain the characteristics of each area for which it was identified.

Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River:

- Provides visual variety by providing vegetative diversity.
- Provide for more secluded, less-roaded recreational experiences relative to the rest of the Huron-Manistee National Forests.
- Provides a variety of fish and wildlife habitats for species which avoid human activity.
- Produces low to moderate volumes of forest products.
- Provides habitat suitable for species requiring an old-growth environment.
- Allows facility development to separate competing uses.
- Provides for recreational activities such as hunting, fishing, viewing scenery, and water based recreational opportunities.
- Management will strive to increase utilization of wood residues and other currently nonmerchantable material, when not needed for resource concerns such as soil productivity and wildlife habitat.
- Quality sites and opportunities for intensive timber management practices will be identified commensurate with the site's ecological capabilities.
- Manage permanent openings and/or grasslands to meet species viability needs.
- Distribution of openings will recognize the contribution of adjacent private lands.
- The first land acquisition priority is to acquire private inholdings.
- Subsurface Ownership: Acquiring ownership of severed mineral rights is a high priority.
- Provide mineral development opportunities at a limited density.

**Desired Future Condition:**

Special Areas have unusual or significant biological, historical, geological, cultural, or recreational characteristics. Federal or state ownership of all surface and subsurface mineral rights is desirable.

Three areas within the 8.4 Management Area, including Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary will be managed for their biological and historical values and purpose.

Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River will be characterized by a predominantly natural or natural-appearing environment and will provide a more secluded, less-roaded recreational experience relative to the remainder of the Huron-Manistee National Forests. Concentration and interaction between users is low, but there is often evidence of other users. The areas are managed in such a way that on-site controls and restrictions may be present, but are subtle. Nonmotorized trail use is emphasized. Closed roads may be evident and some may be utilized as trails. Users are aware of the services provided, such as visitor information, and restrictions and controls are evident.

Dominant forest types are variable depending on the area and will range from northern hardwoods on morainal hills and plains to aspen, oaks and red and white pines on dry sandy plains. Low, wet areas will be characterized by aspen, black ash, cedar, fir and hemlock. Stand distribution by age and size, across the landscape, is natural in appearance and dominated by old-growth characteristics. Some roads are present but gated to provide access only for administrative or other permitted purposes. Improvements on these roads are infrequent and maintained to minimal standards necessary for health and safety. Other public agency roads may be present.

Approximately 39,385 acres of designated old growth occur in the biological, historical, and recreation Special Areas.

### **Standards and Guidelines:**

#### 1900 PLANNING

- I Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River Special Areas
  - A Vegetation Management
    - 1 Limit vegetation management to improving visual quality; reducing hazard fuels, pest management and fuelbreaks, or maintaining diversity of wildlife habitats. G

#### 2200 RANGELAND MANAGEMENT

- I Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River Special Areas
  - A Grazing will not be permitted. S

#### 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

- I Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River Special Areas
  - A Do not allow motorized use on lakes. G
  - B Au Sable River
    - 1 Allow watercraft with motors on the river. G

- C Cooke
  - 1 Camping is allowed at designated sites only. G
- D Hoist Lakes Foot Travel Area
  - 1 Prohibit saddle, pack and draft animals and bicycles. S
- E Reid Lake Foot Travel Area
  - 1 Prohibit saddle, pack and draft animals and bicycles. S
- F South Branch Au Sable
  - 1 The existing road that provides access to the Mason Chapel will remain open to motorized use. G
- G Wakeley Lake
  - 1 The existing dikes and dam will be maintained at Wakeley Lake. G
  - 2 The existing perimeter fence will be allowed to deteriorate before removal. G
- H Bowman Lake
  - 1 Allow camping around Bowman Lake only at designated sites. G
  - 2 Prohibit saddle, pack and draft animals. S
- I Whalen Lake
  - 1 Camping around Whalen Lake and the Big South Branch of the Pere Marquette River will be allowed at designated sites or areas only. G
  - 2 A nonmotorized trail system will be developed. G
- J White River
  - 1 Camping areas and sites will be designated. Sites and areas will avoid Karner blue butterfly habitat. S
  - 2 Allow dispersed camping at existing sites along open roads. Evaluate opportunities to phase out of these existing sites and develop sites adjacent to the area. G
  - 3 Within a one-quarter mile corridor on each side of the White River, manage using the Wild and Scenic Study River Standards and Guidelines in management area 9.2. S
  - 4 Trail locations will avoid concentrated areas of wild lupine and other nectar plants utilized by the Karner blue butterfly and other associated sensitive species. S
  - 5 Allow watercraft with motors on the river. G

#### 2400 TIMBER MANAGEMENT

- I Timber harvest in Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary will be limited to safety and salvage.
- II Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake,

## Whalen Lake, and White River Special Areas

- A The following Standards and Guidelines apply to both even- and uneven-aged silvicultural systems.
- 1 Uneven- and even-aged systems will be used. They will be consistent with area management objectives and the following restrictions:
    - a Even-aged management will be the primary silvicultural system used. G
    - b Allow thinnings of red pine plantations. G
    - c The uneven-aged system will normally be used only in northern hardwoods. G
    - d Seasonal restrictions on time of entry for timber harvests may be applied to protect other resources, activities and facilities. G
    - e Standard cutting methods such as single-tree and group selection, shelterwood, seed-tree and clearcutting may be used. S
    - f Silvicultural standards will incorporate genetic improvement principles, practices and programs. G
    - g Regeneration activities:
      - 1 Site preparation activities can include mechanical, prescribed fire, hand and chemical. G
      - 2 For revegetation, use native vegetative species for timber production purposes. Revegetation activities can include natural-preferred-artificial or seeding methods. G
      - 3 Fertilization may be used to establish vegetation on disturbed areas. Manage use of fertilizers or soil enrichments to prevent movement into lakes and streams. G
- B The following Standards and Guidelines apply only to the even-aged silvicultural system:
- 1 Temporary openings created by the application of the even-aged silvicultural system:
    - a Will be separated by a stand of at least 10 acres, except in wildlife emphasis areas. G
    - b Generally should be 20 acres or less. G
- C Firewood gathering may be allowed except in old-growth areas. A permit is required. G
- D Intermediate treatment guidelines include:
- 1 Pruning for timber-crop trees-visual improvement, safety and wildlife-fruit trees. G
  - 2 Thinning. G
  - 3 Using precommercial thinnings to maintain winter thermal cover for deer in lowland hardwood and G

conifer types.

- 4 Using hand release methods in all vegetative types. G
- E Harvest guidelines include the following: (See Appendix B for a discussion of each harvest method):
  - 1 The clearcutting method may be used only for jack, red and white pines; oak; aspen; lowland conifers and northern hardwoods with adequate advanced regeneration. G
  - 2 The seed-tree cutting method may be used only for jack, red and white pines and lowland conifers. G
  - 3 The shelterwood cutting method may be used only for jack, red and white pines; all oak; northern hardwoods; lowland conifers and lowland hardwoods. G
- F Allow commercial thinning in all vegetative types. G  
Precommercial thinning in all types is allowed if necessary to meet objectives of timber, wildlife and/or visual quality objectives.

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

### I Newwaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary Special Areas

- A New motorized trails will not be constructed in cedar swamps, hardwood conifer swamps and subirrigated forests unless there are no reasonable alternatives. G
- B Manage wetlands identified as good and excellent sandhill crane nesting habitat to improve habitat conditions for this species. G
- C Develop and implement direction for each osprey nesting area and great blue heron colony G

### II Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River Special Areas

- A General Management
  - 1 Dry Grasslands
    - a Manage dry grassland habitat, 250 acres or larger in Landtype Associations 1 and 2. Manage multiple Habitats as blocks when they are within one mile of each other to increase suitability. G
- B Regional Forester Sensitive Species
  - 1 Standards and Guidelines for the management of Regional Forester Sensitive Species are:
    - a Within core northern hardwood habitat areas:
      - 1 In 80 percent of the high-quality mesic northern hardwood (ginseng) habitat:
        - a Permit non-ground disturbing activities that mimic natural disturbance regimes common to this habitat. G



## D Wildlife Emphasis Areas

## 1 Condon Lakes

- a In selected oak stands, extend the rotation age to 120 years. G
- b Identify 25 to 35 percent of the stands in the area to be retained as over-mature. This should be concentrated around the isolated lakes, but there should also be stands identified as over-mature throughout the area. G

## 2 White River

- a Continue or develop cooperative efforts with private landowners that will:
  - 1 Establish and maintain protective zones around bald eagle nests. G
  - 2 Avoid and discourage disturbances during critical periods. G
- b Identify areas of potential nest sites and protect these from alteration or development on National Forest System lands and private lands where possible. G
- c Management for other wildlife habitats should not conflict with the management and protection of potential bald eagle habitat elements. G

## 3 Deer yards

- a Manage recognized deer yards outside old growth areas to provide a sustained supply of winter thermal cover and associated browse. G

## 2700 SPECIAL USES MANAGEMENT

## I Newygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary Special Areas

- A Adhere to the Federal Power Act Section 4(e) Forest Service conditions on the eight hydro-electric projects licensed by the federal Energy Regulatory Commission. S
- B Do not allow developed organizational camps. G

## II Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River Special Areas

- A Determine approval of applications on an individual basis for special uses involving National Forest System lands. G
- B Do not permit special-use motorized recreation events. G
- C Discourage utility transmission corridors. Exceptions will be considered on an individual basis supported by a documented environmental analysis. G

## 2800 MINERALS AND GEOLOGY

## I Newygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary Special Areas

- A Federal oil and gas leases will contain a no-surface- S

occupancy stipulation.

- II Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River Special Areas
  - A Federal oil and gas leases will contain a controlled surface use stipulation with a maximum surface development density of 1 surface location per 640 acres. G
  - B Endangered, Threatened and Sensitive Wildlife
    - 1 Karner Blue Butterfly
      - a Federal oil and gas leases will contain a lease notice that the lands are identified as Karner blue butterfly metapopulation areas and occupancy is subject to more restrictive controls than routine areas. No surface occupancy or road construction will be permitted in occupied habitat. S
      - b Access to oil and gas development is by low standard road with minimum clearing. These roads are gated. The access road should be obliterated upon abandonment of the site. G
  - C Mineral Exploration and Development
    - 1 General oil and gas development conditions:
      - a Production facilities are outside the area when practical. G
      - b Needed pumps are run by electric motors or equipped to minimize noise. G
  - D Common Variety Minerals
    - 1 Use of common variety mineral deposits will be considered with the following limitations: G
      - a Permitted only for use within the management prescription area. G

#### 5100 FIRE MANAGEMENT

- I Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary Special Areas
  - A Suppression
    - 1 Minimize use of tractor plows, retardant, constructed helispots and wheeled vehicles. G
- II Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River Special Areas
  - A Suppression
    - 1 Minimize use of tractor plows, retardant, constructed helispots and wheeled vehicles. G
  - B Fire Use and Fuels Treatment
    - 1 Constructed fuel barriers will be no longer than eight miles in length, and temporary or permanent openings will be G

limited to no more than 500 acres.

- C Activity fuels–slash–will be treated to a level commensurate with the allowable fire intensity and rate of spread that meets resource objectives in established prescriptions. Treatment along highways and adjacent properties will meet applicable state laws. G
- D Management action to address high fuel hazards may occur in old growth when public safety and property are at risk. G

#### 7700 TRANSPORTATION SYSTEM

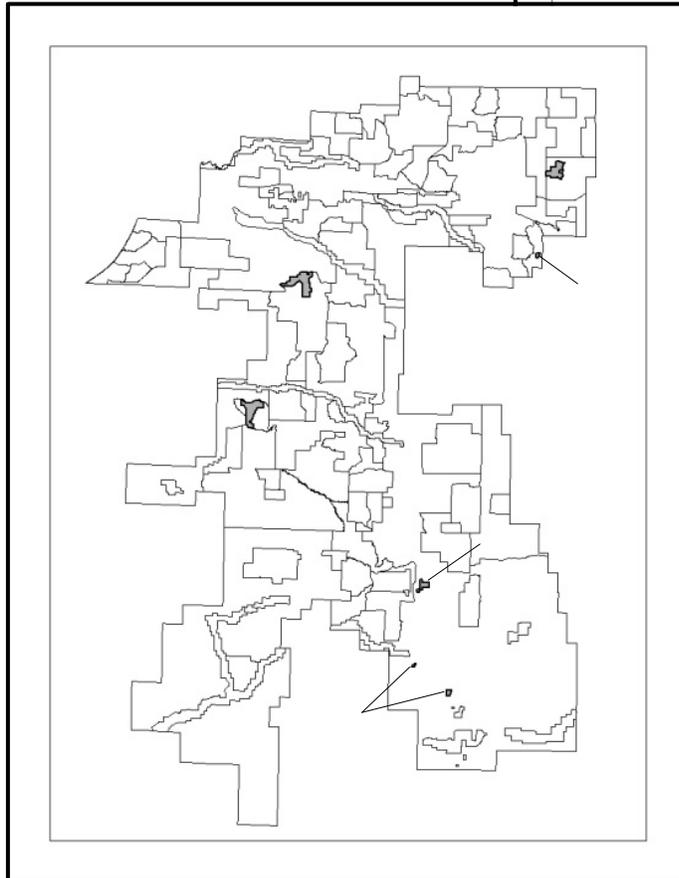
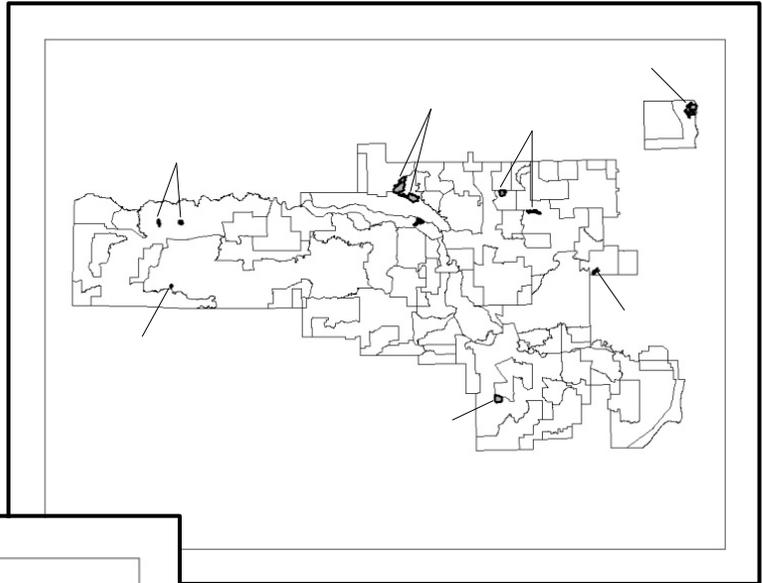
- I Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River Special Areas
  - A Close all Forest Service roads to public motorized vehicles except for emergency and administrative use. See 2300 II A 5 for an exception. G
  - B Oil and Gas
    - 1 All temporary roads will be planned and constructed to be revegetated within one year of termination of contract, lease or permit. G
    - 2 Roads must use existing transportation corridors when compatible, feasible and practical. G

## Management Area 9.1 – Candidate Research Natural Areas

### Maps:

Shaded area depicts Management Area 9.1.

**Figure III-19. Management Area 9.1 on the Huron National Forest.**



**Figure III-20. Management Area 9.1 on the Manistee National Forest.**

**Purpose:**

Lands in holding for candidate Research Natural Areas until establishment record and environmental documentation is completed for designation. Management activities provide for Research Natural Area attributes and values.

**Landscape Description:**

This area contains approximately one percent of all National Forest System lands on the Huron-Manistee National Forests.

Candidate Research Natural Areas occur throughout the Huron-Manistee National Forests and are listed in Table III-15.

**Table III-15. Candidate Research Natural Areas on the Huron-Manistee National Forests.**

<b>Candidate Research Natural Area</b>	<b>Location</b>
Bear Swamp (includes Yonker's Meadow)	Manistee National Forest
Big South (includes Whelan Lake)	Manistee National Forest
Black River Complex	Huron National Forest
Blockhouse Swamp/Creek	Huron National Forest
Brandybrook	Manistee National Forest
Hunter's Lake	Huron National Forest
Loon Lake	Manistee National Forest
Loud Creek	Huron National Forest
McDonald Creek Forest	Huron National Forest
McMaster's Bridge Bog	Huron National Forest
North Branch White River	Manistee National Forest
O'Brien Lake Forest and Swamp	Huron National Forest
Pearl Lake	Manistee National Forest
Toft Lake	Manistee National Forest
South Branch (Foley) Bog	Huron National Forest
South Olga Bog	Manistee National Forest
Trout Lake Swamp	Huron National Forest
Vaughn Lake	Huron National Forest

**Goals and Objectives and Desired Future Condition:****Goals and Objectives:**

- Maintain the characteristics of each candidate Research Natural Area for which they were identified.
- Recreation in the area such as hiking, hunting, camping and fishing will not be encouraged.

- Research and monitoring that aids the protection and management of populations of endangered, threatened, sensitive or rare species will be encouraged.
- Develop an establishment plan.

### Desired Future Condition:

Management direction for candidate Research Natural Areas will be the same as Research Natural Areas.

There are approximately 5,600 acres of designated old growth in this management area.

### Standards and Guidelines:

#### 1900 PLANNING

##### I Vegetation Management

- |   |   |   |
|---|---|---|
| A | Timber harvesting or wood gathering will not be allowed.  | G |
| B | Removal of exotic species or encroaching vegetation will be permitted if the presence of such threatens the special values of the area. | G |
| C | Cutting, but not removal, of trees that are safety hazards along roadsides will be permitted.   | G |
| D | Do not allow fuelwood or other special forest products gathering.   | G |

#### 2000 NATIONAL FOREST RESOURCE MANAGEMENT

##### I Control

- |   |   |   |
|---|---|---|
| A | Infestations of non-native invasive plant and animal species that threaten candidate Research Natural Area values will be controlled using appropriate integrated pest management techniques. | S |
|---|---|---|

#### 2200 RANGELAND MANAGEMENT

- |   |                                |   |
|---|--------------------------------|---|
| I | Grazing will not be permitted. | S |
|---|--------------------------------|---|

#### 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

- |     |  |   |
|-----|--|---|
| I   | Use of motorized vehicles or bicycles should not be allowed.               | G |
| II  | Use of the area by saddle, draft or pack animals is generally prohibited.  | G |
| III | Removal or use of live or dead vegetation will not be permitted.           | G |
| IV  | No new trails will be established in candidate Research Natural Areas.     | G |
| V   | Significant and unevaluated heritage cultural resources will be protected. | G |

#### 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

- |    |   |   |
|----|---|---|
| I  | Reintroduction of extirpated species is permitted.  | G |
| II | If endangered or threatened species are found, they will be protected and recovery plans will be implemented. | S |

## 2700 SPECIAL USES MANAGEMENT

- I Do not allow developed organizational camps. G
- II New facilities and new corridors for utility rights-of-way will not be established. Existing special uses may be allowed. G

## 2800 MINERALS AND GEOLOGY

- I Federal oil and gas leases will contain a no-surface-occupancy stipulation for candidate Research Natural Areas. s

## 3400 FOREST PEST MANAGEMENT

- I Protection from introduced and endemic insects, diseases, plants and animals will be allowed only when the special values of the area are threatened. Recommendations regarding the need for action will be made by the Forest Research Natural Area Coordinator and approved by the Forest Supervisor. s
- II Protection will follow existing Integrated Pest Management guidelines. G

## 4000 RESEARCH

- I The attributes defining the candidate Natural Research Natural Area will be protected until an evaluation is completed to determine its potential for establishment as a Research Natural Area. s
- II Collection of monitoring data and non-manipulative sampling is permitted. Activities such as clipping of vegetation, use of incremental borers, creating temporary shelter for instrumentation, flagging, permanent markers to relocate long-term plots and tree tagging may be allowed. G
- III All plant and animal specimens collected in the course of research conducted on National Forest System lands will be properly preserved and maintained within university or Federal agency herbaria and museums. When necessary, appropriate permits for collection will be obtained from state and federal agencies. Collection of endangered, threatened, or rare species will be conducted in accordance with State and federal laws. s

## 5100 FIRE MANAGEMENT

- I Suppression
  - A Minimize use of tractor plows, retardant, constructed helispots and wheeled vehicles. G

## 7300 BUILDINGS AND STRUCTURES

- I No new facilities of any kind will be allowed. s

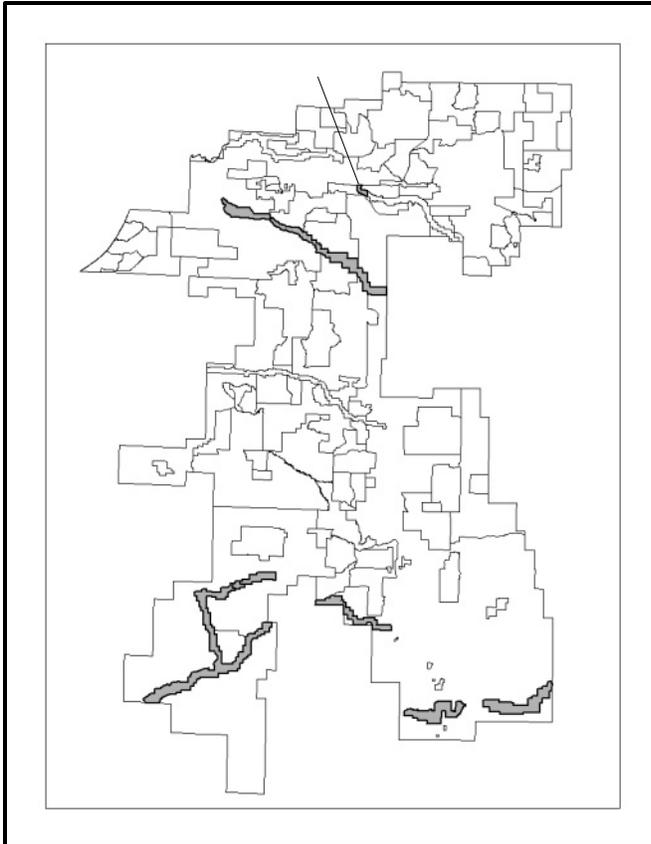
## 7700 TRANSPORTATION SYSTEM

- I No new roads will be established. s

## Management Area 9.2 - Study Wild and Scenic Rivers

### **Map:**

Shaded area depicts Management Area 9.2. There are no Management Area 9.2 areas on the Huron National Forest.



**Figure III-21. Management Area 9.2 on the Manistee National Forest.**

### **Purpose:**

Lands in holding until studies and environmental documentation for designation are completed. Management activities provide for Wild and Scenic River attributes and values.

### **Landscape Description:**

This prescription area contains approximately 1 percent of all National Forest System lands on the Huron-Manistee National Forests.

Study Wild and Scenic Rivers are listed in Table III-16.

**Table III-16. Study Wild and Scenic Rivers on the Huron-Manistee National Forests.**

River	Status	Description	Location
White River	Study	74.5 miles of the White River were identified in the Michigan Scenic Rivers Act (P.L. 102-249) for potential inclusion in the Wild and Scenic River system.	Manistee National Forest
Little Manistee River	Study	42 miles of the Little Manistee River were identified in the Michigan Scenic Rivers Act (P.L. 102-249) for potential inclusion in the Wild and Scenic River system.	Manistee National Forest
Muskegon River	Suitability to be determined	14 miles were identified as eligible in the Final Environmental Impact Statement for the Huron-Manistee National Forests' Land and Resource Management Plan (1986).	Manistee National Forest
Little Muskegon River	Suitability to be determined	25 miles were identified as eligible in the Final Environmental Impact Statement for the Huron-Manistee National Forests' Land and Resource Management Plan (1986).	Manistee National Forest
Pine River Addition	Suitability to be determined	The lands between the Pine River National Scenic River's western boundary to M-55.	Manistee National Forest

Table III-17 displays emphasis areas within Management Area 9.2. Manage the wildlife emphasis area with the following objectives:

**Table III-17. Emphasis Areas Within Management Area 9.2.**

Wildlife Emphasis Area	Approximate Acres	Location	Objectives
Croton Prairie	2,200	Manistee National Forest (Little Muskegon River)	<p>Identify and manage habitats for other wildlife, for example, winter deer range, in these areas on National Forest lands so long as they do not conflict with the management and protection of potential eagle habitat elements.</p> <p>Develop cooperative efforts with private landowners that will encourage landowners to request the advice of State and Federal biologists on any activities that may affect the nesting territory.</p>

### ***Goals and Objectives and Desired Future Condition:***

#### **Goals and Objectives:**

- Maintain the unique characteristics of each river for which they were identified.
- Complete the evaluation of these rivers.

**Desired Future Condition:**

Complete the evaluation of the study rivers—White and Little Manistee Rivers—and suitability evaluation of the Muskegon River, Little Muskegon River and Pine River Addition.

There are approximately 7,600 acres of designated old growth in this management area.

**Standards and Guidelines:**

## 2300 RECREATION, WILDERNESS AND RELATED RESOURCE MANAGEMENT

- |   |  |   |
|---|--|---|
| I | Camping within Wild and Scenic Study River corridors is permitted at designated sites.   | G |
| A | The following apply to the Little Muskegon River, Little Manistee, and the Pine River Addition (scenic classification):  |   |
| 1 | All water supply dams and major diversions are prohibited.   | S |
| 2 | No development of hydroelectric power facilities will be allowed.  | S |
| 3 | Flood control dams and levees will be prohibited.  | S |
| 4 | No new stream crossings. Roads may occasionally be built within the corridor if they protect the river's outstandingly remarkable values and are consistent with other Standards and Guidelines.   | G |
| 5 | New transmission lines, gas lines, water lines, etc. are discouraged. Where no reasonable alternative exist, additional or new facilities should be restricted to existing rights-of-way. Where new rights-of-way are indicated, the scenic, recreational and fish and wildlife values must be evaluated in the selection of the site. | G |
| B | The following apply to the Muskegon River and White River—including both the North and South Branches (recreational classification):   |   |
| 1 | Existing low dams, diversion works, riprap and other minor structures are allowed provided the waterway remains generally natural and riverine in appearance. New structures would not be permitted except for possibly a lamprey control device following an environmental analysis.  | G |
| 2 | No development of hydroelectric power facilities is allowed.   | G |
| 3 | New structures will not be permitted.  | G |
| 4 | No new bridges. Roads may be built within the corridor if they protect the rivers' scenic qualities and are consistent with other Standards and Guidelines.  | G |
| 5 | Existing developments will be maintained. Recreation   | G |

facilities may be constructed, provided the recreation qualities of the river are maintained.

- 6 New transmission lines, gas lines, water lines, etc. are discouraged. Where no reasonable alternative exists, additional or new facilities should be restricted to existing rights-of-way. Where new rights-of-way are indicated, the scenic, recreational and fish and wildlife values must be evaluated in the selection of the site. G
- 7 Motorized travel routes will not detract from the recreational values for which the river may be designated. G

## 2600 WILDLIFE, FISH AND SENSITIVE PLANT HABITAT MANAGEMENT

### I Wildlife Emphasis Areas

#### A Croton Prairie

- 1 Establish and maintain protective buffer zones around bald eagle nests. G
- 2 Avoid and discourage disturbances during critical periods. G
- 3 Identify areas of potential nest sites and protect these from alteration or development on National Forest System lands and private lands, where possible. G

- II New motorized trails will not be constructed in cedar swamps, hardwood hardwood conifer swamps and subirrigated forests unless there are no other reasonable routes. G

## 2700 SPECIAL USES MANAGEMENT

- I Decision on special uses involving National Forest System lands will be made on an individual basis. G
- II Do not allow developed organizational camps. G

## 2800 MINERALS AND GEOLOGY

- I Federal oil and gas leases within the corridors of rivers designated for Study under the Wild and Scenic Rivers Act will contain a no-surface-occupancy stipulation. S

## 5100 FIRE MANAGEMENT

### I Suppression

- A Minimize use of tractor plows, retardant, constructed helispots and wheeled vehicles. G

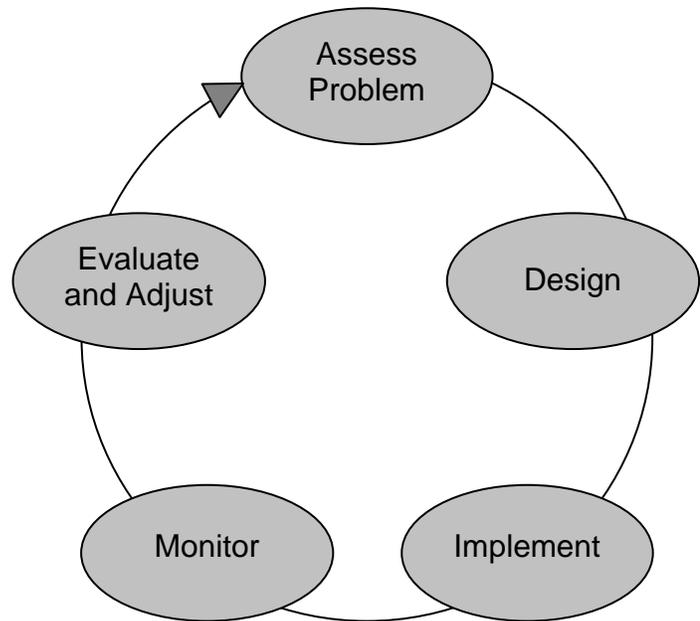


## Chapter IV - Monitoring and Evaluation

### Introduction

Monitoring and evaluation are separate, sequential activities required by National Forest Management Act regulations. Monitoring involves collecting data by observation or measurement. Evaluation involves analyzing and interpreting monitoring data. The information gained from monitoring and evaluation is used to determine how well the desired conditions, goals, objectives and outcomes of the Forest Plan have been met. Regular monitoring and evaluation keeps the Forest Plan current by providing the feedback mechanism for adaptive management (Figure IV-1). Monitoring and evaluation results are used to identify needed changes to the Forest Plan or implementation methods.

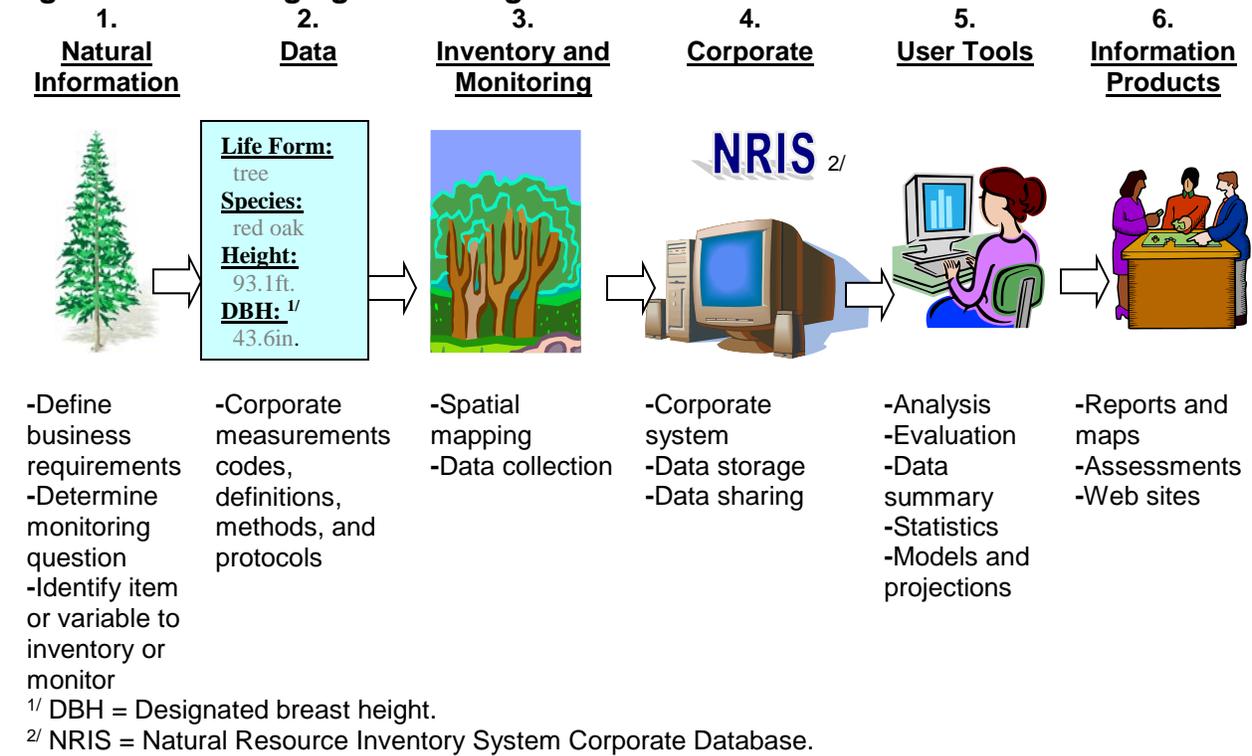
**Figure IV-1. Monitoring and Adaptive Management.**



Monitoring and evaluation involves more than just collecting and interpreting data. Data must be converted to useful information and stored in a form that is accessible to others. A plan for managing monitoring information over time is critical to a successful program and should be developed early in the planning process (Figure IV-2).

Data will be designed and collected according to appropriate data standards and entered into corporate databases, such as the Automated Lands Program, Natural Resource Inventory System or Geographic Information System. The information can then be accessed and analyzed to produce information products such as monitoring reports that would be available for internal and external review.

**Figure IV-2. Managing Monitoring Data.**



## Monitoring Categories

The Forest Plan addresses several types of monitoring as required in the 2012 planning regulations and monitoring attainment of Forest Plan Goals and Objectives.

- Category 1: 8 required monitoring topics.
- Category 2: Attainment of goals and objectives.

Category 1 monitoring items are mandatory components of every Forest Plan. Category 2 monitoring items are more flexible and are tailored to address issues raised through public involvement and interdisciplinary team review. A more complete description of Category 1 items is shown in the Matrix for Minimum Legal Requirements section (page IV-6).

## Legal Requirements

The 2012 Code of Federal Regulations (CFR) directs the Forests to implement a monitoring and evaluation program to provide a basis for a periodic determination of the effect of management practices.

Under 36 CFR 219.12(a), The responsible official shall develop a monitoring program for the plan area and include it in the plan. Monitoring information should enable the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed. The development of the plan monitoring program must be coordinated with the regional forester and Forest Service State and Private Forestry and Research and Development. Responsible officials for two or more administrative units may jointly develop their plan monitoring programs.

The plan monitoring program sets out the plan monitoring questions and associated indicators. Monitoring questions and associated indicators must be designed to inform the management of resources on the plan area, including by testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives. Questions and indicators should be based on one or more desired conditions, objectives, or other plan components in the plan, but not every plan component needs to have a corresponding monitoring question.

Subject to the requirements of paragraph (a)(5) of this section, the responsible official has the discretion to set the scope and scale of the plan monitoring program, after considering:

- (i) Information needs identified through the planning process as most critical for informed management of resources on the plan area; and
- (ii) The financial and technical capabilities of the Agency.

2012 Planning Rule Monitoring Topics: Under 36 CFR 219.12(a)(5), each plan monitoring program must contain one or more monitoring questions and associated indicators addressing each of the following:

- (i) The status of select watershed conditions.
- (ii) The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
- (iii) The status of focal species to assess the ecological conditions required under §219.9.
- (iv) The status of a select set of the ecological conditions required under §219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.
- (v) The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.
- (vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
- (vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.
- (viii) The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)).

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## Monitoring

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### ***Monitoring Prioritization:***

Within any agency or institution, necessary or desirable work demands often exceed available funding. Forest Plan monitoring is no exception. Consequently, a prioritization process for the Monitoring and Evaluation Implementation Guide items will be developed to ensure efficient use of limited time, money and personnel. Following is a list of potential criteria that may be used in the screening process:

- Is monitoring of a particular question or resource mandated by regulation or court order?
- Is the frequency of a particular question or resource mandated by regulation or court order?
- Is the monitoring question one of the questions responding to the monitoring topics in 36 CFR 219.12(a)(5)?
- Is there a high degree of uncertainty associated with management assumptions?
- Is there a high degree of disparity between existing and desired conditions?
- Is the current trend upwards or downwards?
- How rapidly is the trend changing?
- Are proposed management activities likely to affect resources of concern?
- How do monitoring items fit into national and regional priorities?
- What are the consequences of not knowing resource conditions?

Should funding limit the ability to perform all monitoring listed, monitoring priorities will be established using the above criteria and information gained during the past year.

### ***Information Management:***

There will be a tremendous amount of monitoring information collected over time. Information is of little value if it is not documented so it can easily be retrieved, shared with the public and other stakeholders, or used by agency managers to foster better decisions. Information management will consist of: (1) Management of the collection and storage of data, (2) Evaluation and interpretation of data and (3) Sharing of information internally and externally.

- **Manage the Collection and Storage of Data:** The interdisciplinary team will work with Forest Service employees and cooperators to see that data is collected.
- **Evaluation and Interpretation of Data:** Evaluation is the process of transforming data into information. It is a process of synthesis that brings together value, judgment, and reason with monitoring information to answer selected monitoring questions. Successful adaptive management depends on this information to reach the Forests' desired conditions.

The Forests' interdisciplinary team will review the current year's monitoring and evaluation results at the end of each calendar year. Based on these findings, changes (if any) to the Forest Plan and Forest Service Manual or Handbook will be recommended to the Forests' Leadership Team.

- **Sharing of Monitoring Information and Findings:** Information gathered through monitoring will be summarized in various reports and publications, most notably the biennial Monitoring and Evaluation Report, and shared internally and externally with cooperating agencies and organizations, interest groups, policy makers and the general public.

### ***Biennial Monitoring and Evaluation Report:***

The biennial monitoring and evaluation report provides an opportunity to track progress toward the implementation of Forest Plan decisions and the effectiveness of specific management practices. The focus of the evaluation is to provide short- and long-term guidance to ongoing management. The monitoring and evaluation report should include components such as:

- 1) Forest accomplishments toward desired conditions and outputs of goods and services.
- 2) Update of research needs.
- 3) Whether or not a change to the plan, management activities, or the monitoring program, or a new assessment, may be warranted based on the new information.

### ***Public Involvement:***

The Forest Service mission, "Caring for the Land and Serving the People," will not be realized without public trust in the Forest Service decision-making process. Even though agency decisions will not consistently please everyone, using an open process for making decisions should foster public understanding of the rationale for individual decisions. The same principle applies to monitoring. Moreover, since the approach incorporates an adaptive strategy, frequent public feedback is necessary to facilitate monitoring activity prioritization, protocols, evaluation, and ultimately better informed decisions. The monitoring plan will be posted to the Forests' webpage and made available to anyone who requests a copy.

**Table IV-2. Definition of Components in the Monitoring Matrix.**

<b>COMPONENT</b>	<b>DEFINITION</b>
2012 Planning Rule Monitoring Topics	8 topics listed in 36 CRF 219.12(a)(5)
Monitoring Question	Specific monitoring question(s) developed to ensure that monitoring and evaluation addresses information essential to measuring the Forest Plan. These questions relate to the different purposes and rationales for monitoring. There may be more than one monitoring question per resource area.
Evaluation and Reporting Frequency	Identifies how often monitoring information is evaluated and reported.
Indicator	Measure used to answer monitoring questions.

**Table IV-3. Monitoring Matrix.**

Required 2012 Monitoring Topics (Category 1)				
Monitoring Question number	2012 Monitoring Topic	Monitoring Question(s)	Indicator	Evaluation/ Reporting Frequency
1	1	What is the status of select watershed conditions?	Watershed Condition Class Score (25 indicators) - 24 Attributes Associated With 12 Core National Watershed Condition Indicators	5 years
2	2 & 3	Does the HMNFs have adequate acres of trembling and bigtooth aspen in early successional habitat?(Early seral stage aspen with a high aspen composition)	Acres of Aspen in 0-9 age class	Annual
3	4	To what Extent is forest plan implementation contributing to the conservation of federally-listed endangered, threatened, or proposed species, and to the conservation of species of viability concern.	Number of Kirtland's warbler singing males counted in the census and estimated Karner blue butterfly abundance from surveys.	Annual
4	5	What is the status of visitor use and visitor satisfaction?	<ul style="list-style-type: none"> <li>• NVUM data report               <ul style="list-style-type: none"> <li>o Annual Visitation Estimates (by type of visit - day use, developed, general forest area, designated wilderness visits)</li> <li>o Description of Visit (demographics, visit descriptions, activities)</li> <li>o Economic Information (spending, substitute behavior, etc.)</li> <li>o Visitor Satisfaction</li> <li>o Wilderness Visit Demographics</li> </ul> </li> </ul>	5 years
5	6	How are the occurrence, intensity, and distribution of pests and pathogens changing on an annual basis?	Acres infected /infested and insects and diseases found on the Forests	Annual
6	7	How close are projected outputs and services to actual?	Acres of timber harvested. Acres and volumes of timber harvested by silvicultural method and wood class (softwood vs hardwood). Acres or miles accomplished annually by management activity or practice. Compare to tables in appendix D of the Plan.	Annual

**Table IV-3. Monitoring Matrix (Continued).**

<b>Required Monitoring Items (Category 1)</b>				
<b>Monitoring Question number</b>	<b>2012 Topic</b>	<b>Monitoring Question(s)</b>	<b>Indicator</b>	<b>Evaluation /Reporting Frequency</b>
7	8	Are the effects of Forest management, including prescriptions, resulting in significant changes in productivity of the land?	Growth metrics of trees and remaining soil nutrient stocks following different harvest scenarios on FS land- data from LTSP study plot on Huron side of Forest.	5 years
<b>Attainment of Goals and Objectives Monitoring Items (Category 2)</b>				
8		Are harvested lands adequately restocked after 5 years?	Number of acres certified from stands harvested five year previous. All stands should be certified within five years or remedial actions taken to provide adequate stocking if certification has not been met. Also the number of acres where stocking surveys have been completed from harvested lands to show that monitoring of regeneration is taking place.	Annual
9		To what extent have conditions or information changed the classification of lands "not suited" for timber production to "suitable" for timber production?	Acres moved from Not suitable to suitable or vice versa.	Annual
10		To what extent has the forest used fuels treatments to reduce hazardous fuels	Acres treated by mechanical and prescribed fire by Wildfire Condition Class	Annual
11		What are the population trends of management indicator species?	Number of active bald eagle nests and nest productivity, Average number of ruffed grouse drums per stop. Brook Trout and mottled sculpin: Relative (Catch-Per-Unit-Effort), total (e.g. pounds/acre, fish/acre), or age-class abundance of brook trout and mottled sculpin. The number of Kirtland's warbler singing males. Estimated Karner blue butterfly abundance.	Annual
12		To what extent is forest management contributing or responding to populations of terrestrial / aquatic non-native invasive species of concern?	Number of acres treated and monitored for non-native invasive species by fiscal year.	Annual
13		What is the mix (product ration) of sawtimber and pulpwood produced and what is the output level of non-chargeable timber (restoration treatments), versus chargeable (ASQ)?	Total volume sold for chargeable and nonchargeable fiscal year. Ratio of sawtimber and pulpwood sold volume by fiscal year. Acres by silvicultural method by fiscal year.	Annual

## Appendix A – Scenery Management System

### Landscape Character, Scenic Attractiveness, Scenic Integrity and Desired Future Condition for the Huron National Forest

#### ***Landscape Character:***

##### **General:**

In the Scenery Management System, landscape character is defined as the combination of physical, biological and cultural attributes that give a geographic area its visual and cultural image. Landscape character contains those features that make each landscape identifiable or unique. Landscape character represents distinct landscape attributes of landform, vegetation, surface water features and cultural features that exist throughout the area being described.

The landscape character of the 694,098-acre Huron National Forest, located on the east side of northern Lower Michigan, has been shaped and influenced by natural as well as cultural influences. Landforms observed today are the results of glacial action and subsequent postglacial erosion and continuing soil formation processes. More distinctively, landscape character for the Forest can be described within the context of specific ecological sub-subsections associated with the Forest land-base and the landtype associations that make up these sub-subsections. Descriptions for sub-subsections associated with the Forest generally speak to a range of glacial landforms that include glacial outwash plains, ice-contact ridges, till plains and moraines and lake plains.

##### **Landform and Vegetation:**

###### **Glacial Outwash Plain:**

Over 50 percent of the Forest is identified as glacial outwash plain with soils ranging from the more dominant excessively drained sands to very poorly drained organic soils. Along with landscape position, soil structure, drainage and climate conditions, fire has been a major influence on historical vegetation patterns for the outwash plains. Historically, large stand-replacing “wildfires were common and often spread for many miles, especially where plains were expansive and without natural fire breaks such as steep ridges or less flammable hardwood dominated till plains” (Corner et al. 1999). These wildfires were a natural part of the ecosystem and had a major effect on vegetation types occupying specific landscape positions.

Several events have had an effect on alteration in vegetation patterns for the glacial outwash plains, and to a lesser degree, other ecological regions. Starting in the 1800s, disturbances such as logging, agriculture, drainage alteration, forest planting by the Civilian Conservation Corps, fire suppression and other forest management practices have significantly altered the pre-Euro-American plant cover and composition.

Pre-Euro-American vegetation of the well-drained outwash plains varied, but was predominantly xeric conifer forest with extensive pine barrens on the most fire-prone sites. The ground cover would have been thick sod, comprised of native grasses, sedges and forbs. Scattered red pine may have occurred within some of the barrens. On the less fire-prone sites, the forest was comprised of white pine and other conifers or oak while deciduous forests of American beech and sugar maple were found on the least fire-prone sites.

Today, conifer forests are still the dominant vegetation found on the outwash plains. However, it now occurs more extensively as row-planted red or jack pine plantations with less of the naturally occurring pine barrens historically found on the same landscapes. Overall hardwood acreage remains close to the same, but aspen/white birch, which were not readily present in the mid 1800s, have dramatically increased in acreage.

Also within the outwash plains, a lesser amount of the area includes poorly drained soils. Prior to the mid to late 1800s, these areas were dominated by conifer swamps. Dry-mesic conifers and northern hardwoods were also common on upland inclusions. Today, aspen/white birch is the most common forest type found within these wetlands with a substantial decrease in conifer swamps. In contrast, hardwood swamps have increased significantly.

### **Ice-Contact Ridges:**

Ice-contact ridges, a characteristic landform, cover the least amount of Forest compared to the other landforms discussed. “These features occur as very large, sandy ridges and are often surrounded by outwash plain. Prior to the late 1800s vegetation was characterized by American beech/sugar maple forest, dry-mesic forest such as white pine/red pine or white pine/American beech/red maple, and dry conifer forest of jack pine. Ridges with excessively drained sandy soils or those surrounded by large, fire-prone, outwash plains, from which wildfires readily spread, often supported coniferous forests. In contrast, ridges with more favorable soil conditions or those more isolated from fire-prone outwash plains by lakes, large streams or wetlands, tended to support deciduous forest types” (Corner et al. 1999).

Current vegetation type on ice-contact ridges remains similar to what it was in the mid to late 1800s. However, coniferous forest has been greatly reduced in overall extent while the aspen/white birch forest type has increased dramatically. Attempts at agriculture for these areas were largely unsuccessful, resulting in a small percentage that remains in abandoned fields.

### **Till Plains and Moraines:**

The northeast part of the Huron National Forest, as well as other scattered areas, is characterized by till plains and steep moraine topography. Prior to the late 1800s, vegetation for both was dominantly American beech/sugar maple forest, especially the till plains. Although this forest type is still common, these till plains and moraines have been fragmented into numerous cover types with the most common being cropland, old field, aspen/white birch and conifer forest.

**Lake Plains:**

Broad, flat lake plains are representative of the Forest closest to Lake Huron. Tuttle Marsh Wildlife Area is the largest block of National Forest System lands located in the lake plains.

**Surface Water Features:**

Major water features associated with the Huron National Forest include Lake Huron, the Au Sable National Scenic River, lesser streams, a few inland lakes and numerous wetlands. While the boundary of the Huron National Forest abuts Lake Huron, little Forest ownership exists along the shoreline of this Great Lake. The Au Sable River drainage incorporates six impoundments forming Mio, Alcona, Loud, Cooke, Five Channels and Foote Dam Ponds. For these water features, National Forest System ownership is high and little development occurs, resulting in mostly natural appearing shorelines. Except for a few isolated lakes, such as Wakeley and Mack Lake, most of the remaining larger lakes have shorelines that are predominantly in private ownership and residential and/or commercial development is more prominent.

**Land Use Patterns and Cultural Features:**

In combination with natural features found within the Forest, several small towns or population centers exist that include: Luzerne, Mio, McKinley, Curran, Curtisville, South Branch, Glennie and Barton City, which have an influence on Forest landscape character. Development and greater private ownership around these areas is in contrast to the more natural appearing environment of the forested setting found elsewhere within the Forest boundary. Away from these population centers, the Forest remains in a fairly large, contiguous block with occasional in holdings of other ownership.

Other contrasting elements include occasional Forest recreation developments, utility rights-of-ways, hydroelectric dams, gas and oil wells, and on-going timber harvesting activities. The Huron National Forest includes several paved highways; an abundance of county roads, lower standard forest access roads, and a significant number of two-track roads, resulting in a landscape highly dissected by roads and recreational trails. High recreation use on the Forest is associated with these population centers, recreational facilities, roads and trails.

Notable scenic features on the Huron National Forest include the Au Sable National Scenic River, River Road National Scenic Byway, Lumberman's Monument Visitor Center, Wakeley Lake Wildlife Area, and Tuttle Marsh Wildlife Management Area.

**Scenic Attractiveness:**

Scenic Attractiveness measures the scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, water characteristics, vegetation pattern, and cultural land use. Scenic attractiveness is classified as:

- Distinctive (Class A) – landscapes whose attributes and patterns combine to provide unusual, unique or outstanding scenic quality.

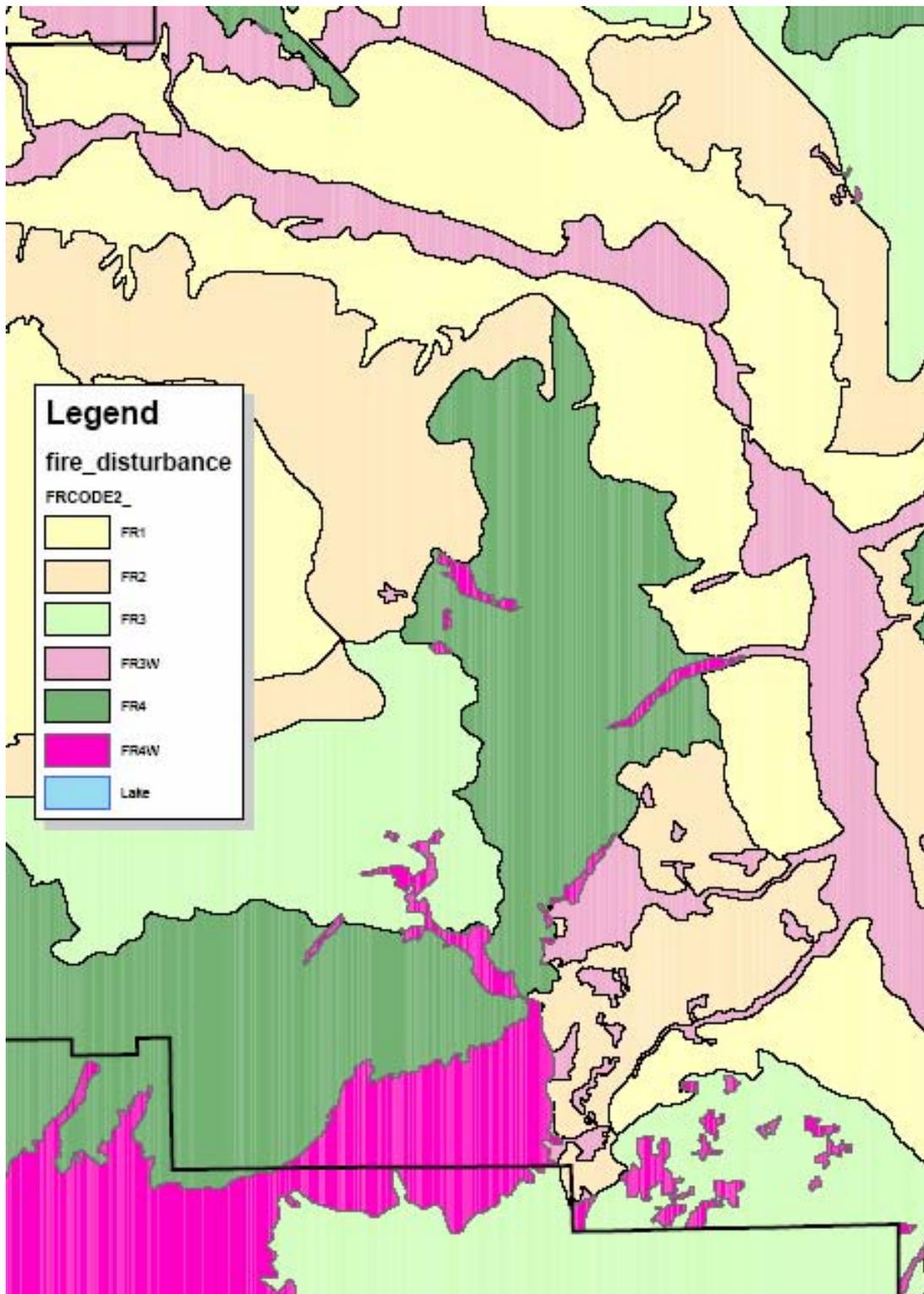
- Typical (Class B) - landscapes that provide ordinary or common scenic quality.
- Indistinctive (Class C) – landscapes having low scenic quality.

The broad Forest characteristics and attributes described under Landscape Character all combine to establish different levels of scenic quality for the Huron National Forest. However, these attributes can better be defined and applied to provide for delineation and mapping of Scenic Attractiveness levels. Past methods relied more on developing a matrix of indicators defining landform, vegetation, water and cultural characteristics representative of the different classes. Aerial photos and topographical maps were used as tools to determine boundaries. However, other related resource maps and utilization of GIS technology provides a more consistent and ecological based way to complete identification of Scenic Attractiveness.

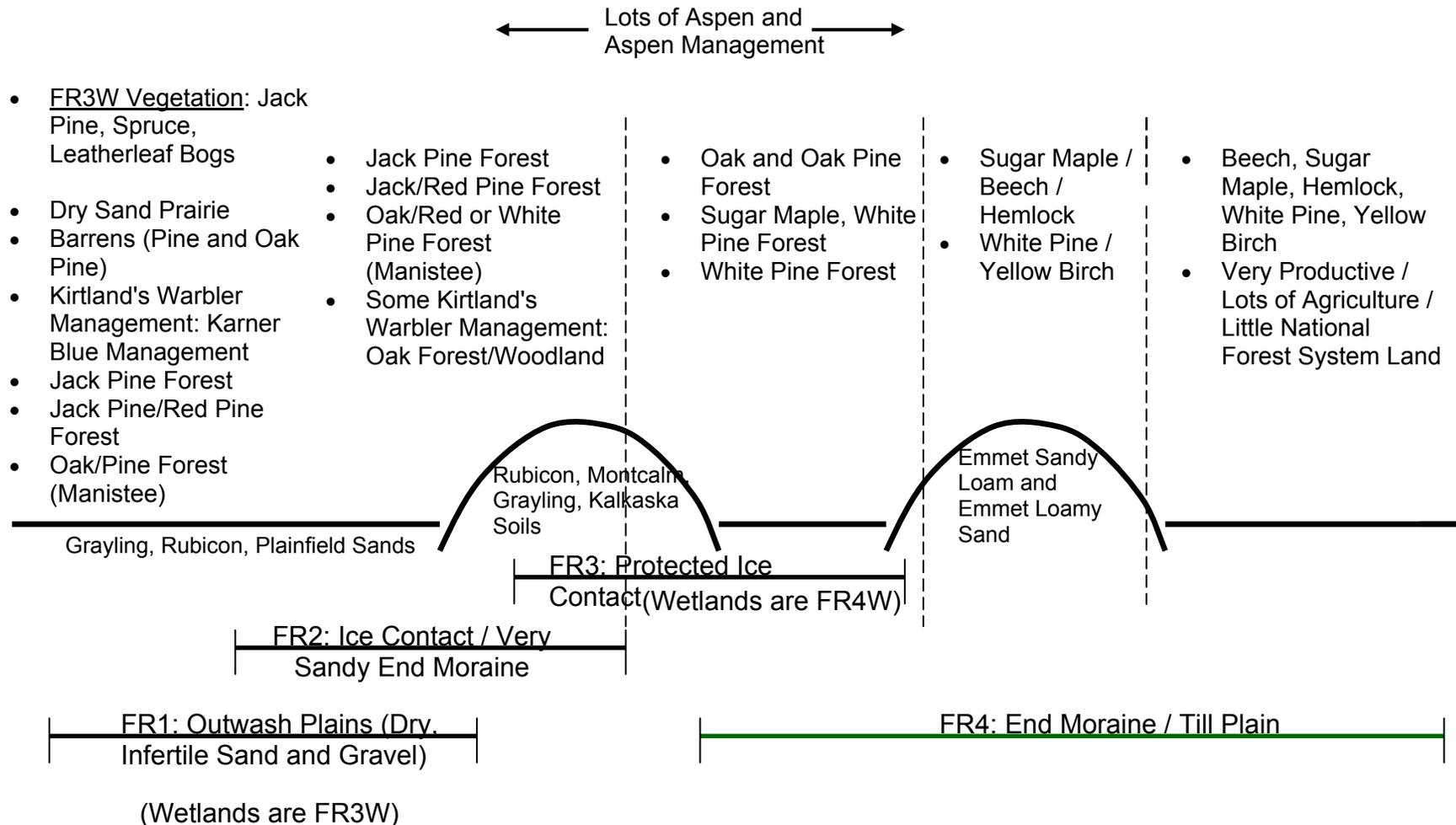
Landtype associations, because they use similar attributes related to landform, vegetation and water in their ecological make-up, often provide a good measure for identifying Scenic Attractiveness levels at a Forest-wide scale. Application for each National Forest depends on the appropriate mix and interpretation of the landtype associations for their ability to be representative of scenic quality.

Evaluation for the Huron National Forest found that using landtype association groupings that form the Fire Regime classes within the Forest serve as a suitable starting point to delineate the Scenic Attractiveness levels. Fire Regime classes are identified in six classes (Figure A-1 on page A-5, Example of the Fire Regime Classes (FRCs) for the Huron National Forest). See also Figure A-2 on page A-6, General Landscape Locations of Fire Regime Classes for the Huron-Manistee National Forests, which illustrates landscape location/position and vegetation composition associated with the Fire Regime classes.

**Figure A-1. Example of the Fire Regime Classes (FRCs) for the Huron National Forest.**



**Figure A-2. General Landscape Locations of Fire Regime Classes (FRCs) for the Huron-Manistee National Forests.**



FR=Fire Regime Class; described below

The following briefly describes the landscape ecosystem fire regimes based on Fire Regime classes (Cleland, USFS 2003):

- Fire Regime class 1 represents landscape ecosystems historically experiencing frequent, large catastrophic stand-replacing fires. These ecosystems typically occur within very dry, flat outwash plains underlain by coarse-textured sandy soils. The dominant forest types, prior to the mid to late 1800s, were short-lived jack pine forests and pine barrens.
- Fire Regime class 2 represents landscape ecosystems historically experiencing large, catastrophic stand-replacing fires at lower frequencies, hence longer fire rotations, than the FR1 category. These ecosystems typically occur within dry outwash plains and ice-contact landforms underlain by sandy and loamy sand soils. The dominant forest types, prior to the mid to late 1800s, were white-red pine and mixed red-white-jack pine forest.
- Fire Regime class 3 represents landscape ecosystems historically experiencing relatively infrequent stand-replacing fires at much longer fire rotations than the FR1 or FR2 categories. These ecosystems typically occur within dry-mesic ice-contact, glacial lakebed, and morainal landforms underlain by loamy sand to sandy loam soils, and commonly occur within close proximity to fire-prone ecosystems. The dominant forest type, prior to the mid to late 1800s, was long-lived mixed hemlock-white pine forest with minor elements of northern hardwood forests. Frequent ground-fires prevented succession to fire-sensitive hardwoods.
- Fire Regime class 3W represents landscape ecosystems historically experiencing relatively infrequent stand-replacing fires. These ecosystems typically occur within wetlands embedded within or adjacent to fire-prone landscapes. The dominant forest types, prior to the mid to late 1800s, were wetland conifers including spruce, fir, and tamarack. Fire regimes and fuel formation were likely caused by interactions of insect and disease and large-scale blow-downs, as well as periods of drought.
- Fire Regime class 4 represents landscape ecosystems historically experiencing very infrequent stand-replacing or community maintenance (ground) fires. These ecosystems typically occur within mesic (moist) moraines and glacial lakebeds underlain by fine-textured sandy loam to heavy clay and silt loams soils. The dominant forest types, prior to the mid to late 1800s, were long-lived, fire-sensitive northern hardwood and hardwood-hemlock forests including sugar maple, basswood, and white ash.
- Fire Regime class 4W represents landscape ecosystems historically experiencing very infrequent stand-replacing or community maintenance (ground) fires. These ecosystems typically occur within wetlands embedded within or adjacent to fire-sensitive, hence fire protected landscape ecosystems (FR4). The dominant forest types, prior to the mid to late 1800s, were wetland hardwoods and mixed hardwood-conifer forests including black and green ash, silver maple, elm, and cedar.

To determine initial Scenic Attractiveness level assignments, Fire Regime classes are further grouped to most closely represent the inherent variety and scenic interest that are found in those classes.

Fire Regime class 1 and Fire Regime class 2 are grouped and are illustrative of Indistinctive Scenic Attractiveness (Class C). They are typical of flatter terrain with shorter-lived conifer species providing little interest and variety in the landscape, such as the jack pine forests on the Mio Ranger District.

Fire Regime class 3 and Fire Regime class 4 are grouped and are illustrative of Typical Scenic Attractiveness (Class B). They contain stands of relatively long-lived tree species with various species mix. The terrain is also typically more variable than with the previous classes.

Fire Regime class 3W and Fire Regime class 4W are grouped with the water elements and are representative of Distinctive Scenic Attractiveness (Class A). The water bodies are the major rivers of the Forest (Au Sable for example) as well as some major lakes and certain large wetlands.

Refinement and completion of Scenic Attractiveness at the Forest-wide scale was completed through refinement for specific areas that are identified through review and field knowledge of resource managers. Table A was used to accomplish the field review and designate changes to the Fire Regime starting points. An example of the resulting existing Scenic Attractiveness levels for the Huron National Forest is shown in figure A-3 on page A-10, Example, Scenic Attractiveness Level Map for Part of the Huron National Forest.

The following matrix (Table A-1) was used to modify the Fire Regimes beginning product to the final Scenic Attractiveness maps:

**Table A-1. Matrix Used to Modify the Fire Regimes Beginning Product to the Final Scenic Attractiveness Maps.**

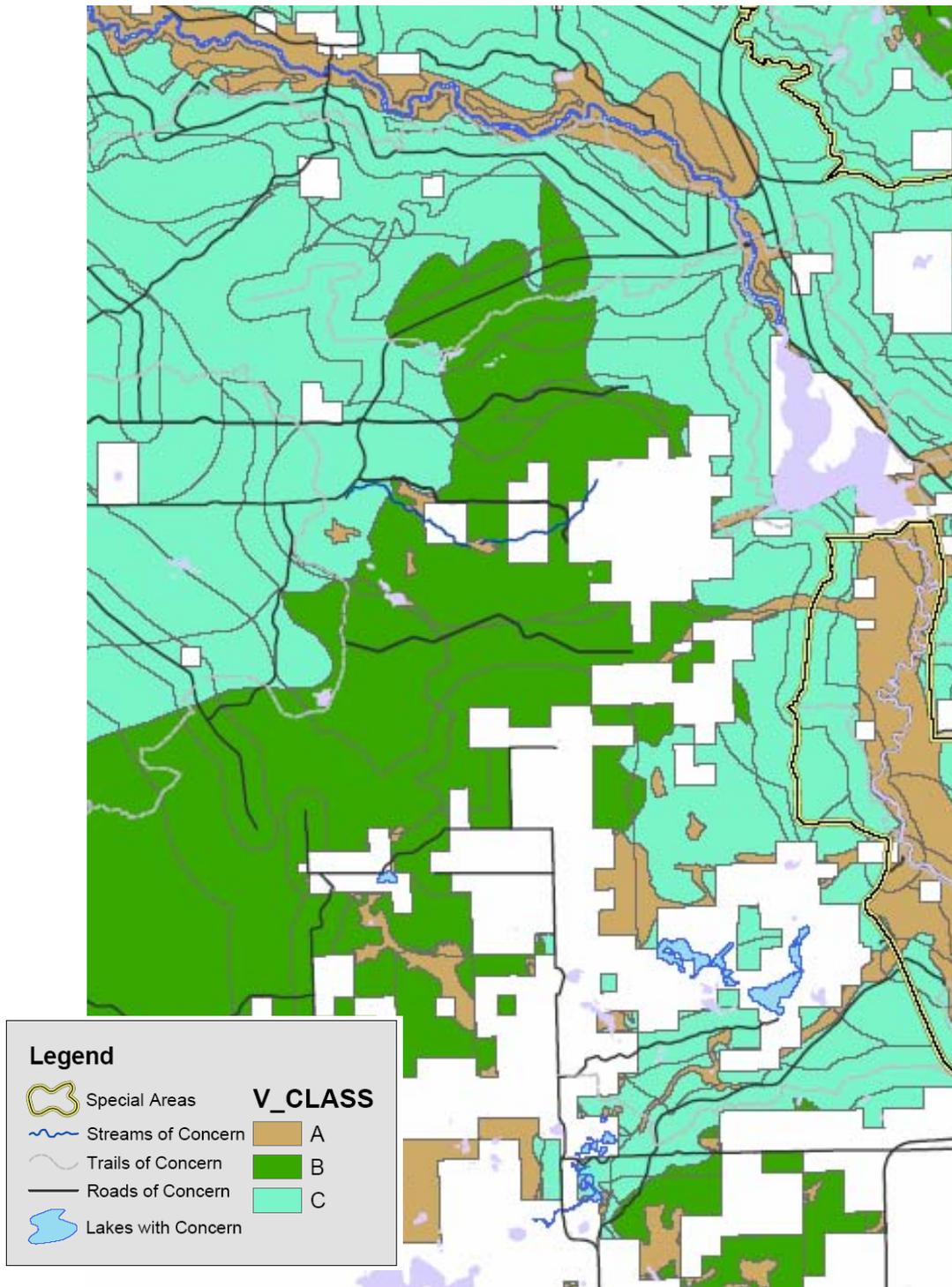
ELTPs 1/	12, 10, 14, 18 Distinctive (Class A)	7, 8, 9, 11, 15, 16, 17, 13 Typical (Class B)	1, 2, 3, 4, 5, 6 Indistinctive (Class C)
LANDFORM	High, rolling hills, definite ridges and river valleys, slopes generally over 20 percent; sand dunes (active or inactive). Strong edge contrast and spatial definition, pronounced spatial variety.	Low, rolling hills, wide valleys, no perceivable ridges or stream valleys. Slopes generally 12-20 percent. Edge contrast and spatial definition are moderate. Moderate spatial variety.	Flat, no recognizable hills or ridges; slopes under 12 percent. Weak edge contrast or spatial definition. Little spatial variety.
GEOLOGY	Characterized by presence of terminal moraines.	Characterized by presence of ground moraines and pitted outwash plains.	Characterized by outwash plains and lake basin areas.

**Table A-1. Matrix Used to Modify the Fire Regimes Beginning Product to the Final Scenic Attractiveness Maps (Continued).**

ELTPs 1/	12, 10, 14, 18 Distinctive (Class A)	7, 8, 9, 11, 15, 16, 17, 13 Typical (Class B)	1, 2, 3, 4, 5, 6 Indistinctive (Class C)
VEGETATION	A highly varied vegetative pattern. Many variations of color and texture. Vegetative type changes are sharply defined and tend to dominate the visual field.	A moderately varied vegetative pattern with some variation in color and texture. Edges are weakly defined.	Uniform vegetative patterns with little variety in color or texture. Vegetative edge contrasts tend to be minimal.
WATER	<b>Lakes:</b> Area greater than 50 acres with rolling, steep or diverse shoreline topography, little shoreline development.	Area 15 to 50 acres; some irregularities in shoreline topography; some moderate shoreline development (such as cabins and docks) may be present.	Less than 15 acres, includes small ephemeral lakes, mucky shorelines. Large, but highly developed lakes also included.
	<b>Rivers and Streams:</b> rocky-cobble bottom; generally undeveloped shoreline, diverse shorelines.	Sandy bottom; slow, smooth water speed; some shoreline development.	Murky, slow-moving; sand or muck bottom; no bank topography; may not be developed.
	<b>Wetlands:</b> Open water, diverse shorelines with features that tend to dominate the visual field.	Shallow basins, surface water may not be present, shrubby cover or open.	Large amounts of dead or dying vegetation; no pattern apparent; no readily visible edge. Features tend to be minimal in visual field.
SOCIO-CULTURAL EFFECTS	More solid ownership greater than 50 percent net. Large Tracts. No local communities, few non-forest uses; summer residences may occur in this class.	Intermingled ownership 30-50 percent net. Larger tracts (average 120+ acres). Few local communities. Some varied uses (such as farming).	Intermingled less than 30 percent net ownership. Small tracts. Many local communities and varied non-forest uses.
	FR3W, FR4W	FR3, FR4	FR1, FR2

1/ ELTP=Ecological Landtype Phases. Descriptions of the Ecological Landtype Phases can be found in the Field Guide, Ecological Classification and Inventory System of the Huron-Manistee National Forests, Cleland et al. 1993.

**Figure A-3. Example, Scenic Attractiveness Level Map for Part of the Huron National Forest.**



***Scenic Integrity and Desired Future Condition:***

Scenic Integrity is an indication of the state of naturalness or, conversely, the state of disturbance created by human activities or alteration. It is stated in degrees of deviation from the existing landscape character. The highest Scenic Integrity ratings are given to those landscapes that have little or no deviation from the character valued by forest users for aesthetic appeal. Landscape character with a high degree of Scenic Integrity has a sense of wholeness or being complete. In its purest definition, integrity means perfect condition. In the Scenery Management System process, Scenic Integrity is managed in degrees ranging over five levels from Very High to Very Low. Scenic Integrity Levels are:

- Very High – Landscapes are unaltered with no deviation from the landscape character. Landscape character is fully expressed.
- High – Landscape appears unaltered. Deviation is subtle and not evident. Landscape character is largely expressed
- Moderate – Landscape appears slightly altered. Deviations are evident but not dominant. Landscape character is moderately expressed.
- Low – Landscape appears moderately altered. Deviations begin to dominate. Low expression of landscape character.
- Very Low – Landscape appears heavily altered. Deviations may be strongly dominant. Very low expression of landscape character.

The Scenery Management System Handbook also makes reference to Unacceptably Low Integrity. This is considered a condition and is not to be used as a scenery management goal. For this level, landscape character is extremely altered. Deviations are also extremely dominant to the point that landscape character is unrecognizable.

Refer to the Scenery Management System Handbook, Chapter 2, for additional explanation and discussion of Scenic Integrity.

For application on the Huron National Forest, Scenic Integrity is evaluated from existing travelways and use areas, using typical on-the-ground observer positions. These should represent the same features to which Concern Levels were assigned for visibility mapping.

Scenic Integrity may be evaluated and addressed at four different levels, all interrelated. The four levels are:

- Historic
- Existing
- Interim
- Long term

Historic or past state of integrity

This level is important to the Huron National Forest. It serves as a reference point in determining Desired Future Condition for long-term management. Regarding ecosystem management, there are vegetation types or patterns that existed in pre-Euro-American time that are not present today. The Desired Future Condition may be to restore these vegetation patterns where site conditions are appropriate to do so. Pre-Euro-American patterns are generally described in vegetation circa 1800 map series for counties affecting the Forest and are based on an interpretation of the General Land Office surveys for Michigan.

Existing or current state of integrity

Existing Integrity levels become important as they provide the baseline to develop and transition to long-term scenic goals.

Knowledge of the existing levels will be a key element in determining the ease at which long-term Scenic Integrity Goals established for the Huron National Forest can be achieved. If significant alteration of the existing landscape will occur in order to restore landscapes to desired vegetation types different than what exist, and the current state of integrity is moderate to high, important management decisions may need to be made. These would relate to the need to structure an acceptable timeline with appropriate guidelines that provides for temporary but lower Scenic Integrity levels.

While evaluation of existing Scenic Integrity can best be made through detailed field analysis closer to the project level, certain resource maps and tools can provide a general indication of the current Scenic Integrity level condition on the Forest for general planning purposes. For the Huron National Forest, two map resources are available that when combined provide a general indication of existing Scenic Integrity. These are the Management Areas and the Age-class Distribution maps. See page A-14, Process for Mapping Existing Scenic Integrity Levels – Huron National Forest.

Interim or short-term minimum level necessary to reach a long-term character goal

As suggested above, interim or short-term goals may become essential to achieve long-term goals for certain restoration projects on the Forest, especially for achieving prairie, pine barren and oak savannah restoration. Potentially, short-term and interim integrity levels could drop to low or even very low for a period of time in order to achieve long-term goals.

It is important to note that once the long-term goal is reached, it may actually change the current landscape character and scenic attractiveness to a higher level. Once achieved, on-going management should maintain the ability to perpetuate the vegetation within the parameters of the assigned Scenic Integrity level goal.

Long-term level of integrity achievable when the desired management condition is reached

These objectives correspond to the Scenic Integrity assignments established in the Revised Forest Plan Standards and Guidelines for Scenic Resources.

**Table A-2. Long-Term Scenic Integrity Objectives.**

Scenic Class	Management Area 2.1 - Roded Natural Rolling Plains and Morainal Hills	Management Area 4.2 - Roded Natural Sandy Plains and Hills	Management Area 4.3 - Roded Natural Wetlands	Management Area 4.4 - Rural
1	High	High	High	High
2	High	Moderate	High	Moderate
3	Moderate	Low	Moderate	Low
4	Low	Low	Low	Low
5	Low	Low	Low	Low
6	Low	Low	Low	Low
7	Low	Low	Low	Low

Management Area	Scenic Integrity Objective
5.1 Wilderness	Very High
6.2 Semiprimitive Motorized Areas	Moderate
7.1 Concentrated Recreation Areas	High
8.1 Wild and Scenic Rivers	High
8.2 Research Natural Areas	<u>1/</u>
8.3 Experimental Forests	<u>2/</u>
8.4 Special Areas	High
9.1 Candidate Research Natural Areas	Very High
9.2 Wild and Scenic Study Rivers	High

1/ Determined by establishment record for Research Natural Area.

2/ Managed same as the management area it would be if it were not Experimental Forest. Projects submitted to North Central Research Station for approval.

## Process for Mapping Existing Scenic Integrity - Huron National Forest

Existing Scenic Integrity is defined as the current state of the landscape, considering previous human alterations. Existing Scenic Integrity serves multiple purposes in forest planning, project implementation, and monitoring.

Initially, Existing Scenic Integrity can provide important benchmarks for Forest Plan decision-making. It is the baseline for addressing and assigning short and long-term Scenic Integrity levels.

Existing Scenic Integrity can be used in describing the existing landscape character and in the writing of the affected environment section of the Final Environmental Impact Statement.

See list of benefits – Page 2-7 / Scenery Management System Handbook, available in the Planning record.

### ***Mapping:***

#### **Level 1 - Use Management Areas as a general descriptor for describing probable Existing Scenic Integrity levels:**

Current management Standards and Guidelines outline management practices that result in on-the-ground effects that influence Scenic Integrity. For the Huron-Manistee National Forests, there is a correlation established using Landtype Association structure and Recreation Opportunity System Classes that are indicative of how the management area is managed and probable visual condition of the land base. As an example, the Wilderness management direction associated with Management Area 5.1 is indicative of an existing condition of High to Very High Integrity Level.

Toward the opposite end of the spectrum, Management Area 4.2 would include the full range of Scenic Integrity levels but tend toward a much higher percentage of Low and Very Low due to the type of vegetation and how it has been managed over time, as well as the percentage of the land base proposed for shelterwood and clearcut activity. The frequency of roads, the type use and condition of the roads could also be an influence on Existing Scenic Integrity.

#### **Level 2 - Use vegetation disturbance or age-class distribution as a more specific indicator Existing Scenic Integrity:**

A vegetation disturbance map outlining age classes in the 0–10, 11–25, 26–75, and greater than 76 year age classes can be used as an indicator of more specific areas that are Low / Very Low, Low to Moderate, Moderate to High, and High respectively. There may be instances where a lower age class is indicative of a vegetation or character type that is in more of a natural condition and therefore should be identified as having a higher Existing Scenic Integrity level. The opposite condition could also occur where there are stand characteristics that may cause a lower Scenic Integrity in the higher age class stands. These are situations that can be further refined by review of the land base from the current Forest colored (infrared) orthophotos or from land managers familiar with the land base.

For this level, a specific Existing Scenic Integrity value can be applied to a unit, such as a compartment or other established land management unit, to create a graphic representation of the current condition. This would incorporate overlaying the compartment map with the disturbance pattern map and assigning an Existing Scenic Integrity value based on interpretation of the age class (See values suggested previously). The next step would then be to further evaluate compartment assignments to other known modifiers, such as utilities, and have a review by

District or knowledgeable field staff for edits. Final Scenic Integrity values would be based on all factors or attributes.

**Level 3 - Complete Level 2 but have a high involvement, participation and input from District or other knowledgeable field staff during the process. Also use recent orthoquads to scan the entire Forest land base to assist in interpretations:**

Assign values to compartments or other established land management units.

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## General Considerations

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Two factors need to be taken into consideration and could have an influence in application of Existing Scenic Integrity for the Huron-Manistee National Forests. One is the high frequency of roads. Even though vegetation or other conditions may indicate a high Scenic Integrity, the Forest map and road frequency are indicative that a road of some standard will be present within ½ mile of the area, causing some indication of disturbance. This may or may not be a factor depending on the size of the land base being evaluated and the attributes chosen to assign Scenic Integrity values.

The other consideration is the fragmentation and number of small isolated units found on the forests, particularly on the Manistee National Forest. While vegetation or other attributes may indicate a high Scenic Integrity level on Forest lands, there is a probability the unit is surrounded by land that is influenced by urban, agriculture, and other factors, thus creating a landscape condition different than the unit being assigned the Scenic Integrity level value. This could have an influence on interpretations made regarding long-term value assignments.

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## **Landscape Character, Scenic Attractiveness, Scenic Integrity and Desired Future Condition for the Manistee National Forest**

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### ***Landscape Character:***

#### **General:**

In the Scenery Management System, landscape character is defined as the combination of physical, biological and cultural attributes that give a geographic area its visual and cultural image. Landscape character contains those features that make each landscape identifiable or unique. Landscape character represents distinct landscape attributes of landform, vegetation, surface water features and cultural features that exist throughout the area being described.

The landscape character of the 1,331,671-acre Manistee National Forest, located on the west side of northern Lower Michigan, has been shaped and influenced by natural as well as cultural influences. Landforms observed today are the results of glacial action and subsequent postglacial erosion and continuing soil formation processes. Landscape character for the Forest can be described within the context of specific ecological sub and sub-subsections associated with the Forest land-base, and more specially, by landtype associations that make up these broader ecological units.

#### **Landform and Vegetation:**

##### **Newaygo Outwash Plain:**

The Manistee National Forest lies primarily in the Newaygo Outwash Plain. This subsection occupies the central area of the Forest from the north to the south boundary and contains soils ranging from excessively drained sands to ponded mucks and peats. The topography of the outwash landtypes is level to gently rolling. Steep, broken-end moraines and rolling to strongly undulating till plains are also a component of the landscapes within this subsection.

Within the Forest boundary, lake plain can also be found in the very northern part of the Newaygo Outwash Plain Subsection. As will be noted under water features, some of the Forest's most significant rivers are found in the narrow outwash channels in this subsection and the Manistee subsection to the west.

The Manistee subsection is associated with the most western areas of the Forest and is located along the Lake Michigan shoreline. This subsection is quite diverse and includes several glacial landforms. Within the National Forest, the outwash plains and the poorly drained, mucky, glacial lake plains are the dominant landforms found. The outwash within the subsection is located in the southwest part of the Forest. Areas of till plain with broad, gently rolling topography are also found within this subsection on the Forest.

To the east of the Newaygo Outwash Plain Subsection lies the Cadillac Sub-subsection. On the Manistee National Forest, this sub-subsection is very dominant to moraine ridges where the topography is steep and broken with slopes ranging from 6 to 40 percent. Outwash plain occupies most of the remaining Forest area in this subsection.

Vegetation characteristics prior to the mid to late 1800s and current vegetation characteristics vary considerable within the content of the dominant glacial landforms.

### **Glacial Outwash Plain:**

The excessively drained outwash plains were typically conifer forest that ranged from forest dominated by red or jack pine to mixtures of white pine with other conifers or oak. Large expanses of open oak/pine and pine barrens were common throughout these dry, sandy plains but were most concentrated in Lake County and the eastern half of southern Newaygo County. “Large, open grasslands were also relatively common in the southeast quarter of Newaygo County, but did not occur elsewhere in the subsection. The establishment and perpetuation of conifer forest, savannahs, and grasslands were tied to catastrophic wildfires, which were commonplace on the outwash plains south of the Manistee River.” (Corner et al. 1999c)

Since the logging era, much of the conifer forests on the dry outwash plain have been converted to hardwood stands dominated by oak. While conifer forests are still relatively common, northern hardwoods are the dominant vegetation type. Aspen/white birch, which was practically nonexistent prior to the mid to late 1800s, now covers a small portion of the outwash plains.

The open savannahs and grasslands that existed prior to the mid to late 1870’s, in general, are absent today and are a focus of restoration efforts. These areas were attractive to settlers because they required relatively little clearing for cultivation. Some of the large grasslands in the Newaygo and Big Prairie areas may have had deep A1 soil horizons. The soils, where rich, quickly were depleted due to the loss of biomass in the soil. The result today is that much of these areas are in abandoned fields or converted to other land uses.

In the mid to late 1800s, conifer swamps dominated those portions of the outwash plains that are poorly drained. Other types included mesic hardwoods, white pine forests, or mixed pine/oak forests. Current types have seen an increase in hardwood swamps with a dramatic decrease in conifer swamps.

### **Lake Plains:**

Glacial lake plain is scattered along the entire Lake Michigan coast, both as a flat, sandy plain and as steep coastal dunes. A unique area, the Nordhouse Dunes is located on Lake Michigan south of the city of Manistee. Generally, Lake Plain landforms supported forests of beech and sugar maple, with hemlock, white pine and associations of these two species. Wetlands, which covered a portion of the lake plain, were forested with lowland conifers. Much of the upland areas today contain second growth forests or have seen conversion to other land uses.

**Moraine Ridges:**

The majority of the steep moraines were covered by American beech/sugar maple forests prior to the mid to late 1800s. "Dry-mesic conifer forest, such as white pine, white pine/red pine or white pine/American Beech/red maple forests were also relatively extensive on moraines. These forest types generally occurred where soils were relatively droughty, nutrient-poor sands. These conifer forests often occurred where moraines were directly adjacent to droughty outwash plains and were thus exposed to wildfires originating on the plains" (Corner et al. 1999).

Various types of hardwood forests remain as the dominant vegetation type on these landforms within the forest, but are mostly second growth forest with a relatively high component of oak. Aspen/white birch now occurs on a considerable portion of the area compared to the mid to late 1800s. Significant portions of moraine ridges have also seen conversion to agricultural use and some are now in abandoned fields.

**Surface Water Features:**

Several major rivers flow through the Manistee National Forest. These include the Manistee, Little Manistee, Big Sable, Pere Marquette, Pine, White and Muskegon Rivers.

To a great extent, these streams within the Forest area have trenched deeply into outwash sands, creating steep, easily eroded banks, especially in the Newaygo Outwash Plains Subsection.

Scattered lakes occur throughout the Forest, with the primary concentration within the Newaygo Outwash Plain Subsection. Some of the largest water bodies found are those created by impoundments such as Tippy Dam Pond on the Manistee and Pine Rivers, and Hardy Dam Pond on the Muskegon River. Wetland and swampy areas occupy a considerable amount of the Forest land base, usually a component of the many smaller streams that dot the landscape. A major water feature of the Manistee National Forest includes several miles of ownership along the shoreline of Lake Michigan.

**Land Use Patterns and Cultural Features:**

In combination with natural features found within the Forest, several small towns or population centers exist, such as Newaygo, White Cloud and Baldwin, which have an influence on Forest landscape character. Commercial and residential development, along with adjacent areas in greater private ownership, is in contrast to the more natural appearing environment of the forested setting found elsewhere within the Forest boundaries. Although there are significantly large blocks of Forest ownership, lands in private or other ownership are intermingled and create a fragmented ownership pattern. Land use patterns on private holdings include a much higher amount of land in agriculture, old-field and Christmas tree plantations.

Other contrasting elements include numerous Forest recreation developments, utility rights-of-ways, oil and gas wells, and ongoing timber harvesting activities. The Manistee National Forest includes several paved highways; an abundance of county roads, lower standard forest access roads, and a significant number of two-track roads, resulting in a landscape highly dissected by

roads and recreational trails. High recreation use on the Forest is associated with these population centers, recreational facilities, roads and trails.

Notable scenic features on the Manistee National Forest include the Pere Marquette National Scenic River, Pine National Scenic River, Manistee National Scenic River, Nordhouse Dunes, Newaygo Prairies and Loda Lake Wildflower Sanctuary.

### **Scenic Attractiveness:**

Scenic Attractiveness measures the scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, water characteristics, vegetation pattern and cultural land use. Scenic attractiveness is classified as:

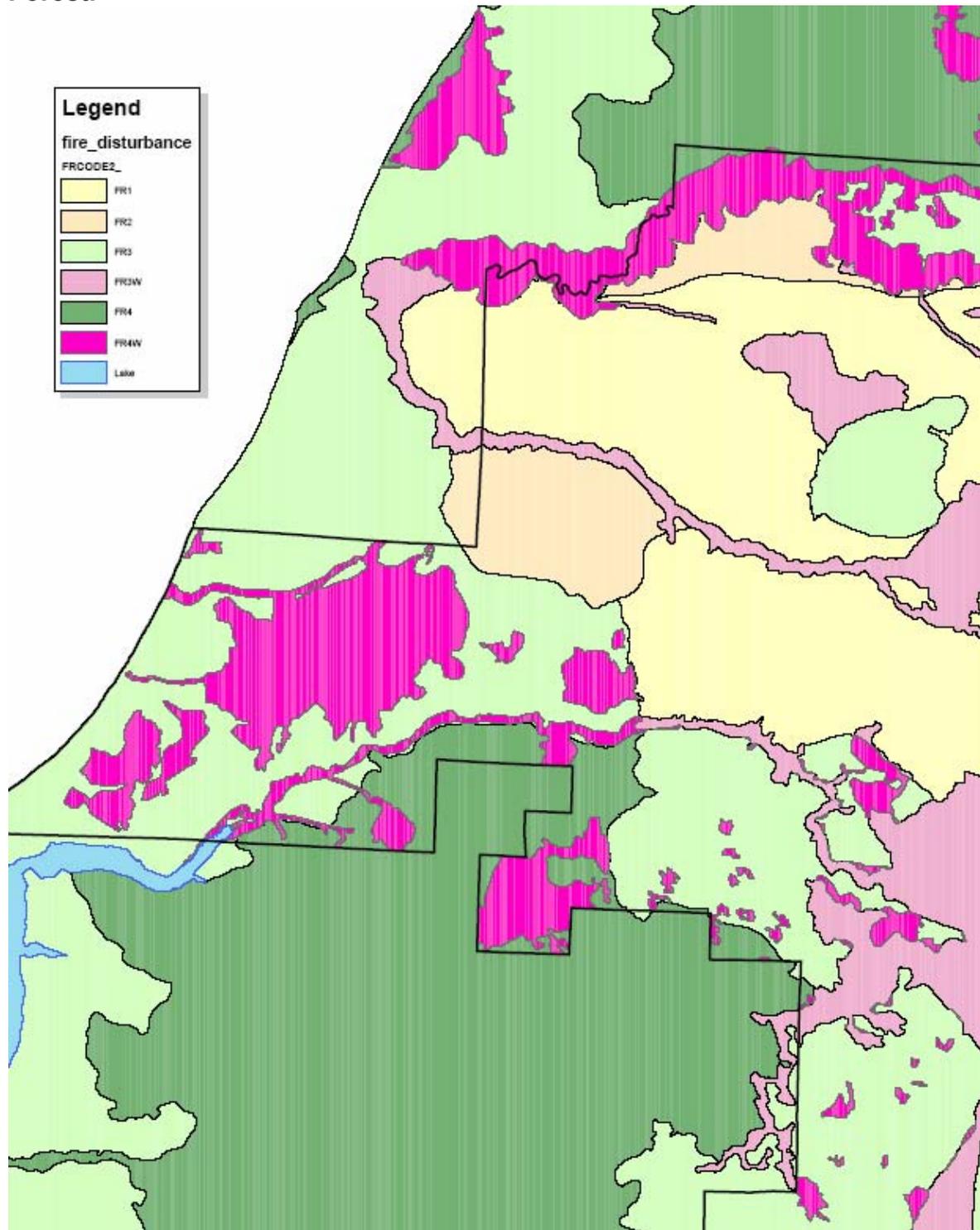
- Distinctive (Class A) – landscapes whose attributes and patterns combine to provide unusual, unique, or outstanding scenic quality.
- Typical (Class B) - landscapes that provide ordinary or common scenic quality.
- Indistinctive (Class C) – landscapes having low scenic quality.

The broad Forest characteristics and attributes described under Landscape Character all combine to establish different levels of scenic quality for the Huron National Forest. However, these attributes can better be defined and applied to provide for delineation and mapping of Scenic Attractiveness levels. Past methods relied more on developing a matrix of indicators defining landform, vegetation, water and cultural characteristics representative of the different classes. Aerial photos and topographic maps were used as tools to determine boundaries. However, other related resource maps and utilization of Geographic Information System technology provides a more consistent and ecological based way to complete identification of Scenic Attractiveness.

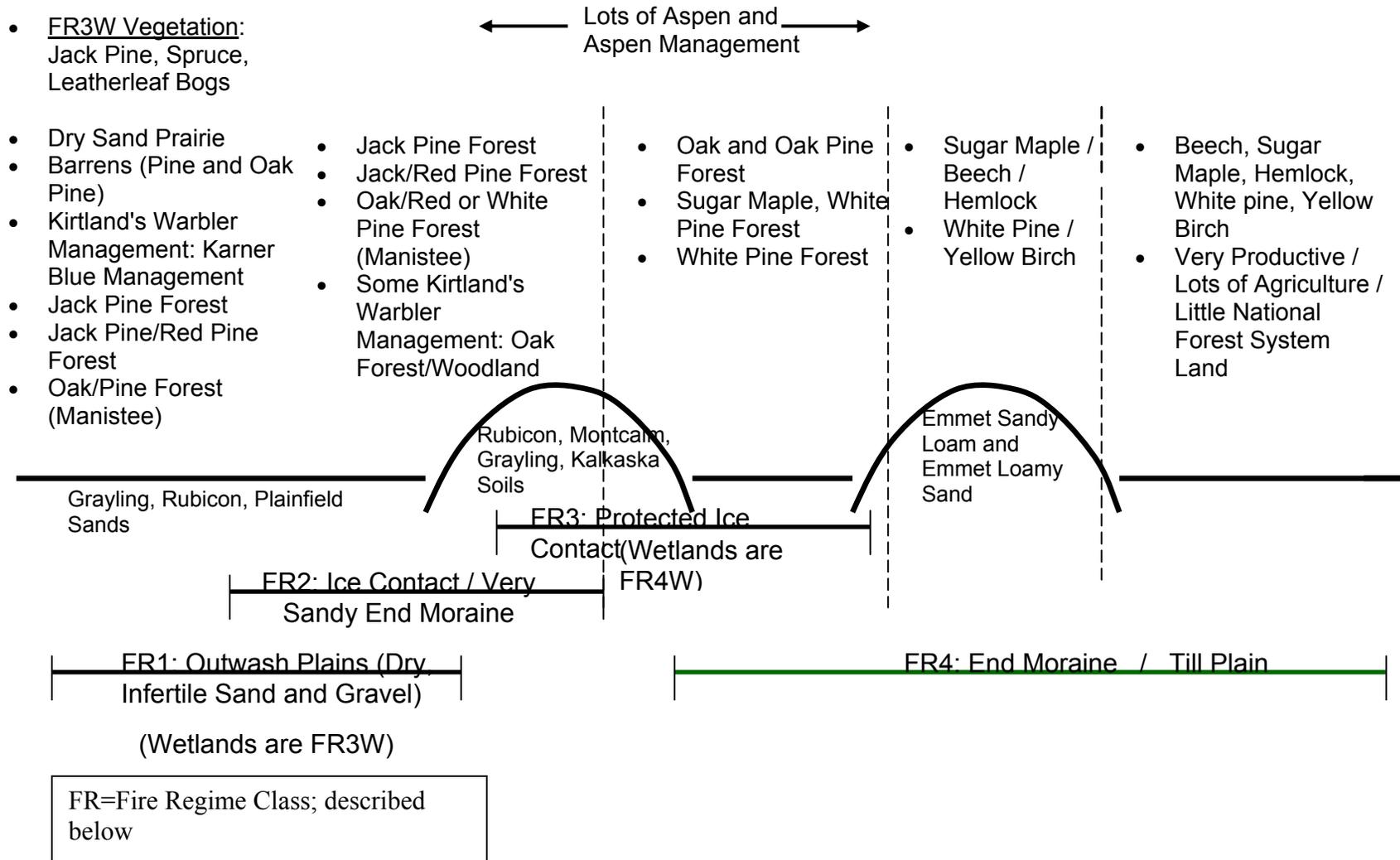
Landtype associations, because they use similar attributes related to landform, vegetation and water in their ecological make-up, often provide a good measure for identifying Scenic Attractiveness levels at a Forest-wide scale. Application for each National Forest depends on the appropriate mix and interpretation of the landtype associations for their ability to be representative of scenic quality.

Evaluation for the Manistee National Forest found that using landtype association groupings that form the Fire Regime classes within the Forest serve as a suitable starting point to delineate the Scenic Attractiveness levels. Fire Regime classes are identified in six classes (Figure A-4 on page A-21, Example of the Fire Regime Classes (FRCs) for the Manistee National Forest). See also Figure A-5 on page A-22, General Landscape Locations of Fire Regime Classes for the Huron-Manistee National Forests, which illustrates landscape location/position and vegetation composition associated with the Fire Regime classes.

**Figure A-4. Example of the Fire Regime Classes (FRCs) for the Manistee National Forest.**



**Figure A-5. General Landscape Locations of Fire Regime Classes (FRCs) for the Huron-Manistee National Forests.**



The following briefly describes the landscape ecosystem fire regimes based on Fire Regime classes (Cleland USFS 2003):

- Fire Regime class 1 represents landscape ecosystems historically experiencing frequent, large catastrophic stand-replacing fires. These ecosystems typically occur within very dry, flat outwash plains underlain by coarse-textured sandy soils. Prior to the mid to late 1800s the dominant forest types were short-lived jack pine forests and pine barrens.
- Fire Regime class 2 represents landscape ecosystems historically experiencing large, catastrophic stand-replacing fires at lower frequencies, hence longer fire rotations, than the Fire Regime 1 category. These ecosystems typically occur within dry outwash plains and ice-contact landforms underlain by sandy and loamy sand soils. The dominant forest types prior to the mid to late 1800s were white-red pine and mixed red-white-jack pine forest.
- Fire Regime class 3 represents landscape ecosystems historically experiencing relatively infrequent stand-replacing fires at much longer fire rotations than the Fire Regime 1 or Fire Regime 2 categories. These ecosystems typically occur within dry-mesic ice-contact, glacial lakebed, and morainal landforms underlain by loamy sand to sandy loam soils, and commonly occur within close proximity to fire-prone ecosystems. The dominant forest types prior to the mid to late 1800s were long-lived mixed hemlock-white pine forest with minor elements of northern hardwood forests. Frequent ground-fires prevented succession to fire-sensitive hardwoods.
- Fire Regime class 3W represents landscape ecosystems historically experiencing relatively infrequent stand-replacing fires. These ecosystems typically occur within wetlands embedded within or adjacent to fire-prone landscapes. The dominant forest types prior to the mid to late 1800s were wetland conifers including spruce, fir, and tamarack. Fire regimes and fuel formation were likely caused by interactions of insect and disease and large-scale blow-downs, as well as periods of drought.
- Fire Regime class 4 represents landscape ecosystems historically experiencing very infrequent stand-replacing or community maintenance (ground) fires. These ecosystems typically occur within mesic (moist) moraines and glacial lakebeds underlain by fine-textured sandy loam to heavy clay and silt loams soils. The dominant forest types, prior to the mid to late 1800s, were long-lived, fire-sensitive northern hardwood and hardwood-hemlock forests including sugar maple, basswood and white ash.
- Fire Regime class 4W represents landscape ecosystems historically experiencing very infrequent stand-replacing or community maintenance (ground) fires. These ecosystems typically occur within wetlands embedded within or adjacent to fire-sensitive, hence fire protected landscape ecosystems (Fire Regime class 4). The dominant forest types, prior to the mid to late 1800s, were wetland hardwoods and mixed hardwood-conifer forests including black and green ash, silver maple, elm and cedar.

To determine initial Scenic Attractiveness level assignments, Fire Regime classes are further grouped to most closely represent the inherent variety and scenic interest that are found in those classes.

- Fire Regime class 1 and Fire Regime class 2 are grouped and are illustrative of Indistinctive Scenic Attractiveness (Class C). They are typical of flatter terrain with shorter-lived conifer species providing little interest and variety in the landscape.
- Fire Regime class 3 and Fire Regime class 4 are grouped and are illustrative of Typical Scenic Attractiveness (Class B). They contain stands of relatively long-lived tree species with various species mix. The terrain is also typically more variable than with the previous classes.
- Fire Regime class 3W and Fire Regime class 4W are grouped with the water elements and are representative of Distinctive Scenic Attractiveness (Class A). The water bodies are the major rivers of the Forest, Manistee River for example, as well as some major lakes and certain large wetlands.

Refinement and completion of Scenic Attractiveness at the Forest-wide scale is completed through refinement for specific areas that are identified through review and field knowledge of resource managers. Table A-2 was used to accomplish the field review and designate changes to the Fire Regime starting points. An example of the resulting existing Scenic Attractiveness levels for the Manistee National Forest is shown in figure A-6 on page A-26, Example, Scenic Attractiveness Level Map for the Manistee National Forest.

The following matrix (Table A-3) was used to modify the Fire Regimes beginning product to the final Scenic Attractiveness maps:

**Table A-3. Matrix Used to Modify the Fire Regimes Beginning Product to the Final Scenic Attractiveness Maps.**

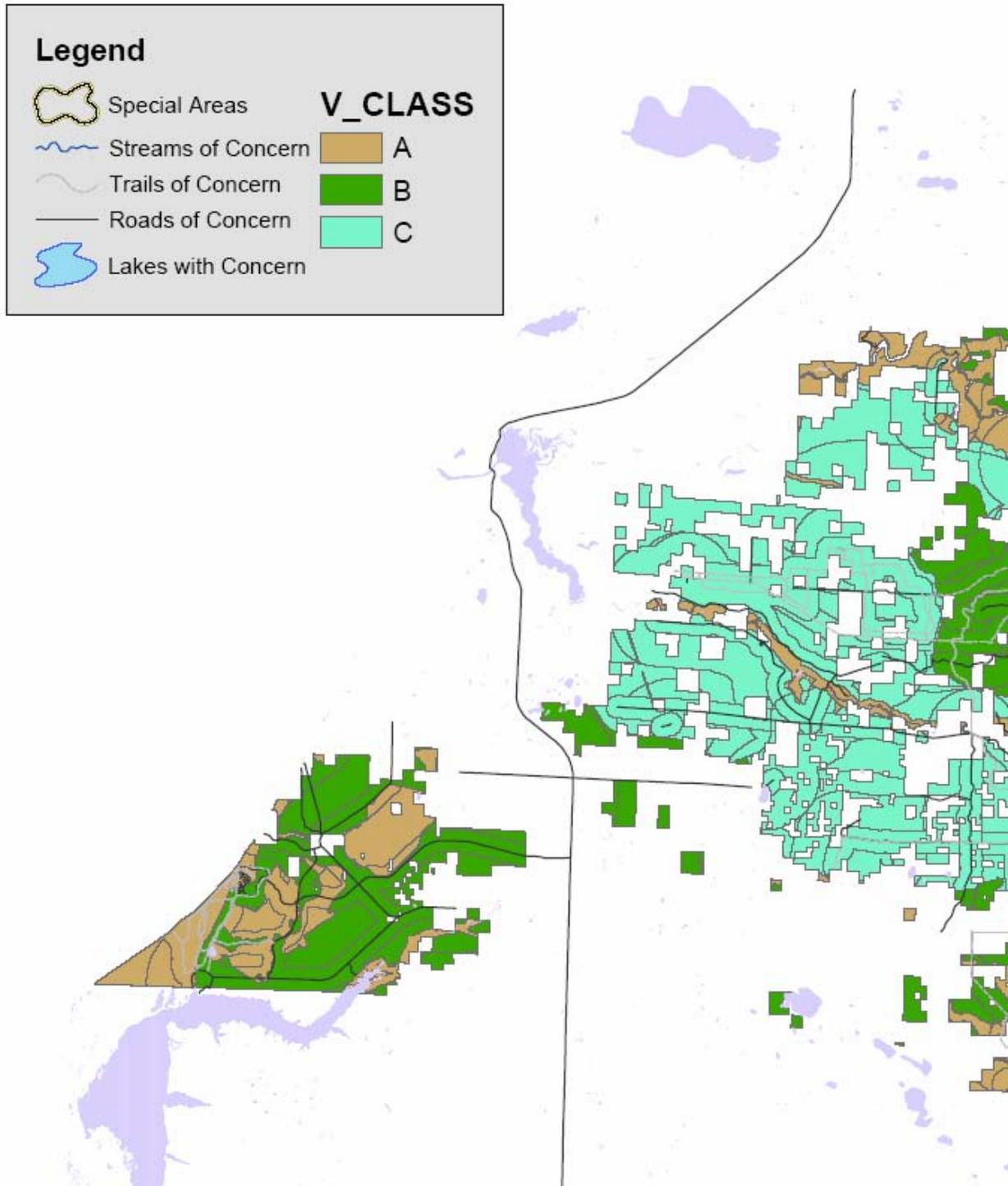
ELTPs 1/	12, 10, 14, 18 Distinctive (Class A)	7, 8, 9, 11, 15, 16, 17, 13 Typical (Class B)	1, 2, 3, 4, 5, 6 Indistinctive (Class C)
LANDFORM	High, rolling hills, definite ridges and river valleys, slopes generally over 20 percent, sand dunes (active or inactive). Strong edge contrast and spatial definition, pronounced spatial variety.	Low, rolling hills, wide valleys, no perceivable ridges or stream valleys. Slopes generally 12-20 percent. Edge contrast and spatial definition are moderate. Moderate spatial variety.	Flat, no recognizable hills or ridges; slopes under 12 percent. Weak edge contrast or spatial definition. Little spatial variety.

**Table A-3. Matrix Used to Modify the Fire Regimes Beginning Product to the Final Scenic Attractiveness Maps (Continued).**

ELTPs 1/	12, 10, 14, 18 Distinctive (Class A)	7, 8, 9, 11, 15, 16, 17, 13 Typical (Class B)	1, 2, 3, 4, 5, 6 Indistinctive (Class C)
GEOLOGY	Characterized by presence of terminal moraines.	Characterized by presence of ground moraines and pitted outwash plains.	Characterized by outwash plains and lake basin areas.
VEGETATION	A highly varied vegetative pattern. Many variations of color and texture. Vegetative type changes are sharply defined and tend to dominate the visual field.	A moderately varied vegetative pattern with some variation in color and texture. Edges are weakly defined.	Uniform vegetative patterns with little variety in color or texture. Vegetative edge contrasts tend to be minimal.
WATER	<b>Lakes:</b> Area greater than 50 acres with rolling, steep or diverse shoreline topography, little shoreline development.	Area 15 to 50 acres; some irregularities in shoreline topography; some moderate shoreline development, such as cabins and docks, may be present.	Less than 15 acres, includes small ephemeral lakes, mucky shorelines. Large, but highly developed lakes also included.
	<b>Rivers and Streams:</b> rocky-cobble bottom; generally undeveloped shoreline, diverse shorelines.	Sandy bottom; slow, smooth water speed; some shoreline development.	Murky, slow-moving; sand or muck bottom; no bank topography; may not be developed.
	<b>Wetlands:</b> Open water, diverse shorelines with features that tend to dominate the visual field.	Shallow basins, surface water may not be present, shrubby cover or open.	Large amounts of dead or dying vegetation; no pattern apparent; no readily visible edge. Features tend to be minimal in visual field.
Socio-Cultural Effects	More solid ownership greater than 50 percent net. Large Tracts. No local communities, few non-forest uses; summer residences may occur in this class.	Intermingled ownership 30-50percent net. Larger tracts (average 120+ acres). Few local communities. Some varied uses (such as farming).	Intermingled less than 30 percent net ownership. Small tracts. Many local communities and varied non-forest uses.
	FR3W, FR4W	FR3, FR4	FR1, FR2

1/ ELTPs = Ecological Landtype Phases. Descriptions of the Ecological Landtype Phases can be found in the Field Guide, Ecological Classification and Inventory System of the Huron-Manistee National Forests, Cleland et al, 1993.

**Figure A-6. Example, Scenic Attractiveness Level Map for Part of the Manistee National Forest.**



***Scenic Integrity and Desired Future Condition:***

Scenic Integrity is an indication of the state of naturalness or, conversely, the state of disturbance created by human activities or alteration. It is stated in degrees of deviation from the existing landscape character. The highest Scenic Integrity ratings are given to those landscapes that have little or no deviation from the character valued by forest users for aesthetic appeal. Landscape character with a high degree of Scenic Integrity has a sense of wholeness or being complete. In its purest definition, integrity means perfect condition. In the Scenery Management System process, Scenic Integrity is managed in degrees ranging over five levels from Very High to Very Low. Scenic Integrity Levels are:

- Very High – Landscapes are unaltered with no deviation from the landscape character. Landscape character is fully expressed.
- High – Landscape appears unaltered. Deviation is subtle and not evident. Landscape character is largely expressed
- Moderate – Landscape appears slightly altered. Deviations are evident but not dominant. Landscape character is moderately expressed.
- Low – Landscape appears moderately altered. Deviations begin to dominate. Low expression of landscape character.
- Very Low – Landscape appears heavily altered. Deviations may be strongly dominant. Very low expression of landscape character.

The Scenery Management System Handbook also makes reference to Unacceptably Low Integrity. This is considered a condition and is not to be used as a scenery management goal. For this level, landscape character is extremely altered. Deviations are also extremely dominant to the point landscape character is unrecognizable.

Refer to the Scenery Management System Handbook, Chapter 2, for additional explanation and discussion of Scenic Integrity.

For application on the Manistee National Forest, Scenic Integrity is evaluated from existing travelways and use areas, using typical on-the-ground observer positions. These should represent the same features to which Concern Levels were assigned for visibility mapping.

Scenic Integrity may be evaluated and addressed at four different levels, all interrelated. The four levels are:

- Historic
- Existing
- Interim
- Long-Term

Historic or past state of integrity

This level is important to the Manistee National Forest. It serves as a reference point in determining Desired Future Condition for long-term management. Regarding ecosystem management, there are vegetation types or patterns that existed in pre-Euro-American time that are not present today. The Desired Future Condition may be to restore these vegetation patterns where site conditions are appropriate to do so. Vegetation patterns prior to the mid to late 1800's are generally described in vegetation circa-1800 map series for counties affecting the Forest and are based on an interpretation of the General Land Office surveys for Michigan.

Existing or current state of integrity

Existing Integrity levels become important as they provide the baseline to develop and transition to long-term scenic goals.

Knowledge of the existing levels will be a key element in determining the ease at which long-term Scenic Integrity Goals established for the Manistee National Forest can be achieved. If significant alteration of the existing landscape will occur in order to restore landscapes to desired vegetation types different than what exist, and the current state of integrity is moderate to high, important management decisions may need to be made. These would relate to the need to structure an acceptable timeline with appropriate guidelines that provides for temporary but lower Scenic Integrity levels.

While evaluation of existing Scenic Integrity can best be made through detailed field analysis closer to the project level, certain resource maps and tools can provide a general indication of the current Scenic Integrity level condition on the Forest for general planning purposes. For the Manistee, two map resources are available that when combined provide a general indication of existing Scenic Integrity. These are the Management Areas and the Age-class Distribution maps. See page A-30, Process for Mapping Existing Scenic Integrity Levels – Manistee National Forest.

Interim or short-term minimum level necessary to reach a long-term character goal

As suggested above, interim or short-term goals may become essential to achieve long-term goals for certain restoration projects on the Forest, especially for achieving prairie, pine barren and oak savannah restoration. Potentially, short-term and interim integrity levels could drop to low or even very low for a period of time in order to achieve long-term goals.

It is important to note that once the long-term goal is reached, it may actually change the current landscape character and scenic attractiveness to a higher level. Once achieved, on-going management should maintain the ability to perpetuate the vegetation within the parameters of the assigned Scenic Integrity level goal.

Long-term level of integrity achievable when the desired management condition is reached

These goals correspond to the Scenic Integrity assignments established in the Revised Forest Plan Standards and Guidelines for Scenic Resources.

**Table A-4. Long-Term Scenic Integrity Objectives.**

Scenic Class	Management Area 2.1 - Roaded Natural Rolling Plains and Morainal Hills	Management Area 4.2 - Roaded Natural Sandy Plains and Hills	Management Area 4.3 - Roaded Natural Wetlands	Management Area 4.4 - Rural
1	High	High	High	High
2	High	Moderate	High	Moderate
3	Moderate	Low	Moderate	Low
4	Low	Low	Low	Low
5	Low	Low	Low	Low
6	Low	Low	Low	Low
7	Low	Low	Low	Low

Management Area	Scenic Integrity Objective
5.1 Wilderness	Very High
6.2 Semiprimitive Motorized Areas	Moderate
7.1 Concentrated Recreation Areas	High
8.1 Wild and Scenic Rivers	High
8.2 Research Natural Areas	<u>1/</u>
8.3 Experimental Forests	<u>2/</u>
8.4 Special Areas	High
9.1 Candidate Research Natural Areas	Very High
9.2 Wild and Scenic Study Rivers	High

1/ Determined by establishment record for Research Natural Area.

2/ Managed same as the management area it would be if it were not Experimental Forest. Projects submitted to North Central Research Station for approval.

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## Process for Mapping Existing Scenic Integrity - Manistee National Forest

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Existing Scenic Integrity is defined as the current state of the landscape, considering previous human alterations. Existing Scenic Integrity serves multiple purposes in forest planning, project implementation, and monitoring.

Initially, Existing Scenic Integrity can provide important benchmarks for Forest Plan decision-making. It is the baseline for addressing and assigning short and long-term Scenic Integrity levels.

Existing Scenic Integrity can be used in describing the existing landscape character and in the writing of the affected environment section of the Draft Environmental Impact Statement.

See list of benefits – Page 2-7 / Scenery Management System Handbook, available in the Planning Record.

### **Mapping:**

#### **Level 1 - Use Management Areas as a general descriptor for describing probable Existing Scenic Integrity levels:**

Current management Standards and Guidelines outline management practices that result in on-the-ground effects that influence Scenic Integrity. For the Huron-Manistee National Forests, there is a correlation established using Landtype Association structure and Recreation Opportunity System Classes that are indicative of how the management area is managed and probable visual condition of the land base. As an example, the Wilderness management direction associated with Management Area 5.1 is indicative of an existing condition of High to Very High Integrity Level.

Toward the opposite end of the spectrum, management area 4.2 would include the full range of Scenic Integrity levels but tend toward a much higher percentage of Low and Very Low due to the type of vegetation and how it has been managed over time, as well as the percentage of the land base proposed for shelterwood and clearcut activity. The frequency of roads, the type use, and condition of the roads could also be an influence on Existing Scenic Integrity.

#### **Level 2 – Use vegetation disturbance or age-class distribution as a more specific indicator of Existing Scenic Integrity:**

A vegetation disturbance map outlining age classes in the 0 – 10, 11 – 25, 26 – 75, and greater than 76 year age classes can be used as an indicator of more specific areas that are Low/Very Low, Low to Moderate, Moderate to High, and High respectively. There may be instances where a lower age class is indicative of a vegetation or character type that is in more of a natural condition and therefore should be identified as having a higher Existing Scenic Integrity. The opposite condition could also occur where there are stand characteristics that may cause a lower Scenic Integrity level in the higher age class stands. These are situations that can be further refined by review of the land base from the current Forest colored (infrared) orthophotos or from land managers familiar with the land base.

Additional map overlays, resource data, and input by the appropriate resource managers could add additional attributes for refining Existing Scenic Integrity. These could include items such as utilities, recreation or other facilities, and urban influence (Overlay with Forest map).

For this level, a specific Existing Scenic Integrity value can be applied to a unit, such as a compartment or other established land management unit, to create a graphic representation of the current condition. This would incorporate overlaying the compartment map with the disturbance

pattern map and assigning an Existing Scenic Integrity value based on interpretation of the age class (See values suggested previously). The next step would then be to further evaluate compartment assignments to other known modifiers, such as utilities, and have a review by District or knowledgeable field staff for edits. Assign final Scenic Integrity value based on all factors or attributes.

**Level 3 – Complete Level 2 but have a high involvement, participation and input from District or other knowledgeable field staff during the process. Also use recent orthoquads to scan the entire Forest land base to assist in interpretations:**

Assign values to compartments or other established land management units.

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## General Considerations

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Two factors need to be taken into consideration and could have an influence in application of Existing Scenic Integrity for the Huron-Manistee National Forests. One is the high frequency of roads. Even though vegetation or other conditions may indicate a high Scenic Integrity level, the Forest map and road frequency are indicative that a road of some standard will be present within one-half mile of the area, causing some indication of disturbance. This may or may not be a factor depending on the size of the land base being evaluated and the attributes chosen to assign Scenic Integrity values.

The other consideration is the fragmentation and number of small isolated units found on the forests, particularly on the Manistee National Forest. While vegetation or other attributes may indicate a high Integrity level on Forest lands, there is a probability the unit is surrounded by land that is influenced by urban, agriculture, and other factors, thus creating a landscape condition different than the unit being assigned the Scenic Integrity level value. This could have an influence on interpretations made regarding long-term value assignments.

# **APPENDIX B - HARVEST CUTTING METHODS**

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## Appendix B - Harvest Cutting Methods

There are 13 management prescriptions presented in the Huron-Manistee National Forests' Land and Resource Management Plan (Forest Plan). These management prescriptions, which will be applied to areas of land that are called management areas, provide for different future forest conditions. Timber harvest methods are specified in the Standards and Guidelines for each Management Prescription. This Appendix specifies timber harvest methods by forest type to meet the objectives of each management prescription. Rationale and references for each harvest method are presented.

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### Management Prescription Summaries

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#### ***Roaded Natural Areas:***

##### **Prescription 2.1 - Roaded Natural Rolling Plains and Morainal Hills:**

Management activities provide high volumes of quality hardwood timber products and firewood with special consideration for enhancing wildlife habitats. Emphasis is given to managing deer, grouse and wildlife emphasis areas and fish habitat. A broad variety of recreational opportunities is available and visual diversity is high.

Even-aged management practices of clearcutting, thinning or shelterwood will be the primary silvicultural system used. The uneven-aged system can be used in the northern hardwood types. Other practices identified in the Standards and Guidelines may be used.

##### **Prescription 4.2 - Roaded Natural Sandy Plains and Hills:**

Management activities enhance and increase the variety of wildlife habitats with emphasis given to managing deer, grouse, wildlife and Kirtland's warbler essential habitat. High volumes of softwood and hardwood timber products are produced, except in Kirtland's warbler emphasis areas. Emphasis includes reducing life-threatening and property-damaging wildfire potential and providing a variety of recreational opportunities.

Even-aged management practices of clearcutting, thinning or shelterwood will be the primary silvicultural system used. The uneven-aged system can be used in the northern hardwood types. Other practices identified in the Standards and Guidelines may be used.

A considerable portion of the dry sand outwash plains on the Huron National Forest in Management Prescription 4.2 will be managed as essential habitat for the Kirtland's warbler. Management activities maintain and develop essential nesting habitat for the Kirtland's warbler in compliance with the provisions of Section 7 of the Endangered Species Act (P.L. 93-205) and as outlined in the Strategy for Kirtland's Warbler Habitat Management and the Kirtland's Warbler Recovery Plan.

In the Kirtland's warbler essential habitat, even-aged management practices of clearcutting and, when feasible, seed-tree or shelterwood cutting best achieve the desired conditions and normally will be used. Planned timber harvests follow the intent of the Kirtland's Warbler Recovery Plan.

The National Forest Management Act of 1976 [Section 6(g) (3), (E)(iv), and (P)(i)] and the resulting Secretary's Regulations (36 CFR 219.15) requires that vegetation management practices be appropriate to meet the objectives and requirements of the Land and Resource Management Plan.

### **Prescription 4.3 - Roaded Natural Wetlands:**

Management activities in these areas provide a variety of forest views and scenes and recreational experiences in a primarily motorized recreational environment. Fish and wildlife are abundant, and efforts are made to increase and enhance various habitats. Emphasis is given to managing deer, grouse, and wildlife emphasis areas.

Even-aged management practices of clearcutting, thinning or shelterwood will be the primary silvicultural system used. The uneven-aged system can be used in the northern hardwood types. Other practices identified in the Standards and Guidelines may be used.

### ***Rural Areas:***

#### **Prescription 4.4 - Rural:**

Management activities provide recreational opportunities, sources of firewood close to users, and moderate to high volumes of softwood timber products. Emphasis includes reducing life-threatening and property-damaging wildfire potential. Wildlife management is coordinated with adjacent non-National Forest land management with emphasis on deer, grouse and wildlife management. Some small blocks will be managed to protect isolated, essential areas for endangered, threatened or sensitive species.

Even-aged management practices will be the primary silvicultural system used. Clearcutting and thinnings best achieve the desired conditions for these areas. The uneven-aged system can be used in the northern hardwood types. Other practices identified in the Standards and Guidelines may be used.

### ***Wilderness Areas:***

#### **Prescription 5.1 - Wilderness:**

Management activities of Congressionally designated Wilderness provide for the protection and enhancement of wilderness characteristics and values. Semiprimitive, non-mechanized recreational opportunities occur in a natural environment emphasizing solitude. Recreational opportunities include backpacking, hiking, camping, canoeing, hunting, fishing, cross-country skiing, snowshoeing and other nonmotorized activities.

***Semiprimitive Motorized Areas:*****Prescription 6.2 - Semiprimitive Motorized Areas:**

Management activities provide for semiprimitive, motorized recreational experiences. These areas provide high visual diversity; enhance and increase wildlife habitats; will reduce damaging wildfire potential; and provide moderate amounts of quality hardwood timber products from appropriate areas.

Even-aged management practices of clearcutting, thinning or shelterwood best achieve the desired condition and normally will be used. The uneven-aged system can be used in the northern hardwood types. Other practices identified in the Standards and Guidelines may be used.

***Concentrated Recreation Areas:*****Prescription 7.1 - Concentrated Recreation Areas:**

Management activities will provide for a variety of high-density nonmotorized recreational experiences in a roaded natural environment.

The majority of the area is in old growth. A variety of practices may be used for these areas. Either even- or uneven-aged silvicultural systems may be used as long as the practice follows the individual area's management plan.

***Special Management Areas:*****Prescription 8.1 - Wild and Scenic Rivers:**

Management of Wild and Scenic River corridors will protect unique areas that have outstandingly remarkable values such as scientific, biological, geological, historical or recreational characteristics of local, regional or national significance.

Other practices identified in the Standards and Guidelines may be used based on the management plan for the individual river.

**Prescription 8.2 - Research Natural Areas:**

Management of designated Research Natural Areas will protect unique areas that have scientific, biological, geological or historical characteristics of local, regional or national significance.

Management activities provide for non-destructive research, education and ecological representation.

### **Prescription 8.3 - Experimental Forests:**

Management of designated Experimental Forests will provide a land base for research activities.

All harvest methods may be utilized in the Experimental Forests.

### **Prescription 8.4 - Special Areas:**

Management direction of special areas protect their scientific, biological, historical, geological, social, or recreational characteristics of local, regional, or national significance.

Newaygo Prairie Ecological Study Area and Loda Lake Wildflower Sanctuary were identified for their unique scientific and biological characteristics. Lumbermen's Monument was identified for its unique historical nature. Silvicultural systems in these areas may be either even- or uneven-aged, depending upon the management objectives and the silvicultural needs of the area. The Standards and Guidelines in the individual area management plan will be followed.

Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River were identified for their significant recreational characteristics. Management activities in these areas provide for more secluded, less roaded recreational experiences and will reduce life-threatening and property-damaging wildfire potential. Areas support a wide variety of fish and wildlife species. Management enhances and improves habitats for species which avoid human activity. Low-intensity vegetative management and more secluded, less-roaded recreation in these forest areas will enhance conditions which favor wildlife species intolerant of human disturbance. Much of the areas will be maintained as old growth. Even-aged management practices of clearcutting, thinning or shelterwood best achieve the desired conditions and normally will be used. The uneven-aged system can be used in the northern hardwood types. Other practices identified in the Standards and Guidelines may be used.

### **Prescription 9.1 - Candidate Research Natural Areas:**

Management of candidate Research Natural Areas will protect unique areas that have scientific, biological, geological or historical characteristics of local, regional or national significance.

Management activities provide for Research Natural Area attributes and values.

### **Prescription 9.2 - Wild and Scenic Study Rivers:**

Management of study Wild and Scenic River corridors will protect unique areas that have scientific, biological, geological, historical or recreational characteristics of local, regional or national significance.

Management activities provide for Wild and Scenic River attributes and values.

## Description of Forest Types and Harvest Methods on the Huron-Manistee National Forests

The forest types on the Huron-Manistee National Forests fit the Society of American Foresters' definitions (Society of American Foresters 1980). For the purposes of this discussion, a single species will represent 51 percent or more of the total trees in a stand. In multiple species types, a group of species will represent 51 percent or more of the total tree stock. The descriptions of each forest type are brief. More detailed descriptions can be found in the United States Department of Agriculture, Handbook Number 445, *Silvicultural Systems for the Major Forest Types of the United States*, revised December 1983; and the various manager's handbooks and other technical publications and information sources for the specific forest types provided by the Forest Service. These references are cited in the tables shown later in this appendix and are listed in the References section at the end of this appendix.

### ***Silvicultural Systems and Regeneration Harvest Methods:***

The principal reasons for harvesting timber are to regenerate and to meet a number of resource management objectives. These objectives include achieving desired conditions for visual management, recreation, vegetative species composition, wildlife habitat, timber products, mineral, gas, and oil products and integrated pest management. Achieving the management objectives is foremost when land managers select a harvest method. Although many harvest methods are used in managing forest lands, there are only two silvicultural systems; even- and uneven-aged management.

Within the even-aged category, there are three silvicultural harvest methods recognized by the Society of American Foresters: clearcut, shelterwood and seed-tree. The uneven-aged system consists of single-tree and group selection harvests.

### **Uneven-aged System:**

A stand is considered uneven-aged if three or more 20-year classes are represented within the stand. With an uneven-aged system, a portion of each age class in each stand must be harvested on a routine cutting cycle, such as 10 to 20 years.

Two harvest methods may be used in an uneven-aged silvicultural system, individual-tree selection and group selection. The individual-tree selection method will be the predominant uneven-aged harvest method used on these Forests. However, in some cases, group selection may be used to more effectively meet the management objectives on a particular site.

The Forest Plan accents uneven-aged management of northern hardwoods. The uneven-aged system cannot be successfully used to regenerate trees, such as aspen, that require full sunlight.

### **Individual-Tree Selection Method:**

Individual-tree selection entails the periodic removal of individual trees. The goal is to maintain a given number of trees per acre in several diameter classes. In order for the practice to work, some live trees must be removed within most, or all, diameter classes to maintain the desired distribution of diameter classes in the residual stand. This method favors shade-tolerant tree species. Shade-tolerance is a term that refers to the ability of a tree to survive and grow in shaded conditions. Sugar maple is the primary shade-tolerant species in this area. Shade-intolerant species, such as aspen, require full sunlight to regenerate while shade mid-tolerant species, such as red oak, require partial sunlight to regenerate.

The individual-tree selection method provides habitats for most high forest, cavity-dwelling, closed-canopy wildlife species. This method is least beneficial for wildlife species that require openings, edges or low browse.

Harvesting with the individual-tree selection method affects the visual resource minimally. This method retains a landscape with large-tree characteristics. To some individuals, the frequent and repeated harvest operations and the extensive timber skidding system may be objectionable. The Forests' vegetative type that has the highest potential to respond to individual-tree selection is northern hardwood. The northern hardwood type contains shade-tolerant species such as sugar maple. Often vegetative types, if managed by individual-tree selection, will eventually be replaced by shade-tolerant species, such as maples. For example, if high-site oak stands are managed by individual-tree selection, in time the stands may convert to northern hardwoods. This may be less desirable for wildlife because an important mast source may be lost.

### **Group Selection Method:**

In order to establish regeneration, the group selection method removes all the trees in small areas or groups. These areas can vary from several trees to a few acres. Because the removal of groups will permit more light to reach the forest floor than individual-tree selection will, group selection can be used to encourage a higher proportion of shade-intolerant or shade mid-tolerant species.

When group selections, often up to two acres in size, are made, they resemble small clearcuts. The aesthetic and wildlife benefits of using group selection depend largely upon group size and spacing. Group selection harvest systems develop a vegetative condition with an interconnected canopy and many small openings, one-half to two acres, simulating a checkerboard pattern within a forested environment. Unbroken stands of timber greater than 20 acres would not exist.

Regeneration of shade mid-tolerant species, such as red oak, can be accomplished more efficiently with the shelterwood method. Also, the group selection method is more difficult to regulate over long periods of time. The very small size of regeneration groups and intensive skidding systems is inefficient for small tracts. Maximum growth occurs only in the opening not influenced by the tall trees.

**Even-aged System:**

The intent of an even-aged management system is to maintain stands of manageable size and of the same age or age class. A stand is considered even-aged if the difference in age between the oldest and youngest trees of the managed stand does not exceed 20 percent of the length of rotation. This is 16 years for an 80-year rotation and 24 years for a 120-year rotation. With any of these systems the size, shape, timing and dispersion of harvest units is done to achieve the multiple-use management objectives for the area.

The rotation age under an even-aged management system is the number of years between establishment of a stand of timber and when it is considered ready for harvesting and regeneration. Culmination of mean annual increment is generally used to determine a stand's rotation age. If a forested area is being managed on a 120-year average rotation, about 8 percent of the area would be regenerated each decade, or less than 1 percent per year. During a rotation, there may be one or more periodic thinnings prior to the next regeneration harvest. Thus, after the trees in the stand reach commercial size, the area may be impacted periodically by harvesting equipment.

Even-aged management offers many opportunities for a wide range of vegetative diversity. It provides a wide range of vegetative cover types and age classes, ranging from old, mature forest to open conditions.

Three harvest methods may be used in an even-aged silvicultural system: clearcut, shelterwood, and seed-tree. Under this Forest Plan, the clearcut and shelterwood methods will be featured. However, in some situations, the seed-tree method may best meet site-specific management objectives, with limited application.

**Clearcut Method:**

With the exception of trees left for wildlife or visual purposes, all merchantable trees on an area are harvested at one time by clearcutting. Non-merchantable live trees are also felled to eliminate competition with the regeneration. Regeneration of tree species develops from natural seeding and/or sprouting or artificial seeding or planting in clearcut areas. This regeneration method favors the establishment and development of shade-intolerant species, such as aspen and jack pine.

Clearcutting is used to create conditions necessary to regenerate early successional vegetation, such as aspen and jack pine. Without man-made or natural disturbances, the forest would move toward a condition dominated by late successional vegetation, such as sugar maple.

Clearcutting favors species of wildlife that utilize open and young-growth habitat conditions, such as the white-tailed deer, ruffed grouse, chestnut-sided warbler and Lincoln's sparrow.

### **Shelterwood Method:**

In the shelterwood method, the mature stand is regenerated in a series of two or three cuts. The early cuts are designed to improve the vigor and seed production of the remaining trees while preparing the site for new seedlings. The removal harvest is made when a sufficient amount of desirable reproduction has become established and before the regeneration has reached 20 percent of its rotation age. This method provides a partial cover of either large or small trees. When the shelter or overstory becomes a hindrance to the growth of the seedlings, rather than a benefit, it is necessary to treat the remainder of the mature stand.

The shelterwood method is most appropriate for species or sites where the shelter of a partial overstory is needed for reproduction, or to give desirable regeneration an advantage over less desirable species.

The shelterwood method provides conditions favorable to regeneration of a wide variety of hardwood and conifer tree species; such as white pine, red pine, red oak, sugar maple and black oak. The individual species favored depends on several physical and biological factors; such as seed source, soil-site conditions, seedbed conditions, amount of shade and microclimatic conditions at the forest floor. Therefore, shelterwood cutting tends to favor wildlife species similar to those species listed under clearcutting.

The shelterwood method will be commonly used on these Forests in oaks and northern hardwoods and in long-lived conifers.

### **Seed-Tree Method:**

This method involves harvesting all but a few well-distributed trees of the desired species to provide seed for natural regeneration. After adequate regeneration has been established, the seed trees are normally treated. This method is suited to situations where a seed source is needed along with full sunlight. This method will be utilized on a very limited basis under this Forest Plan.

### ***Selection of Harvest Method:***

Some forest types can be regenerated by more than one silvicultural system and/or harvest method, but other types cannot. Since a management area typically contains several forest types and forest type diversity is desirable within a management area, more than one silvicultural system or harvest method may be used within a management area.

Table B-1 shows the common harvest methods by forest type that may be used on the Huron-Manistee National Forests in management areas where timber harvest is utilized to meet the management area objectives. It illustrates harvest cutting methods that are considered appropriate for regeneration of each of the major forest types on the Huron-Manistee National Forests. The amount of each harvest cutting method used will vary by management area.

The silvicultural system and harvest cutting methods chosen are based on achieving a desired mixture of conditions within each management area and across the Forests. The method selected will best meet the Forest-wide management objectives and respond to the public issues, management concerns, and resource opportunities. The rationale for selection of a harvest method is based on a variety of factors, some of which are site-specific in nature, as well as the overall direction for the management area.

**Table B-1. Common Harvest Methods by Vegetation Type.**

Vegetation Type <u>1/</u>	Harvest Cutting Method			
	Clearcutting <u>2/</u>	Shelterwood <u>2/</u>	Individual or Group Selection	Seed-Tree <u>2/</u>
Aspen/Birch	X			
Low-site Oak	X	X		
High-site Oak	X	X		
Short-lived Conifer	X	X		X
Northern Hardwood		X	X	
Long-lived Conifer	X	X		X
Lowland Conifer	X	X		X
Lowland Hardwood		X		

1/ Type to be regenerated through maintenance of an existing type or converted from another forest type. For example: Conversion of hardwood to aspen would utilize harvest cutting methods for aspen.

2/ Clearcutting, shelterwood and seed-tree may include intermediate cuts during the rotation of the stand.

The harvest method is based upon the vegetative type that is to be regenerated and how that regeneration is to be accomplished either naturally or artificially. The determination of the desired vegetative type to be regenerated requires management considerations such as:

- Vegetative composition objectives for the management area.
- Existing vegetative conditions.
- Spatial distribution of types within the management area.
- Potential soil-site productivity for suitable vegetative types based on ecological classification system information.
- Relative cost and benefits of alternative regeneration options.
- Ability to manage and protect the regenerated stand.
- Need for intra-stand diversity.
- Desired recreation setting objectives.
- Desired mixture of timber products.
- Presence of riparian areas.
- Scenery Management System.
- Integrated Pest Management.

The optimum mixture of harvest methods proposed in this Forest Plan is based on the objective of maximizing net public benefits from the entire Forests as a unit, as opposed to site-by-site analysis. As part of the overall Forests' objectives, clearcutting was determined to be the optimum harvest cutting method to achieve some of those objectives. The appropriate silvicultural system and harvest method will be determined at the project level and will consider the site-specific conditions along with the objectives for the management area.

Table B-1 lists the common harvest methods by vegetation type. Tables B-2 through B-10 list the forest type harvest methods by management prescription area. Common harvest methods will be used when both the objectives of the management prescription can be met and the methods are compatible with the silvicultural characteristics of the primary species being regenerated. Other practices can be used when needed to achieve specific resource objectives. Any harvest method may be used if justified by an environmental analysis and approved by the Forest Supervisor.

Management Prescriptions 7.1, 8.1, 8.2, 8.3 and 8.4 (Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake Wildflower Sanctuary) are not included in the following tables because any timber harvest method may be used to achieve the management objective for the concentrated recreation and special management areas. Prescriptions 5.1, 9.1 and 9.2 are omitted because limited or no harvests are planned in the Wilderness and lands in holding areas.

### Aspen/Birch Type:

Aspen occurs naturally across the entire range of soils on the Huron-Manistee National Forests, except for the poorest outwash sands and deep organic wetlands. Big tooth aspen is predominant in upland ecosystems, whereas quaking aspen occurs frequently on somewhat poorly drained soils and in calcareous and loamy uplands. The even-aged system of management is recommended for growing and reproducing aspen (Table B-2).

**Table B-2. Aspen Harvest Cutting Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest Method(s) <u>1/</u>		Other Harvest Methods <u>1/</u>	Reference <u>2/</u>		Reason <u>3/</u>
2.1, 4.2, 4.3, 4.4, 6.2, & 8.4 <u>4/</u>	CC	9, 15	SEL, GS	9, 13, 14, 15	A, B, F	
<u>1/</u> Harvest methods: CC - clearcut; SEL - selection; GS - group selection. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics; B - water temperature, and F - change in species composition desired. <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River						

Clearcutting was determined to be the optimum method for regeneration of aspen because:

- Aspen is a very shade-intolerant tree species.

- Early successional species, such as raspberries, blackberries, grasses and strawberries, or community types, including temporary openings, can be maintained within the management area as well as can aspen regeneration.
- Habitat conditions for wildlife species that use young-growth habitat are provided.
- Clearcutting stimulates root suckering and increases stocking and early growth of aspen. Partial cuts produce inadequate stocking and result in reduced growth.
- Visual variety can be increased in some specific locations through the design, timing, size and location of clearcuts.
- Other types, including hardwoods, balsam fir and jack pine can be naturally converted to aspen by clearcutting to meet management objectives.
- Motorized access needs are minimized. Most stands are accessed only once every 40 to 60 years, usually by temporary roads. This reduced access need results in conditions that reduce the conflicts with dispersed recreation activities and favor wildlife species requiring remoteness, such as the black bear.
- Costs are lower and revenues higher, when compared to other harvest methods. Costs are lower because there is only one final harvest sale entry, these stands regenerate naturally by suckering, they produce valued products, and the harvest operations are conducted in a more efficient manner.

Pest and disease problems may be reduced by harvesting aspen before the peak (culmination of mean annual increment) of growth occurs. *Phellinus tremulae*, a common heart rot disease, causes significant volume losses in aspen at advanced ages. Although no prevention methods are known, losses can be reduced by making regeneration harvests prior to culmination of mean annual increment. Rotation ages of 50 to 60 years are recommended to avoid unacceptable losses. Other common diseases include hypoxylon canker, cytospora canker, shepherd's crook and leaf and shoot blights. Insect pests, such as the forest tent caterpillar, aspen tortrix, gypsy moth and various wood borers, are common.

### **Low-Site Oak and High-Site Oak Types:**

The predominant oak species occurring naturally on the Huron-Manistee National Forests are red, white, black and northern pin oak. Oaks cover a broad range of soils on the Forests and are divided into two management classifications based on site index, a measure of soil productivity. Oak regeneration problems differ in the two management classifications as the soil productivity values differ. Low-site oaks occur in areas with a site index of 55 or less. High-site oaks occur in areas with a site index of more than 55.

### **Low-site Oak - Site Indices Less Than 55:**

Low-site oak types, site indices less than 55, occur on poor outwash sands, presorted sand moraines, and sandy glaciated topography. The soils of these landforms have a limited capacity to provide water and nutrients. The black, white and northern pin oaks predominate on these sites and often are interspersed with pines, red oak and red maple.

The even-aged management system best perpetuates low-site oaks (Table B-3). Clearcutting is recommended when adequate regeneration is established prior to harvesting, while shelterwood harvests may be appropriate under some stand conditions.

**Table B-3. Low-Site Oak (Site Index Less Than 55) Harvest Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest		Other Harvest		
	Method(s) <u>1/</u>	Reference <u>2/</u>	Methods <u>1/</u>	Reference <u>2/</u>	Reason <u>3/</u>
2.1, 4.2, 4.4, 6.2, 8.4 <u>4/</u>	CC, SW	2, 3, 6, 15, 17	SEL, GS	2, 3, 15, 17	A, D, E
4.3	N/A Tree types not common or not found in these Prescription areas.				
<u>1/</u> Harvest methods: CC - clearcut; SW - shelterwood; SEL - selection; GS - group selection. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics; D - wildlife cover; and E - regeneration inadequate. <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River.					

**High-Site Oak - Site Indices Greater Than or Equal to 55:**

High-site oak types, composed of northern red, white and black oaks, primarily occur on loamy moraines and outwash. The soils of these landforms have higher moisture and nutrient levels than low-site soils due to the composition of the unconsolidated glacial drift and their manner of deposition. Many productive oak systems are on sandy materials underlain by loamy substrata and/or perched water tables.

Even-aged management by shelterwood harvest is the recommended method of management for high-site oaks (Table B-4). Clearcutting is appropriate when abundant natural oak reproduction is present. Shelterwood harvest methods are used when there is inadequate advance regeneration.

**Table B-4. High-Site Oak (Site Index Greater Than 55) Harvest Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest		Other Harvest		
	Method(s) <u>1/</u>	Reference <u>2/</u>	Methods <u>1/</u>	Reference <u>2/</u>	Reason <u>3/</u>
2.1, 4.2, 4.4, 6.2, 8.4 <u>4/</u>	CC, SW	2, 3, 6, 15	SEL, GS	2, 3, 6, 15, 18	A, D, E
4.3	N/A Tree types not common or not found in these Prescription areas.				
<u>1/</u> Harvest methods: CC - clearcut; SW - shelterwood; SEL - selection; GS - group selection. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics; D - wildlife cover; and E - regeneration inadequate. <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River.					

Silvicultural knowledge for managing the oak type is improving. Most oak reproduction originates from stump sprouts or seedling sprouts. Since nearly full sunlight is necessary for optimum development and growth, either a clearcut or shelterwood harvesting system is best suited for oaks. Uneven-aged management through selection harvest is not recommended because more shade enduring species, such as maples, will become dominant through natural succession over a period of years. This may be undesirable for the wildlife resource since desirable mast (acorn) production could be lost.

To determine which harvest system to use, a number of factors must be considered. Chief among them are: 1) the amount of oak regeneration; the number of seedlings and seedling sprouts per acre existing prior to harvest, 2) the adequacy of the oak advance regeneration; the number of seedlings and seedling sprouts exceeding 4.5 feet in height, and 3) the predicted capacity of oak stumps to sprout after harvesting to supplement the advance regeneration of seedlings and seedling sprouts (Sander, et al. 1976).

Clearcutting was determined to be the preferred harvest method when:

- The amount and adequacy of advanced oak regeneration equals or exceeds the minimum stocking requirements.
- The amount and adequacy of advanced oak regeneration combined with the predicted stump sprouting capacity equals or exceeds minimum stocking requirements.
- There is inadequate stocking and stand volume to support more than one operable cut.
- Stands are over-mature, classed as high risk, and will not survive through more than one cutting cycle.
- The stand must be salvaged due to fire; wind; or insect and disease outbreak.

When one of the above conditions is met, clearcutting is optimum because:

- The oaks are shade intolerant.
- Habitat conditions for wildlife species that use young-growth habitat are provided.
- Clearcutting stimulates stump sprouting and increases growth and development of advanced regeneration.
- Visual variety can be increased in specific locations through the design, timing, size and location of clearcuts.
- Motorized access needs are minimized. Stands are accessed once every 60 to 100 years, usually by temporary roads. The reduced access results in conditions that reduce conflicts with dispersed recreation activities.
- Costs are lower and revenues higher, when compared to other harvest methods. Costs are lower because there is only one final harvest entry; these stands regenerate naturally; they produce valued products; and the harvest operations are conducted in a more efficient manner.
- Mature and over-mature stands can be utilized.
- Low volume stands that would be inoperable under the shelterwood method can be sold commercially.

The shelterwood method will be applied on sites where clearcutting is determined not to be the optimum method. This would normally be the case where advanced regeneration and predicted stump sprouting will not provide adequate stocking after clearcutting.

Some insect and disease factors associated with high- and low-site oak types are the red-humped oakworm, oak leaf roller, saddled prominent oak leaf-tier, forest tent caterpillar, gypsy moth, oak wilt, anthracnose and an oak sprout canker caused by a fungus on sprouts in naturally regenerated stands. The oak canker problem may be reduced by ensuring that natural reproduction has occurred prior to clearcut harvests and by planting oaks interspersed with pines when natural reproduction is supplemented.

Additional environmental factors associated with the establishment of oak regeneration include frost, drought and browse.

### **Short-Lived Conifer Type (Jack Pine):**

Jack pine predominantly occurs naturally on very poor, infertile, outwash sand plains and sandy glacial lake beds. Continuous areas of natural jack pine generally occur in climatic zones where frosts are frequent in late spring and early summer and in more moderate climatic zones where fires have influenced vegetative diversity. A significant portion of the Forests' area is covered with jack pine. The Kirtland's Warbler Recovery Plan directs management on most of the jack pine areas on the Huron National Forest.

Even-aged management is the recommended silvicultural system (Table B-5). Clearcutting, seed-tree, and shelterwood methods are all acceptable. The forests have had very limited success with the shelterwood and seedtree methods. Various conditions, such as the quality of seed trees, the type of cones, slash disposal methods, wind exposure, and seedbeds, are considered when managing this type. Planting may be needed to establish or maintain jack pine on some sites. Cyclic epidemic outbreaks by the jack pine budworm or *Sphaeropsis* shoot blight have caused extensive damage to jack pine. To mitigate the budworm problem, stands should be managed to be fully stocked, even-aged, and harvested at 40 to 45 years of age. Opportunities to mitigate the budworm problem are limited because the Huron-Manistee National Forests currently have extensive acreage of mature jack pine.

**Table B-5. Jack Pine Harvest Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest Method(s) <u>1/</u> Reference <u>2/</u>		Other Harvest Methods <u>1/</u> Reference <u>2/</u> Reason <u>3/</u>		
	2.1, 4.2, 4.4, 6.2, 8.4 <u>4/</u>	CC, ST, SW	4, 5, 15	SEL, GS	4, 5
4.3	N/A Tree types not common or not found in these Prescription areas.				
<u>1/</u> Harvest methods: CC - clearcut; ST - seed-tree; SW - shelterwood; SEL - selection; GS - group selection. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics; F - change in species composition desired; HF - fuels treatments, and H - low product values. <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River.					

Clearcutting was determined to be the optimum method for regeneration of jack pine because:

- Jack pine is a very shade-intolerant tree species.
- Early successional species, such as blueberries and grasses, or community types, including temporary openings, can be maintained within the management area as well as jack pine regeneration.
- Habitat conditions for wildlife species that use young-growth conifer habitats are provided.
- Serotinous cones require high temperatures to open. These high temperatures can be achieved through the use of fire or mechanical means on cone-bearing slash lying on the ground in full sunlight.
- Site preparation for seeding, planting or natural regeneration, including prescribed burning, is accomplished more efficiently.
- Risk from windthrow and insects, such as jack pine budworm and Ips bark beetle, is reduced.
- Visual variety can be increased in some specific locations through the design, timing, size and location of clearcuts.
- Other types, including hardwoods, aspen, red pine, white pine, or balsam fir, can be converted to jack pine to meet management objectives.
- Genetically improved jack pine stock can be introduced through artificial reforestation.
- Costs are lower and revenues higher when compared to other harvest methods. Costs are lower because there is only one final harvest entry, these stands regenerate naturally, they produce valued products, and the harvest operations are conducted in a more efficient manner. Stands tend to be large, especially in Kirtland's warbler management areas.
- Motorized access needs are minimized. Most stands are accessed only once every 40 to 60 years, usually by temporary or short-term roads. This reduced access need results in conditions that reduce the conflicts with dispersed recreation activities and favor wildlife species requiring remoteness such as the black bear.

Some insects and diseases associated with jack pine include the jack pine budworm, white pine weevil, Ips beetles, heart rot and Sphaeropsis. Generally jack pine does not succumb to drought, but due to secondary vectors triggered by dissection.

### Northern Hardwood Type:

Northern hardwoods occur naturally on true moraines and ground moraines that have high moisture-holding capacities and nutrient levels. The soils supporting northern hardwoods typically have finer sands or heavier textures than those supporting oak. Both the overstory and understory of northern hardwoods have high species diversity. The most important species include sugar maple, beech, white ash, black cherry, northern red oak, red maple and basswood. Most of the present stands are even-aged and resulted from the original logging in the early 1900s.

This type can best be perpetuated by the even-aged management system using the shelterwood method. Clearcutting is usually not recommended as a harvest method because clearcutting often does not result in adequate regeneration. A shelterwood/seed-tree harvest made about 20 years prior to rotation age will help ensure that the natural regeneration is well established. Uneven-aged management, such as single-tree and group selection, can be used; it tends to favor the more shade-tolerant species, such as beech, sugar and red maples (Table B-6).

**Table B-6. Northern Hardwood Harvest Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest		Other Harvest		
	Method(s) <u>1/</u>	Reference <u>2/</u>	Methods <u>1/</u>	Reference <u>2/</u>	Reason <u>3/</u>
2.1, 4.2, 4.4, 6.2, 8.4 <u>4/</u>	SEL, SW	10, 11, 15, 18	GS, CC	10, 11, 13, 14, 15, 18	A, C, D, F
4.3	N/A Tree types not common or not found in these Prescription areas.				
<u>1/</u> Harvest methods: SEL - selection; SW - shelterwood; GS - group selection; CC - clearcut. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics; C - wildlife food; D - wildlife cover; and F - change in species composition desired. <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River.					

Widespread pest problems are reduced in this type because of the diverse species mixture. However, basswood thrips, canker-worms, greenstriped mapleworm, maple anthracnose, gypsy moth and ash dieback may cause damage. If beech bark disease, Asian long-horned beetle, and emerald ash borer populations were to reach high levels, heavy mortality could occur in some species of this type.

### Long-Lived Conifer Type (Red and White Pine and Hemlock):

Red and white pine types naturally occur on all soil types except the poorest sands and deep organic wetlands. Red pine was once more prevalent in the somewhat drier oak ecosystems. White pine occurs on knolls within wetlands and along wetland edges. In Pre-Euro-American times, white pine and hemlock were a major component in both northern hardwood and oak ecosystems. Their present distributions are more a function of seed source than soil potential; white pine and hemlock are considered together in the following text.

In today's Forests, red and white pines have been planted on upland soils. In many cases, they provided valuable conservation measures on the eroded soils of formerly mismanaged and abandoned lands. The amount of white pine is increasing as the species becomes established in the understory of stands where a seed source still occurs.

The even-aged management system is recommended for both the red and white pine species (Tables B-7 and B-8, respectively). Clearcutting, seed-tree and the shelterwood harvest systems usually are applied to red pine types. The shelterwood system is prone to insect and disease problems; such as *Sphaeropsis* shoot blight. Uneven-aged management may be appropriate in special areas, but it is not usually recommended. Clearcutting, seed-tree and shelterwood harvesting are acceptable methods of regenerating white pine. Although each method has advantages and disadvantages, the two-entry shelterwood system is the most successful for white pine.

**Table B-7. Red Pine Harvest Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest		Other Harvest		
	Method(s) <u>1/</u>	Reference <u>2/</u>	Methods <u>1/</u>	Reference <u>2/</u>	Reason <u>3/</u>
2.1, 4.2, 4.4, 6.2, 8.4 <u>4/</u>	CC, ST, SW	12, 15	SEL, GS,	12, 13, 14, 15	A, HF
<u>1/</u> Harvest methods: CC - clearcut; ST - seed-tree; SW - shelterwood; SEL - selection; GS - group selection. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics. HF – hazardous fuels <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River.					

**Table B-8. White Pine Harvest Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest		Other Harvest		
	Method(s) <u>1/</u>	Reference <u>2/</u>	Methods <u>1/</u>	Reference <u>2/</u>	Reason <u>3/</u>
2.1, 4.2, 4.3, 4.4, 6.2, 8.4 <u>4/</u>	CC, ST, SW	1, 15	SEL, GS,	1, 13, 14, 15	A
<u>1/</u> Cutting methods: CC - clearcut; ST - seed-tree; SW - shelterwood; SEL - selection; GS - group selection. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics. <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River.					

Clearcutting, shelterwood, and seed-tree were determined to be the optimum methods for regeneration of red and white pine because:

- Red pine is a shade-intolerant species.
- White pine can be managed as if it were a shade-intolerant species

- Early successional species, such as raspberries, blackberries, blueberries and grasses, or community types, including temporary openings, can be maintained within the management area, as well as can red pine regeneration.
- Habitat conditions for wildlife species that use young-growth conifer habitats are provided.
- Artificial regeneration, planting, may be required. Seed production is irregular, occurring at intervals of 10 years or more.
- Site preparation, planting and release can be accomplished efficiently.
- Genetically improved stock or stock from known seed sources can be used.
- Risk from siroccoccus and Sphaeropsis shoot blight is minimized in clearcuts and seedtree systems for red pine.
- Visual variety can be increased over time in some specific locations through the design, timing, size and location of clearcuts.
- Other types, including hardwoods, aspen, balsam fir, and jack pine, can be converted, planted, to red pine or white pine, following clearcutting, to meet management objectives.
- Revenue/cost ratios are high. Costs are lower because these stands regenerate naturally, they produce valued products, and the harvest operations are conducted in a more efficient manner.

White pine weevil and white pine blister rust are major insect and disease problems in the white pine type. Because of the severity of the weevil problem in open-grown plantations, white pine regeneration usually is limited to natural regeneration methods using the shelterwood system. Common insect and disease problems in the red pine type include the Saratoga-spittlebug, redheaded pine sawfly, white grubs, Ips bark beetles and Sphaeropsis. Although red and white pines are not a favored food of the gypsy moth, white pine grown under an oak shelterwood system could receive substantial growth loss and mortality from a gypsy moth outbreak. Introduction of the hemlock woolly adelgid would cause widespread mortality of hemlock.

### **Lowland Conifer Type:**

Lowland conifers occur in deep neutral to alkaline swamps and in acid bogs. Productivity ranges from low in swamps to extremely low in bogs. Vegetative diversity is high in neutral to alkaline swamps but is very low in acid bogs, which are commonly covered with sphagnum moss and leatherleaf.

Even-aged management using clearcutting, shelterwood, and seed-tree cutting methods is the recommended silvicultural system (Table B-9). Most lowland conifer species are shallow rooted and are not windfirm; thus the seed-tree and shelterwood methods must be used with caution. Heavy concentrations of deer and rabbit can prevent success in regenerating northern white cedar. Regeneration of balsam fir is usually successful because balsam is seldom consumed by wildlife.

In situations where the desired condition is lowland conifer and advanced regeneration is not present in adequate numbers, shelterwood harvesting, strip clearcutting or patch clearcutting can be used where feasible. Stands that have a high windthrow hazard or have inadequate volume

per acre to support two or more cuts are not shelterwood opportunities. These stands will be regenerated by clearcutting to regenerate lowland conifers.

Where the shelterwood method is not necessary to regenerate the type, or where shelterwood opportunities are not realistic, clearcutting is the optimum method because:

- Risk of windthrow in mature-overmature stands is reduced.
- Slash disposal such as whole tree logging, broadcast burning or piling and bunching to prepare, expose, a seedbed is accomplished more efficiently.
- Habitat conditions for wildlife species that utilize young-growth lowland conifers are provided.
- Costs are lower and revenues higher, when compared to other harvest methods. Costs are lower because there is only one final harvest entry; these stands regenerate naturally; they produce valued products; and the harvest operations are conducted in a more efficient manner.
- Visual variety can be increased in some specific locations through the design, timing, size and location of clearcuts.
- A variety of age/size classes of lowland conifer vegetation is provided.
- Planting and protection can be used to supplement natural regeneration.
- Protection devices, for example fencing, are easier to install in openings created by the clearcut.

**Table B-9. Lowland Conifer Harvest Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest Method(s) <u>1/</u>		Other Harvest Methods <u>1/</u>		
	Reference <u>2/</u>	Reference <u>2/</u>	Reference <u>2/</u>	Reference <u>2/</u>	Reason <u>3/</u>
2.1, 4.4, 6.2, 8.4 <u>4/</u>	N/A Tree types not common or not found in these Prescription areas.				
4.1, 4.3	CC, ST, SW	7, 8, 15	SEL, GS	7, 8, 13, 14, 15	A, C, D, F, G
<u>1/</u> Harvest methods: CC - clearcut; ST - seed-tree; SW - shelterwood; SEL - selection; GS - group selection. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics; C - wildlife food; D - wildlife cover; F - change in species composition desired; and G - species not windfirm. <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River.					

The principal insect and disease problems for lowland conifers are the spruce budworm and heart rot. They are not significant on the Forests because of the minor acreages in balsam fir and spruce. The primary problem is extensive browsing that occurs during the winter season by deer and rabbit. The lowland conifer stands are of critical importance to wildlife during the bitter winter season because they provide thermal cover and food. Additional research on regeneration techniques, applicable to the Huron-Manistee National Forests, for the lowland conifers is needed. Some regeneration harvests and protection may occur during the first decade.

**Lowland Hardwood Type:**

Lowland hardwood types occur naturally in ancient glacial lake beds and drainways, which have evolved into today's organic wetlands. Productivity is generally low, because high water tables limit rooting zones. Areas with water tables 18 to 24 inches or more below the surface are often highly productive. Vegetative diversity is high with mixtures of red maple, black ash, yellow birch, balsam, balsam fir, hemlock, spruce and northern white cedar. Lowland hardwoods commonly intermix with swamp conifer types.

Even-aged management, using the shelterwood harvest system, is the recommended method (Table B-10). Uneven-aged management using the group selection and the single-tree selection methods can be used, but windthrow may occur. Uneven-aged harvests favor the more shade-tolerant types, such as red maple. Some regeneration cuts, protection and planting may occur during the first decade.

No significant insect or disease problems exist. The Dutch elm disease has reduced most of the elm in Lower Michigan to immature growth stages. If the emerald ash borer situation changes, it may significantly impact the ash species.

**Table B-10. Lowland Hardwood Harvest Methods for Management Prescription Areas.**

Management Prescription Area	Common Harvest		Other Harvest		
	Method(s) <u>1/</u>	Reference <u>2/</u>	Methods <u>1/</u>	Reference <u>2/</u>	Reason <u>3/</u>
2.1, 4.4, 6.2, 8.4 <u>4/</u>	N/A Tree types not common or not found in these Prescription areas.				
4.3	SW	15, 18	SEL, GS	15, 18	A, C, D, F, G, H, I
<u>1/</u> Harvest methods: SW - shelterwood; SEL - selection; GS - group selection. <u>2/</u> Reference number in Footnotes for Tables B-2 through B-10 section. <u>3/</u> Reason for using other harvest methods: A - aesthetics; C - wildlife food; D - wildlife cover; F - change in species composition desired; G - species not windfirm; H - low product values; and I - species intolerant. <u>4/</u> Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River.					

**Footnotes for Tables B-2 through B-10:**

The following references were cited in Tables B-2 through B-10:

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### **Intermediate Harvest Methods:**

Intermediate harvests are modifications to the vegetation of a stand between its year of origin and the final harvest. Over the life of a stand there may be several reasons for entering the stand to modify the current vegetation; such as modify species composition, reduce competition, improve growth, remove volume, stimulate reproduction, reduce hazards for insect, disease, or fire, improve economic returns, and others.

Intermediate harvests remove various amounts of vegetation, but they leave enough good quality trees for the residual stand to meet at least C-level stocking guidelines, (more than 40 percent stocking, for the forest type). Generally thinnings remove less than 50 percent of the live tree biomass and residual stocking is kept above the B-level stocking guides, moderately stocked. The B-line stocking level varies by species, age, and size of trees. Stocking guides are typically found in the management guides for each forest type.

An intermediate harvest can be a valid prescription for all timber lands under all silvicultural management practices, especially to control growth and stocking in managed forests, and as a means to achieve balanced uneven-age classes when using the individual tree selection method.

Intermediate harvests are broken down into two major types: non-commercial thinnings and commercial thinnings.

### **Non-Commercial Thinnings:**

As the name implies, this type of intermediate harvest does not generate commercially saleable volumes. Trees that are harvested are either too small or do not generate enough saleable volume to warrant offering it under a timber sale. Most of these types of treatments occur in very young stands or are used to cut non-merchantable trees or volumes; such as dead, a small number of trees, or species with no markets.

These thinnings are generally utilized to modify species composition, change size composition, alter age class structure, improve stand quality, and control competition.

### **Commercial Thinnings:**

These are all intermediate harvests that generate commercially saleable volumes. This type of thinning generally occurs in older stands, where enough harvested trees have sufficient commercial value to warrant a timber sale. Commercial thinnings usually occur at intervals of 10 years or more, and may occur several times throughout the rotation of a timber stand.



## Appendix C - Ecological Classification System Description

### Landtype Associations and Ecological Landscape Classification

On the Huron-Manistee National Forests, landtype associations are contiguous areas of land delineated based on similarity in glacial land forms, overstory plant communities and soil associations. The landtype associations are an intermediate level in a national system for ecological landscape classification. The classification system, developed by the Forest Service, is based on a nested hierarchy of landscape ecosystems ranging in size from 1000's of square miles to less than one acre (see Table III-1 in Cleland et al. 1993). Landtype associations usually occur at a scale of 10s to 1,000s of acres. Bailey (1995) is an excellent source for more information on methods in ecological landscape classification and the national hierarchical system. Cleland et al. (1993) provide a specific discussion of methods used to delineate landtype associations on the Huron-Manistee National Forests. Note that the classification of landscapes is an ongoing and iterative process. The Huron-Manistee National Forests recognize that alternative systems of landtype associations and ecosystem classification have been developed and are in use, for example, Albert 1995. Time constraints have not allowed for a complete evaluation and/or assimilation of those classification systems into the Forest Plan Revision process. However, the Forests are confident that the system of landtype associations described here and used throughout the Forest Plan Revision process is appropriate for the activities and evaluations for which it was used.

### Landtype Associations

Eight landtype associations occur on the Huron-Manistee National Forests; maps showing the spatial distribution of these landtype associations are available in the planning record.

#### ***Landtype Association 1 - Outwash Plains:***

Landtype association 1 is characterized by dry sandy plains deposited by water from melting glaciers. Some areas have gravelly layers or layers with finer soil textures at various depths in the soil. Topography is comparatively level but may also be pitted or dissected. Vegetation is dominantly jack or red pine, black, white, or pin oak, bracken fern and blueberries. Remnants of dry sand prairie, oak-pine barrens and jack pine barrens occur in some areas. Fire is a common natural disturbance event on this landtype association.

#### ***Landtype Association 2 - Ice-Contact Hills:***

Sandy hills formed in coarse- to medium-textured sandy and gravelly material. Most areas have loamy or clayey layers at various depths in the soil profile. Topography is hilly, with gently rolling to moderately steep slopes. Vegetation is dominantly red oak, red maple and white oak.

White and red pine are present in some areas. White pine regeneration is common. Understory plants include starflower, viburnum and sarsaparilla.

### ***Landtype Association 3 - Sandy Morainal Hardwood Hills:***

Landtype association 3 consists of moraines, which, in this case, are sandy hills created by the direct action of glacial ice. They are formed in sandy, gravelly and loamy material that overlies thick deposits ranging in texture from sandy loam to clay. Topography is hilly, ranging from gently rolling to steep. Vegetation includes sugar maple, beech, red oak, red maple, clubmosses and Solomon's seal.

### ***Landtype Association 4 - Wet Sand Plains and Lake Plains:***

Landtype association 4 consists of wet sand plains and lake plains, formed in coarse and medium textured sandy materials. The water table is shallow in most areas. Topography is level, with low sand ridges in some areas. Vegetation includes aspen, red maple, white and black spruce, balsam fir, paper birch, bunchberry and wintergreen.

### ***Landtype Association 5 - Alluvial, Fluvial and Organic:***

This landtype association is characterized by areas where organic soils have developed or accumulated along streams or in depressions. Water tables are close to the surface, and topography is nearly level. Vegetation is a mix of hydrophilic species. The overstory may include white cedar, balsam fir, tamarack, white and black spruce, hemlock, red maple or ash. Open wetlands may support leather leaf or grasses and sedges.

### ***Landtype Association 6 - Clay Hills and Clayey Plains:***

Landtype association 6 consists of clayey hills and plains. Soils are characterized by medium to fine textured surface layers overlying fine materials. Topography is gently rolling to moderately steep. The overstory includes sugar maple, beech, basswood, hemlock, white ash and red oak. Large areas are also managed for aspen. Ground flora is diverse, and includes violets, trillium, sweet cicely and other spring ephemerals.

### ***Landtype Association 7 - Loamy Outwash and Ground Moraines:***

Landtype association 7 consists of loamy plains and low, gently rolling hills. Surface soils may be course to medium textured but subsurface layers are usually characterized by loamy or clayey materials. Vegetation includes sugar maple, beech, basswood, red oak, red maple, trillium, viburnum and dogwood.

***Landtype Association 8 - Dunes:***

This landtype association is characterized by wind deposited sand dunes that occur along Lakes Michigan and Huron. Topography is rolling to very steep. The dunes may be open, shifting sand or vegetated with beech; hemlock; white and jack pine; black and red oaks and dune grasses.



## Appendix D - Proposed and Probable Practices, Goods Produced and Other Information

The purpose of this appendix is to display an estimate of the goods and services provided, the proposed first decade and probable second decade management practices expected, and other information including land classification.

The outputs and proposed and probable practices listed are projections based on available inventory data and some are based on computer modeling. The outputs and amounts listed below are estimates only and are subject to annual budgets for funding the various resource programs on the forest. Actual amounts may vary from those predicted and will be monitored on an annual basis.

### Outputs and Probable Practices

#### **Land Classification:**

Land identified as suitable for timber management include producing timber as part of multiple use direction. These are lands that contribute to the timber sale program on a regularly scheduled basis. Table D-1 shows how acres of these lands compare to the total acreage of National Forest System land on the Huron-Manistee National Forests.

**Table D-1. Classification of National Forest System Land for Timber Production.**

<b>Classification</b>	<b>Acres</b>
Total National Forest System land (Land Status Acres)	980,341
Non-forest and water	51,468
Legally withdrawn (Wilderness, Research Natural Area, Experimental Forests)	15,029
Land not physically suited for timber production (low site index, regeneration not assured, etc)	581
Forest Land – Inadequate Information	18,202
Land not appropriate for timber production due to other resource Management (riparian areas, campgrounds, unique areas, etc)	493,940
Land suitable for timber management	401,121

#### **Allowable Sale Quantity:**

The allowable sale quantity of timber is the maximum amount of regulated volume that may be offered and sold during a given decade of Forest Plan implementation from land identified as suitable for timber management. Table D-2 shows the mix of volumes by forest type that contribute to the allowable sale quantity (Sale Schedule).

During the first decade, the first ten years of plan implementation, the allowable sale quantity is 910.0 million board feet (151.7 million cubic feet). The amount of timber that may be sold

annually may exceed 91.0 million board feet as long as the decadal allowable sale quantity is not exceeded. During the second decade, the allowable sale quantity is 1,002 million board feet, or 167 million cubic feet. The amount of timber that may be sold annually may exceed 100.2 million board feet as long as the decadal allowable sale quantity is not exceeded.

**Table D-2. Volume by Vegetation Class Breakdown on Lands Suitable for Timber Production for the First and Second Decades.**

Vegetation Class	Decade 1		Decade 2		
	Units	Million Board Feet	Million Cubic Feet	Million Board Feet	Million Cubic Feet
Aspen/Birch		271	45.2	325	54.2
Short-Lived Conifer		109	18.1	176	29.3
Long-Lived Conifer		307	51.2	322	53.6
Low-site Oak		52	8.6	1	.1
High-Site Oak		171	28.5	106	17.7
Northern Hardwood				73	12.1
Total Million Board Feet		910		1,002	
Total Thousand Cubic Feet			151.7		167.0

Volumes were modeled in MMCF. Conversions to MMBF used a factor of 6 MMBF per MMCF.

The long-term sustained yield capacity (LTSYC) is the highest uniform wood yield from lands being managed for timber production that may be sustained under specified management intensity consistent with multiple-use objectives (36 CFR219.3, 1982; as permitted by 36 CFR 219.14[e] of the 2005 Planning Rule). For this planning period, LTSYC is 1.8 billion board feet, as shown in Figure D-1.

**Figure D-1. Allowable Sale Quantity and Long-Term Sustained Yield Capacity**



**Non-Chargeable Sale Volume:**

In addition, volume is sold that may come from land classified as not suitable for timber production. Volumes from these lands do not contribute to the allowable sale quantity. Management for such things as barrens, savannahs, prairies, old-growth restoration or riparian habitat managements are the primary reasons why volume is generated from these lands.

**Table D-3. Volume by Vegetation Class Breakdown on Lands Not Suitable for Timber Production for the First and Second Decades.**

Vegetation Class	Decade 1		Decade 2	
	Units	Million Board Feet	Million Board Feet	Million Cubic Feet
Aspen/Birch				
Short-Lived Conifer		21	51	8.6
Long-Lived Conifer		168	145	24.2
Low-site Oak		19	78	12.9
High-Site Oak		43	45	7.5
Northern Hardwood				
Total Million Board Feet		250	319	
Total Thousand Cubic Feet			41.7	53.2

## Proposed (Decade 1) and Probable (Decade 2) Management Practices

### ***Silvicultural Practices:***

Tables D-4 and D-5 list the proposed and probable silvicultural methods that would be used to work toward the vegetative and other multiple-use desired conditions and objectives of the Forest Plan. The tables display the projected amount of each silvicultural method for the first two decades of Forest Plan implementation based upon modeling. Actual accomplishments during Forest Plan implementation may vary from these modeled outputs.

**Table D-4. Acres of Proposed and Probable Silvicultural Methods in the First and Second Decades From Lands Suitable for Timber Production.**

Vegetation Class	Silvicultural Method							
	Thin		Clearcut		Shelterwood		Selection	
	1	2	1	2	1	2	1	2
Aspen/Birch			24,100	28,000				
Short-Lived Conifer			16,286	22,774				
Long-Lived Conifer	35,432	54,512	11,184	7,101				
Low-site Oak			6,838	6,078				
High-Site Oak	24,025	1,146	2,551	2,548	8,261	22,879		
Northern Hardwood								16,299
Total Decade 1	59,457		60,959		8,261			
Total Decade 2		55,658		66,501		22,879		16,299

**Table D-5. Acres of Proposed and Probable Silvicultural Methods in the First and Second Decades From Lands Not Suitable for Timber Production.**

Vegetation Class	Silvicultural Method									
	Create Barrens		Create / Maintain Fuelbreaks		Reduce Hazardous Fuels		Old Growth to Barrens		Old Growth Restoration	
	Decade 1	Decade 2	Decade 1	Decade 2	Decade 1	Decade 2	Decade 1	Decade 2	Decade 1	Decade 2
Aspen/Birch										
Short-lived Conifer	130	4,248	4,940		80,000			603		
Long-lived Conifer	4,250	5,347	13,090					657		6,347
Low-site Oak	794	4,823	1,980					1,178		
High-site Oak	2,551	2,548								
Northern Hardwood										
Opening	1,593	1,593								
Total Decade 1	9,318		20,000		80,000					
Total Decade 2		16,996						2,438		6,347

**Forest-wide Proposed Practices:**

Table D-6 lists other forest management activities that are proposed to work toward the desired conditions and objectives during the first 10 years of Forest Plan implementation.

**Table D-6. Proposed Practices (Forest-wide).**

Activity or Practice	Definition of Activity or Practice	Unit of Measure	Average Annual Amount in the First Decade
Manage Stream Habitat	Activities include, but are not limited to, bank stabilization through placement of habitat structures; sediment reduction; and angler access improvement.	Miles of stream per year	121
Manage Lake Habitat	Activities include, but are not limited to, bank stabilization through placement of habitat structures; sediment reduction; and angler access improvement.	Acres per Year	240

**Table D-6. Proposed Practices (Forest-wide) (Continued).**

Manage Terrestrial Habitat	Activities include but are not limited to planting, burning, cutting, fencing, nesting structures, and access management aimed at protection, restoration and enhancement of terrestrial habitats and associated desirable species, including species at risk.	Acres per Year	7,000
Manage Noxious Weeds	Prevention, treatment and monitoring of noxious weeds including activities such as biological, mechanical and chemical control.	Acres per Year	4,000
Manage Rangeland Vegetation	Activities include but are not limited to planting/seeding of desired vegetation; protection of desired vegetation, monitoring of rangeland vegetation treatments	Acres per Year	312
Hazardous Fuels Reduction	Fuels hazard mitigation activities including mechanical and prescribed fire fuel treatments	Acres per Year	8,000
Fuelbreaks	Creation and maintenance of fuelbreaks.	Acres per Year	2,000
Maintain and Improve Watershed Condition	Includes activities designed to: care for soil conditions, water quality and quantity; control timing of flows to sustain desired vegetation and soil condition to achieve forest, rangeland, and aquatic health; protect ecological values and function.	Acres per Year	100
Decommission Classified and Unclassified Roads	Activities include stabilizing and restoring unneeded roads to a more natural state.	Miles of road per year	20
Improve Transportation System - Roads	Activities include parking lot and campground spur construction as well and National Forest System road construction.	Miles of road per year	6
Improve Transportation System - Trails	This activity addresses capital improvement of new and existing system trails, trail bridges and associated appurtenances such as, signs, barriers, culverts, fencing, viewing platforms contiguous to the trail, etc.	Miles of trail per year	38
Improve Transportation System - Trails	This activity addresses capital improvement of new and existing system trails, trail bridges and associated appurtenances such as, signs, barriers, culverts, fencing, viewing platforms contiguous to the trail, etc.	Miles of trail per year	38

**Table D-6. Proposed Practices (Forest-wide) (Continued).**

<b>Activity or Practice</b>	<b>Definition of Activity or Practice</b>	<b>Unit of Measure</b>	<b>Average Annual Amount in the First Decade</b>
Establish Forest Vegetation	Activities including but not limited to planting, seeding, natural regeneration, site preparation designed to establish or reestablish desired vegetation to improve or maintain watershed health, forest and aquatic health, protect ecological values and improve the production of forest products and services.	Acres per Year	5,990
Improve Forest Vegetation	Activities include but are not limited to release, weeding, thinning, fertilizing and pruning designed to improve or maintain watershed health, forest and aquatic health, to protect ecological values and to improve the production of forest products and services.	Acres per Year	935

## Oil and Gas

Forest Plan Standards and Guidelines classify oil and gas resource availability for leasing and subsequent development. Application of the Forest Plan Standards and Guidelines shows what lands may be considered available, and if available, under what condition. Many areas of the National Forest System lands are restricted through a no-surface-occupancy restriction; that is, the surface of the lands cannot be occupied for oil and gas drilling operations. These areas are precluded from occupancy due to values such as wetlands, Research Natural Areas, and experimental forests. Other areas are restricted through seasonal or timing restrictions. An example of this type of restriction is the restriction for Kirtland's warbler areas.

In addition, there are "controlled use" restrictions. These limit development by stipulating how exploration may be done. The 6.2 and 8.4 (Au Sable River, Bowman Lake, Briar Hills, Condon Lakes, Cooke, Hoist Lakes, Reid Lake, South Branch Au Sable, Wakeley Lake, Whalen Lake, and White River) Management Areas have a well density restriction of one surface location per 160 and 640 acres, respectively. Three other 8.4 areas (Newaygo Prairie Ecological Study Area, Lumbermen's Monument, and Loda Lake), have a no surface occupancy stipulation. Lands available for oil and gas leasing through application of the Forest Plan's Standards and Guidelines for all alternatives is summarized in Table D-7. Specific details of the Standards and Guidelines can be found in Chapter III-Management Area Direction.

**Table D-7. Total Acres Available for Leasing by Lease Stipulation Category.**

Lease Stipulation Category	Acres
Not Available	3,380
No-Surface Occupancy	204,631
Other Restrictions (total)	419,266
<ul style="list-style-type: none"> <li>• Controlled Surface Use 1 well per 640 Acres</li> <li>• Controlled Surface Use 1 well per 160 Acres</li> <li>• Kirtland's Warbler Restriction</li> <li>• Old Growth Restriction</li> <li>• Wildlife Area/Karner Blue Butterfly</li> </ul>	<ul style="list-style-type: none"> <li>29,208</li> <li>12,426</li> <li>66,676</li> <li>86,952</li> <li>208,836</li> </ul>
Standard Stipulations	360,425
Total National Forest System Lands	973,107

## **Oil and Gas - Reasonably Foreseeable Development Scenario**

### ***Introduction:***

In conformance with regulations addressing the availability of federal oil and gas resources on National Forest System lands for leasing (36 CFR 228.102(c-e)), a reasonably foreseeable oil and gas development scenario has been developed for the next 10 to 15 year period. This report was prepared by Dave Lachance of the Bureau of Land Management, Milwaukee, Wisconsin and represents projections based on best available information.

This report is divided into three parts. Part I provides a general discussion of the five major field types found on the Forests. Part II provides the projections of anticipated development within the administrative boundaries of the Forests over the next 10-15 years purely from a geologic standpoint. Part III provides modified projections with consideration for the Forest Plan Standards and Guidelines.

The projected levels of oil and gas development provided by the reasonably foreseeable oil and gas development scenario under each Forest Plan Alternative are analyzed in the Final Environmental Impact Statement associated with the Forest Plan. This programmatic analysis supports a decision on availability of the federal oil and gas resource for leasing. The availability decision does not commit the resource to leasing and/or development. It simply documents what federal oil and gas would be considered available for leasing and specifies the conditions for surface occupancy. Upon completion of the revision process, if a request for leasing of specific lands is received, the Environmental Impact Statement will be reviewed, the assumptions validated, and if appropriate, the Forests will make a recommendation on “consent” to the Regional Forester. The Regional Forester will then advise the Bureau of Land Management as to whether these specific lands may be offered for lease, and if so, under what conditions (lease stipulations). Should the analysis in the Final Environmental Impact Statement not be adequate for this action, or if new information or changed conditions need to be considered, additional environmental analysis would be done prior to making a recommendation.

### ***Part I: The General Setting in the Lower Peninsula:***

The exploration for commercial accumulations of oil and gas revolves around attempting to locate porous and/or fractured, permeable reservoir rocks which contain oil and gas that has migrated into the reservoir rocks from source rocks and has been prevented from migrating further to shallower depths by the presence of impermeable formations above the reservoir rocks, and the presence of a trapping mechanism along the oil and gas’ migration path. Traps block the movement of oil and gas migrating through porous and permeable rock

Oil and gas production within the Lower Peninsula of Michigan is from sediments deposited in the Michigan Basin, a large depression in the Earth’s crust centered in the Lower Peninsula. Though commercial oil and gas production within the State of Michigan began in 1923, in general, oil and gas fields discovered within the state to date can be grouped into five major field types based upon the type of trap present within these fields. It is anticipated that exploration for

oil and gas within the area being considered in this document will continue to center upon attempts to find undiscovered oil and gas fields which fit into these general categories. A brief description of each field type in the State follows.

### **Lower Tier, Mid-Michigan Rift-Related Fields:**

A roughly northwest-southeast trending feature known as the Mid-Michigan Rift underlies the Lower Peninsula of Michigan. The Mid-Michigan Rift is related to a larger rift system known as the Mid-Continent Rift that has its northern terminus in the general vicinity of Duluth, Minnesota and passes southwest through central Iowa and eastern Kansas.

Formation of both the Mid-Michigan and the Mid-Continent rift systems began in the Pre-Cambrian Period. Both rift systems are widely believed to be “failed rifts” created as a result of normal faulting associated with plate tectonic movements within the Earth’s crust. They are “failed” only in the sense that the rifts did not become spreading centers similar to the Mid-Atlantic rift. Had the rifts become spreading centers, it is feasible that the North American continent would have been split into two major blocks and an open ocean comparable to the Atlantic Ocean would have formed.

The majority of movement along the Mid-Michigan rift faults probably ended at the beginning of the Ordovician Period, which coincides approximately with the deposition of the Prairie du Chien sandstone, considered by many scientists to be equivalent to the St. Peter sandstone. Faults in the Mid-Michigan rift tend to be aligned along three major axes: N 6 degrees W, N 47 degrees W, and N 64 degrees W, and many of the larger faults can be discerned by gravity and aeromagnetic data which has been compiled by various sources. Traps along these trends were formed by normal faulting, which prevented oil and gas from freely migrating through large areas of porous and permeable sedimentary rocks and caused it to accumulate in relatively small areas. Within the Huron-Manistee National Forests, Prairie du Chien gas production from the Mio Field (T25N, R3E, Oscoda County) is an excellent example of this type of Field.

### **Upper Tier, Mid-Michigan Rift-Related Fields:**

After the beginning of the Ordovician Period, movement along faults associated with the Mid-Michigan rift significantly declined, and the majority of further movement along these faults tended to occur along the N 47 degrees W axis. Evidence has been found that movement along some of these faults has continued to occur on an irregular basis, but large-scale movement of these faults appears to have ceased by the end of the Devonian Period in most areas of the Lower Peninsula.

Traps along these trends were formed by normal faulting, which prevented oil and gas from freely migrating through large areas of porous and permeable sedimentary rocks and caused it to accumulate in relatively small areas. Upper Tier Fields are structurally related to the Lower Tier Fields discussed in the previous section in that they formed as a result of reactivation of faults associated with the Lower Tier Fields.

The presence of an Upper Tier Field has often been used to infer the presence of a Lower Tier Field, and the exploration for Prairie du Chien gas Fields has traditionally centered around exploration within existing shallow oil and gas fields. However, it is likely that undiscovered Lower Tier Fields exist within the Lower Peninsula that are not evidenced by shallower Upper Tier traps.

Within the Huron-Manistee National Forests, Richfield oil and gas production from the Mio Field (T25N, R3E, Oscoda County) is an excellent example of this type of Field.

### **Salina-Niagaran Pinnacle Reef Fields:**

Pinnacle Reefs are not unique to Michigan, but are found in two narrow, arcuate bands within the Lower Peninsula. One band is present along the southern end of the peninsula. The other band is located at the northern and western part of the peninsula; passing through a small section of the Manistee National Forest in western Manistee, Mason and Oceana Counties. Though numerous reefs are present within these bands, not all of the reefs contain oil and gas, and exploratory dry holes are common. Further, the part of the band passing through Mason and Oceana Counties is lightly populated with reefs.

The reefs were formed during the Silurian Period and are widely regarded as having been formed by reef-forming organisms which grew upward in equilibrium with downward movement of the Michigan Basin. Oil and gas has also accumulated in porous and permeable space within the reefs, and in sediments draped over their crests. Reef sizes vary, but are generally within 160 to 360 acres in size. Potential reefs are usually located by running seismic tests.

Within the Huron-Manistee National Forests, gas production from the Grant 32-20N-17W Field (T20N, R17W, Section 32) is an excellent example of this type of field.

### **Salt-Related, Shallow Structure Fields:**

In the western half of the Lower Peninsula, leaching of the Salina A-1 salt, a Silurian-aged formation which is also found draped over Pinnacle reefs, led to the fracturing and slumping of overlying carbonates; creating structural features over which sediments being deposited in the Michigan Basin were subsequently draped over. Sediment draping generally continued throughout the Devonian Period and bioherms, a general term for localized accumulations of algal mats, solitary reefs and other associated fauna, formed on many of these features and formed localized structural highs. The size and shape of these fields varies considerably, and prospective exploration targets have usually been found through seismic, analysis of subsurface data and gravity data.

Within the Huron-Manistee National Forests, oil production from the abandoned Cherry Grove Field (T21N, R10W, Section 27) is an example of this type of field.

**Antrim Shale Fields:**

The Antrim Shale has been a widespread, ongoing exploration target within the upper part of the northern Lower Peninsula since the late 1980s. The shale is present beneath broad areas of the Lower Peninsula, and Antrim Shale Fields actually consist of contiguous blocks of land which have been leased by a specific company and unitized to form a continuous drilling block capable of supporting a group of wells serviced by central gas processing and water disposal facilities. Blocks of unitized lands are referred to as Units.

Production from the Shale has occurred for decades, but a combination of tax incentives, the relatively low dry hole risk associated with drilling Antrim wells, the increased demand for gas as opposed to oil to fuel power plants, low drilling and completion costs, and consistent production from these wells has made the Antrim a popular exploration target.

The Antrim Shale is a classic black shale reservoir in that it contains a high organic content, is highly fractured, and is believed to be its own source and reservoir bed. Gas is produced from fractures within the Shale.

Early speculation regarding the Shale's potentially productive area led to the common belief that much of the northern half of the Lower Peninsula would eventually be drilled to support Antrim gas production. However, this assumption has since proven inaccurate and, though the Huron-Manistee National Forests can expect some drilling of Antrim wells within the Forests, most of these wells will be confined to its northern borders. Additional Antrim Shale exploration is occurring in the southern end of the peninsula, but to date the results of exploration in this part of the peninsula have not been encouraging.

Though drilling for the Antrim Shale has occurred within the boundaries of the Huron-Manistee National Forests, the results have been discouraging to operators who have drilled within most of the area. However, numerous examples of Antrim Shale Fields can be found north of the Forests and, in some places, successful field development is occurring within several miles of its northern boundaries. Recent state well permit applications have been approved on private minerals within the Forests' boundary.

***Part II: Prognostications:***

Estimates of the number of wells that are likely to be drilled within the boundaries of a specific area over a specific time interval are at best speculative. However, such numbers can be reasonably estimated by using past general trends. Further, while specific locations likely to experience drilling can only rarely be predicted, general areas likely to attract drilling for specific target types can be broadly outlined with reasonable confidence and the number of wells needed to explore a generic target can be estimated by using existing oil and gas fields as a model for their development.

Estimates of the number, type and general location of exploratory and development wells likely to be drilled within the Huron-Manistee National Forests is given in this section. For ease of

analysis, the estimates are given for the Huron and the Manistee National Forests separately. Though estimates made by individuals will vary, estimates made by large numbers of people will probably fall within a very narrow bell curve. All estimates given below were made as the result of geologic evaluations of data available to Dave Lachance of the Bureau of Land Management's Milwaukee Field Office Staff.

### **Huron National Forest:**

Future exploration and development within the Huron National Forest is likely to be confined to Lower and Upper Tier, Mid-Michigan Rift-Related Fields and Antrim Shale Fields. The following assessments of where exploration for these types of targets is likely to occur are based upon all available data at the time this reasonably foreseeable oil and gas development scenario was written.

#### **Huron, Lower Tier, Mid-Michigan Rift-Related Potential:**

Exploration for Lower Tier, Mid-Michigan Rift-Related fields has traditionally centered upon drilling within the boundaries of established or seismically discernable Upper Tier fields; effectively looking for deeper production along the faults that are indirectly associated with the upper tier fields. These efforts have been further augmented by the use of gravity and magnetic data by some exploration companies to define and refine potential Lower Tier targets. Use of these latter tools centers upon looking for sharp changes in gravity and magnetic data that may indicate the vertical displacement of basement rocks, and consequently the presence of a fault that may extend into the sediments overlying the basement.

As this report is being written, Lower Tier exploration has been proposed in Crawford County, Sections 7, T25N, R1W. If drilled, the proposed well is expected to target a gas accumulation associated with a northwest-southeast trending fault that transects the northern third of the township. If successful, it is anticipated that additional wells would be drilled that fall along the general trend of this fault.

Additional untested, plausible but not certain, Lower Tier, moderate potential exploration targets have been delineated and are centered upon the following areas:

- Iosco County, T22N, R6E, Section 12.
- Iosco County, T23N, R5E, Section 13.
- Crawford County, T25N, R1W, Section 36.
- Alcona County, T25N, R6E, Section 19.
- Oscoda County, T26N, R1E, Section 35.

All other lands within the Forest's boundaries have a low potential for Lower Tier exploration targets.

Exploration of a Lower Tier target can result in the drilling of one well if the well is dry or sub-economic, or approximately five to ten wells for a gas-filled feature. Assuming each postulated structure has a 50 percent chance of containing commercial gas, full exploration of the untested

features and the currently planned well in Section T25N, R1W, would probably result in three dry holes and three discoveries. Each of the three discoveries would support a total of three to seven wells, or a total of nine to twenty one gas wells that would probably be drilled on a 640-acre spacing and the orientation of the fields would generally be in a northwest-southeast direction.

A summary of the number of Lower Tier wells that can reasonably be expected to be drilled within the boundaries of the Huron National Forest is shown in Table D-8.

**Table D-8. Target: Lower Tier Wells - Huron National Forest.**

	Minimum	Maximum	Most Likely
Total Number of Wells	1	27	15
Dry Hole	1	3	3
Producing	0	24	12

### Upper Tier, Mid-Michigan Rift-Related Potential:

Exploration for Upper Tier, Mid-Michigan Rift-Related fields within the forest's boundaries will depend upon a willingness to acquire additional seismic surveys within the forest, and reprocessing of old seismic lines that are available, to detect subtle shallow untested structures. Upper Tier structures are formed by reactivation of faults responsible for the formation of Lower Tier structures. Consequently, decisions to acquire and reprocess seismic data could logically be driven by evidence of Lower Tier structures that can be discerned from magnetic and gravity data. However, the existence of a Lower Tier structure does not guarantee that there will be a corresponding Upper Tier structure associated with a Lower Tier structure.

With the above analysis in mind, it is reasonable to deduce that Upper Tier structures may be associated with the Lower Tier structures that have been described in the previous section of this reasonably foreseeable oil and gas development scenario. Consequently, additional untested, plausible but not certain, Upper Tier, moderate potential exploration targets have been delineated and are centered upon the following areas:

- Iosco County, T22N, R6E, Section 12.
- Iosco County, T23N, R5E, Section 13.
- Crawford County, T25N, R1W, Section 36.
- Alcona County, T25N, R6E, Section 19.
- Oscoda County, T26N, R1E, Section 35.

All other lands within the Forest's boundaries have a low potential for Upper Tier exploration targets.

Exploration of an Upper Tier exploration target can result in the drilling of one well if the well is dry or sub-economic, or approximately ten to fifteen wells for an oil-filled feature. Assuming each postulated structure has a 20 percent chance of containing commercial oil, full exploration

of the untested features would probably result in four dry holes and one discovery. The discovery would support a total of ten to fifteen wells that would probably be drilled on a 40-acre spacing, and the orientation of the fields would generally be in a northwest-southeast direction.

Additional exploration on these types of structures could consist of exploration for “bypassed gas and/or oil” and/or deeper, untested zones in structures that have been delineated by earlier drilling.

Bypassed gas and/or oil consists of producible gas and/or oil that was uneconomical to produce when it was initially encountered in wells drilled in an area, but is now likely to be commercially producible if new drilling was undertaken. However, no solid evidence exists that such exploration is occurring within the Huron on a significant basis, and consequently the likelihood of such exploration occurring in the foreseeable future is considered to be negligible.

A summary of the number of Upper Tier wells that can reasonably be expected to be drilled within the boundaries of the Huron National Forest is shown in table D-9.

**Table D-9. Target: Upper Tier Wells – Huron National Forest.**

	Minimum	Maximum	Most Likely
Total Number of Wells	0	19	14
Dry Hole	0	4	4
Producing	0	15	10

### **Huron, Antrim Shale Potential:**

Antrim Shale development is occurring steadily north of the Forest’s boundary, but extensive development is not expected on the Forest. Potential for Antrim development decreases from north to south throughout the Forest.

It is anticipated that, for the foreseeable future, there is a high potential for Antrim Shale exploration and development within the Forest Boundary in T28N, R9E, and in the northern half of T27N, R9E. If any additional wells are drilled outside of the high potential area, they will most likely be located in T27N, R4E through 8E inclusive, and the southern half of T27N, R9E. These lands have low to moderate potential for Antrim Shale exploration. There have been at least six Antrim wells drilled within the Forest’s administrative boundary T27N, R4-8E that have resulted in either dry holes and/or plugged wells. All lands south of T27N have low potential for Antrim Shale exploration.

In recent years, only seven Antrim wells have been drilled in the high potential area within the Forest’s boundary and no additional drilling is scheduled to take place although there are existing untested leases in this area (Note: Two Federal Applications for Permit to Drill were received during 2005 for lands in T28N, R9E). In addition, there have been recent nominations for additional leasing. All of the prior wells were drilled on non-Federal land with four being plugged and three are currently listed as “shut-in.” Assuming some additional drilling occurs in the high potential area, a summary of Antrim wells that can reasonably be expected to be drilled within the boundaries of the Huron National Forest is shown in table D-10.

**Table D-10. Target: Antrim Shale – Huron National Forest.**

	Minimum	Maximum	Most Likely
Total Number of Wells	1	40	24
Dry Hole/Subeconomic	1	8	5
Producing	0	32	19

These estimates are based on the assumption that two Antrim Units would be established within the administrative boundary of the Forest. Of the total wells drilled, 20 percent would be dry holes or uneconomic. Each well would produce gas and be connected to a gathering line. Gas produced from each Unit would be processed at one central processing facility. All formation water would be disposed of in a water disposal well drilled somewhere within the Units' boundaries.

### **Manistee National Forest:**

Future exploration and development within the Manistee National Forest is likely to run the gamut of all exploration types present within the State of Michigan; Lower and Upper, Mid-Michigan Rift-Related Fields, Salina-Niagaran Pinnacle Reef Fields, Salt Related Shallow-Structure Fields and Antrim Shale Fields. The following assessments of where exploration for these types of targets is likely to occur are based upon all available data at the time this reasonably foreseeable oil and gas development scenario was written.

### **Manistee, Lower Tier, Mid-Michigan Rift-Related Potential:**

Exploration for Lower Tier, Mid-Michigan Rift-Related fields has traditionally centered upon drilling within the boundaries of established or seismically discernable Upper Tier fields; effectively looking for deeper production along the faults that are indirectly associated with the upper tier fields. These efforts have been further augmented by the use of gravity and magnetic data by some exploration companies to define and refine potential Lower Tier targets. Use of these latter tools centers upon looking for sharp changes in gravity and magnetic data that may indicate the vertical displacement of basement rocks, and consequently the presence of a fault that may extend into the sediments overlying the basement.

As this report is being written, Lower Tier exploration is occurring in Newaygo County, Section 13, T.13N., R.12W., and Section 28, T.15N., R.11W. Both wells are redrills of dry and abandoned wells that were drilled to test the same formations currently being evaluated. Collectively, this current drilling effort is expected to lead to further drilling of two to six gas wells.

Unlike the Huron National Forest, as of the date of this report, the area containing the Manistee National Forest has not been evaluated in sufficient detail to determine site-specific, plausible, moderate potential exploration targets. Further, the Manistee National Forest area experienced extensive drilling for Lower Tier exploration targets during the 1980s and early 1990s. Collectively, the Manistee National Forest area has a low potential for attracting Lower Tier

exploration, but several untested Lower Tier targets undoubtedly exist within the Forest's boundaries and will attract exploration.

In general, any area underlain by an Upper Tier structure that has not been experienced Lower Tier exploration will probably be drilled at some time in the indefinite future. Assuming a steady rate of exploration within the Forest's boundaries, it is anticipated that four additional Lower Tier wells will be drilled on a 640-acre spacing within the foreseeable future. Each will have a 50 percent chance of being dry. Each successful discovery will lead to drilling a total of three to seven wells per gas field, and the gas fields will most likely be drilled on a northwest-southeast orientation.

A summary of the number of Lower Tier wells that can reasonably be expected to be drilled within the boundaries of the Manistee National Forest follows:

**Table D-11. Target: Lower Tier Wells – Manistee National Forest.**

	Minimum	Maximum	Most Likely
Total Number of Wells	2	19	13
Dry Hole	2	6	4
Producing	0	13	9

### **Manistee, Upper Tier, Mid-Michigan Rift-Related Potential:**

All of the lands within the boundaries of the Manistee National Forest in Lake, Mason, Muskegon, Newaygo and Oceana Counties have moderate potential for attracting exploration for Upper Tier, Mid-Michigan Rift-Related Structures. All other lands within the boundaries of the Forest have low potential for attracting such exploration.

Exploration for Upper Tier, Mid-Michigan Rift-Related fields within the Forest Boundaries will depend upon a willingness to acquire additional seismic surveys within the Forest, and reprocessing of old seismic lines that are available, to detect subtle shallow untested structures and attempts to locate "bypassed gas and/or oil."

Upper Tier structures are formed by reactivation of faults responsible for the formation of Lower Tier structures. Consequently, decisions to acquire and reprocess seismic information could logically be driven by evidence of Lower Tier structures that can be discerned from magnetic and gravity data. However, the existence of a Lower Tier structure does not guarantee that there will be a corresponding Upper Tier structure.

Bypassed gas and oil consists of producible hydrocarbons that were uneconomical to produce when it was initially encountered in wells drilled in an area, but is now likely to be commercially producible if new drilling was undertaken.

Lake, Mason, Muskegon, Newaygo and Oceana Counties are peppered with wells which were drilled in the 1940s, the 1950s and later years which were completed as dry holes but had encountered noncommercial gas. Identifying wells that have bypassed gas is usually a painstaking process involving searching for scant records and well data from diverse data-

sources. Consequently, deducing the feasibility of extracting commercial gas by new drilling within any given area can be more of an art than a science. The potential for deeper untested zones often act as an additional inducement to drill in an area which may contain bypassed gas and/or oil, but well data for deeper, older wells tends to be relatively scarce, and any exploration efforts for such production is forced to rely upon inferring deeper potential using shallower data.

Although numerous examples of potential areas of land underlain by bypassed gas and oil production are present within the moderate potential area described, delineating specific prospects likely to draw exploration is beyond the scope of this reasonably foreseeable oil and gas development scenario due to lack of data and the level of effort that would be involved in evaluating the data if it were available. Full analysis would require the evaluation of every shallow dry hole drilled in the area. However, at the time this report is being written, active exploration for bypassed gas and/or oil appears to be taking place in several places within the Forest in the following general areas:

- Lake County, T.18N., R.14W., Sections 14 and 24, Wildcat, Stray Sand.
- Newaygo County, T.14N., R.11W., Section 4, Huber Field, Traverse Limestone.
- Newaygo County, T.14N., R.14W., Section 5, Huber Field, Marshall Sand.
- Newaygo County, T.15N., R.11W., Section 28, Woodville Field, Traverse Limestone.
- Newaygo County, T.15N., R.11W., Section 28, Woodville Field, Richfield.
- Oceana County, T.15N., R.16W., Section 25, Filer Sand.

These exploration efforts serve as excellent examples of the type of exploration that are likely to occur as part of efforts to explore these types of structures.

Exploration of newly recognized, and known Upper Tier exploration targets can result in the drilling of one well if the well is dry or sub-economic, or approximately 10 to 15 wells for an oil and/or gas-filled feature. Assuming an aggressive drilling program of one exploratory well on twenty such features within the Manistee National Forest, and that each such structure has a 20 percent chance of containing commercial oil and/or gas, this would result in 16 dry holes and four discoveries. Each discovery would support a total of 10 to 15 wells that would probably be drilled on a 40-acre spacing, and the orientation of the fields would generally be in a northwest-southeast direction.

A summary of the number of Upper Tier wells that can reasonably be expected to be drilled within the boundaries of the Manistee National Forest is shown in Table D-12.

**Table D-12. Target: Upper Tier Wells - Manistee National Forest.**

	Minimum	Maximum	Most Likely
Total Number of Wells	1	76	56
Dry Hole	1	16	16
Producing	0	60	40

**Manistee, Salina-Niagaran Pinnacle Reef Potential:**

Exploration for Pinnacle Reefs is heavily dependent upon acquisition of new seismic data, and the reprocessing older seismic data with new analytical methods. Without such data, drilling for these reefs would be essentially a shot in the dark due to the fact that they have no known structural expression at depth and are only reflected at slightly shallower depths by drape of sediments over the reefs.

Pinnacle Reefs are routinely explored with directional drilling. Consequently, access to the surface overlying these reefs is not crucial to their complete development. However, access to the surface overlying the reefs is crucial for the purposes of seismic acquisition.

Postulating precise exploration targets within the Pinnacle Reef trend is beyond the capability of the Bureau of Land Management, but identifying general areas where exploration may occur is.

All lands within the National Forest Boundaries inside the following areas (Table D-13) have a moderate potential for Pinnacle Reef exploration, but potential for such exploration decreases dramatically from north to south, and most of such exploration is likely to occur in Manistee County. All other areas within the Forest Boundaries have essentially no potential for Pinnacle Reef exploration.

**Table D-13. Moderate Potential for Pinnacle Reef Exploration Locations.**

Manistee County	T.23N., R13W.	Western Half Within Forest Boundaries
	T.22N., R14W.	All Within Forest Boundaries
	T.22N., R15W.	
	T.21N., R15W.	
	T.21N., R15W.	
Mason County	T.20N., R15W.	All Within Forest Boundaries
	T.20N., R16W.	
	T.20N., R17W.	
	T.20N., R18W.	
	T.17N., R16W.	
	T.17N., R18W.	
Oceana County	T.16N., R16W.	All Within Forest Boundaries
	T.16N., R17W.	
	T.14N., R16W.	
	T.14N., R17W.	

Few reefs are located in the areas described above, and many of the wells which have been drilled to explore these reefs have been dry. Based upon available data, the maximum foreseeable development of Pinnacle Reef wells would be 7 wells on an 80-acre spacing. A more likely scenario would be drilling of four Pinnacle Reef wells. Most will be dry, but others will produce oil or gas. Assuming a 25 percent success rate a summary of the number of wells, which can be expected to be drilled within the boundaries of the Manistee National Forest follows:

**Table D-14. Target: Pinnacle Reefs – Manistee National Forest.**

	Minimum	Maximum	Most Likely
Total Number of Wells	1	7	4
Dry Hole	1	5	3
Producing	0	2	1

**Manistee, Salt-Related, Shallow Structure Potential:**

All of the lands within the boundaries of the Manistee National Forest in Mason, Muskegon and Oceana Counties, and the western halves of Lake and Newaygo Counties have moderate potential for attracting exploration for Salt-Related, Shallow Structures. All other lands within the boundaries of the Forest have low potential for attracting such exploration.

The majority of the wells drilled for these types of structures is expected to target “bypassed gas and oil” and/or deeper, untested zones in structures which have been delineated by earlier drilling.

Bypassed gas and oil consists of producible hydrocarbons that were uneconomical to produce when it was initially encountered in wells drilled in an area, but is now likely to be commercially producible if new drilling was undertaken.

Mason, Muskegon and Oceana Counties, and the western half of Lake and Newaygo Counties are peppered with wells which were drilled in the 1940s, the 1950s and later years which were completed as dry holes, but had encountered noncommercial gas. Identifying wells that have bypassed gas is usually a painstaking process involving searching for scant records and well data from diverse data-sources. Consequently, deducing the feasibility of extracting commercial gas by new drilling within any given area can be more of an art than a science. The potential for deeper untested zones often act as an additional inducement to drill in an area which may contain bypassed gas, but well data for deeper, older wells tends to be relatively scarce, and any exploration efforts for such production is forced to rely upon inferring deeper potential using shallower data.

Although numerous examples of potential areas of land underlain by bypassed gas production are present within the moderate potential area described, delineating specific prospects likely to draw exploration is beyond the scope of this reasonably foreseeable oil and gas development scenario due to lack of data and the level of effort that would be involved in evaluating the data if it were available. Full analysis would require the evaluation of every shallow dry hole drilled in the area. However, at the time this report is being written, a 2002 discovery known as the Spruce Field, also known as the Yates Field, is an excellent example of this type of field and exploration efforts which are likely to be driven by the presence of bypassed gas.

The Yates Field is subject to a special spacing order that establishes 80-acre drilling units formed by combining two governmental surveyed quarter-quarter sections of land, except for the discovery well which is spaced at 40 acres. The spacing interval includes all stratigraphic intervals lying within the Dundee Limestone Formation.

Under the spacing order the Field is defined as:

Lake County, Michigan  
Michigan Meridian  
T.17N., R.12W.,  
Section 21, E2SE, S2NE;  
Section 22, SW, S2NW, NENW, SWSE;  
Section 27, W2, W2NE, W2SE;  
Section 28, E2NE, E2SE.

Assuming full development takes place, the Spruce Field has room for 12 wells. Two of the 12 wells have already been drilled and are producing. It is predicted that there may be up to an additional 10 wells drilled of which 60 percent (6) will probably be commercial gas and/or oil wells. The remaining 40 percent (4) are likely to be dry holes.

Numerous, large and small structures similar to the structure supporting the Yates Field probably exist within the area on the Manistee National Forest, considered to have moderate potential for exploration. A smaller number of structures probably exist within the low potential area of the Manistee National Forest. However, it is extremely unlikely that all of them would be explored within the foreseeable future. Further, due to scarce and limited data, it is unlikely that every exploratory well that is drilled to evaluate these types of fields is likely to lead to a commercial discovery. Rather, it is anticipated that approximately 60 percent of such wells are likely to encounter noncommercial gas and/or oil which may be considered bypassed gas and/or oil at some point in the indefinite future, 20 percent of the wells are likely to be dry with no gas discovered, and 20 percent of such wells will lead to a commercial discovery that warrants further development.

For the foreseeable future, in addition to the 10 wells expected to be drilled in the Yates Field, an aggressive exploratory drilling program designed to evaluate structures similar to the Yates structure, would probably test 10 features within the Manistee National Forest. Based upon the above assumptions, six wells will encounter noncommercial gas and/or oil that fail to warrant further development, two wells will be dry, and two wells will lead to further development. Assuming the Yates Field is an average sized field, full field development of the additional two gas/oil discovery wells would result in drilling 24 additional wells, or a total of 12 wells per new gas/oil field. A more plausible exploratory plan would result in testing only five such features, leading to half the number of wells.

A summary of the number of wells which can be expected to be drilled on these lands is shown in table D-15.

**Table D-15. Target: Salt-Related, Shallow Structure Fields - Manistee National Forest.**

	Minimum	Maximum	Most Likely
Total Number of Wells	3	44	27
Dry Hole	0	20	12
Producing	3	24	15

**Antrim Shale Potential:**

Antrim Shale development is occurring steadily along the extreme northwestern area of the Forest's boundary, but is not expected to significantly impact the Forest. Potential for Antrim development decreases from north to south throughout the Forest.

It is anticipated that, for the foreseeable future, there is moderate to high potential for Antrim Shale development within the Forest Boundary within T22 and 23 N., R13, 14 and R15W. The remainder of the Forest has low potential for isolated, sporadic, and probably economically unsuccessful Antrim wells.

Though state spacing for Antrim wells is 80 acres, Antrim Units are often drilled on a one well per 160-acre spacing with additional wells drilled if warranted. An Antrim drilling unit typically includes 12-20 wells and covers an area of approximately 4-6 sections. Full development is predicated upon such development being economically warranted, such as: the results of one well invariably influences a decision to drill the next well and exploration expectations for a large area are rarely met or exceeded when wells are actually drilled. For purposes of this analysis, we will assume that there is potential for development of four drilling units within the moderate to high development potential area. This could result in drilling 48 to 80 wells. Assuming 80 percent of these wells will be economic/productive, this would result in a total of 38 to 64 producing wells.

To date only one Antrim well has been drilled in the area described. Though this leaves ample room for Antrim development, its pace is expected to be relatively slow within this area.

A summary of the number of Antrim wells that can reasonably be expected to be drilled within the boundaries of the Manistee National Forest follows:

**Table D-16. Target: Antrim Shale - Manistee National Forest.**

	Minimum	Maximum	Most Likely
Total Number of Wells	5	80	48
Dry Hole	5	16	10
Producing	0	64	38

All of these wells would become part of multi-well Antrim projects. Each well would produce gas and be connected to a gathering line. Gas produced from the project would be processed at a central processing facility. All formation water would be disposed of in a water disposal well drilled somewhere within the project's boundaries.

**Summary:**

The following tables summarize the foreseeable development by productive formation for each Forest. The following must be considered when using this information:

- The projections are based on best information available to the authors.
- The numbers reflect possible development within the administrative boundaries of each

Forest. Foreseeable development, as depicted in these tables, is not limited to National Forest System lands.

- These projections do not consider existing Forest Plan Standards and Guidelines which further restrict surface occupancy. These numbers are based strictly on geologic potential.

**Table D-17. Total Number of Wells Expected to be Drilled/Productive - Huron National Forest.**

Type of Well	Minimum	Maximum	Most Likely
Lower Tier, Rift-Related	1/0	27/24	15/12
Upper Tier, Rift-Related	0/0	19/15	14/10
Pinnacle Reefs	0/0	0/0	0/0
Salt-Related, Shallow	0/0	0/0	0/0
Antrim Shale	1/0	40/32	24/19
Total	2/0	86/71	53/41

**Table D-18. Total Number of Wells Expected to be Drilled/Productive - Manistee National Forest.**

Type of Well	Minimum	Maximum	Most Likely
Lower Tier, Rift-Related	2/0	19/13	13/9
Upper Tier, Rift-Related	1/0	76/60	56/40
Pinnacle Reefs	1/0	7/2	4/1
Salt-Related, Shallow	3/3	44/24	27/15
Antrim Shale	5/0	80/64	48/38
Total	12/3	226/163	148/103

### ***Part III - Prognostications with Consideration for the Forest Plan's Standards and Guidelines:***

In an effort to better define how the Forest Plan's Standards and Guidelines may affect actual development on the ground (that is lease stipulations), the areas of moderate and high potential were compared to the existing constraints on surface use as outlined in the Standards and Guidelines. Based on this comparison, it was determined that the only area where foreseeable development may change because of these constraints was in the Antrim development on the Huron National Forest. The area identified as high potential for Antrim contains many wet areas and a Potential Candidate Research Natural Area in Alternatives B and C. These areas are identified as "no-surface-occupancy" and the actual number of wells that may be drilled is less than if these areas were unconstrained. Based on this evaluation, revised tables are presented below:

**Table D-19. Total Number of Wells Expected to be Drilled/Productive Within the Huron National Forest Boundary Constrained by Standards and Guidelines.**

Type of Well	Minimum	Maximum	Most Likely
Lower Tier, Rift-Related	1/0	27/24	15/12
Upper Tier, Rift-Related	0/0	19/15	14/10
Pinnacle Reefs	0/0	0/0	0/0
Salt-Related, Shallow	0/0	0/0	0/0
Antrim Shale	1/0	28/22	17/14
<b>Total</b>	<b>2/0</b>	<b>74/61</b>	<b>46/36</b>

**Table D-20. Total Number of Wells Expected to be Drilled/Productive Within the Manistee National Forest Boundary Constrained by Standards and Guidelines.**

Type of Well	Minimum	Maximum	Most Likely
Lower Tier, Rift-Related	2/0	19/13	13/9
Upper Tier, Rift-Related	1/0	76/60	56/40
Pinnacle Reefs	1/0	7/2	4/1
Salt-Related, Shallow	3/3	44/24	27/15
Antrim Shale	5/0	80/64	48/38
<b>Total</b>	<b>12/3</b>	<b>226/163</b>	<b>148/103</b>

The above tables provide an estimate of the total wells projected within the Forests’ administrative border. Forest Plan Standards and Guidelines, or development constraints, apply only to federal wells drilled on National Forest System lands. We will attempt to negotiate with potential operators to apply these Standards and Guidelines to operations involving private or state minerals on National Forest System lands. However, because our control over this type of development is more limited, imposition of the Standards and Guidelines is a negotiated element of any proposed mineral operations on severed mineral estates.

The next step is to determine what development could potentially occur on National Forest System land versus what will occur within the boundary. The percentage of National Forest System land within the administrative boundary on the Huron National Forest is approximately 63 percent and the percentage on the Manistee National Forest is approximately 40 percent. These figures will be used to calculate the foreseeable development on National Forest System lands. Because the analysis contained in the Forest Plan Environmental Impact Statement will be based on the “most likely” scenario, calculations from this point on will focus on those numbers.

**Table D-21. Projection of Wells on National Forest System Lands.**

Forest	Percentage of NFS Lands in Boundary	Total Wells Drilled/Productive in Boundary	Total Wells Drilled/Productive on NFS lands
<b>Huron</b>	63%	46/36	29/23
<b>Manistee</b>	40%	148/103	59/41
<b>Total</b>		<b>194/139</b>	<b>88/64</b>

To further refine these estimates, one needs to consider that some of these wells will be drilled into Federal mineral interest, from which the Federal Treasury and local counties will derive revenues, and some of the wells will be drilled on private or State mineral interest located beneath National Forest System lands. A weighted average of the mineral ownership data across the Forests shows that approximately 61 percent of the mineral ownership under National Forest System lands is in the private or state mineral category. Of the 88 wells drilled, it can be expected that approximately 54 of those will be drilled on private or state mineral interest and 34 will be drilled into federal mineral estate. Of the 64 productive wells, it is estimated that 39 of these will be producing private or state mineral interest and 25 will be producing federal minerals.

Based on the projected development outlined above, the total acreage disturbed over the next 10 to 15 years was calculated. These numbers are summarized in the table below:

**Table D-22. Summary of Disturbance – Oil and Gas Reasonably Foreseeable Development Scenario.**

Scenario	Total Wells Drilled	Total Wells Productive	Acres for Wellpads	Acres for Production Facilities	Acres for Pipeline	Acres for Access Road	Total Acres Initial Disturbance
Within Forests' Boundary	194	139	371	54	208.5	139	772.5
On National Forest System Lands	88	64	170	54	96	64	384

To some extent, historical drilling activity can be a predictor of what may occur in the future. In analyzing drilling permits/approvals between 1987 and 2003 on the Forests, there were a total of 80 wells permitted/approved. Of those 80 wells, 39 were Federal wells and 41 were drilled into private or state minerals beneath National Forest System lands. Given the fact that the Michigan Basin has been extensively drilled over the past century and the discovery of any major new plays is somewhat remote, the projections identified above seem realistic. Should a new play be discovered and the threshold of the analysis be exceeded due to an unexpected increase in drilling activity, additional environmental documentation and analysis would be necessary prior to any recommendations on consent.

All maps showing Standards and Guidelines and development potential can be found in the project file at the Huron-Manistee National Forests' Supervisor's Office, Cadillac, Michigan.



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## Appendix F - Glossary

**Activity Fuels** – Fuels and/or slash which have been directly generated or altered by management action.

**Adaptive Management** – A type of natural resource management in which decision-making is an on-going process. Monitoring the results of actions will provide a flow of information that may indicate the need to change a course of action. Scientific findings and the needs of society may also indicate the need to adapt resource management.

**Age Class** – Grouping of trees originating from a single natural event or regeneration activity. Age classes are grouped by an interval of 10 or 20 years, for example 1-10 years, 11-20 years, 21-30 years, etc.

**Aggregate Road** – See “Road Types.”

**Allelopathy** – The production and release of chemical substances by one species that inhibit the growth of other species of plants

**Allowable Sale Quantity** – The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the plan. This allowable sale quantity is usually expressed on an annual basis as the “average annual allowable sale quantity” (FSM 1900). For timber resource planning purposes, the allowable sale quantity applies to each decade over the planning horizon and includes only chargeable volume. Consistent with the definition of timber production, does not include fuelwood or other non-industrial wood.

**All-terrain Vehicle** – All-terrain vehicles are motorized flotation-tired vehicles with at least three, but no more than six low pressure tires, with an engine displacement of less than 800 cubic centimeters and total dry weight less than 900 pounds.

**Alluvium** – All sediment deposits resulting directly or indirectly from sediment transport within streams deposited in riverbeds, floodplains, lakes, fans, and estuaries.

**Alternative** – One of the several policies, plans, or projects proposed for the decision-making process.

**Analysis** – Methods used to determine or separate inventory and resource mapping information into important components and examine them critically (Webster).

**Analysis Area** – One site or a combination of sites delineated for the purpose of analysis in formulating alternatives and estimating various impacts and effects.

**Analysis of Management Situation** – A determination of the ability of the planning area to supply goods and services in response to society's demand for those goods and services.

**Animal Unit Month** – The quantity of forage required by one mature cow (1,000 pounds) or the equivalent for 1 month.

**Aquatic** – Pertaining to standing or running water in streams, rivers, lakes and reservoirs.

**Aquatic Ecosystems** – Aquatic systems are those that contain plants and animals that predominantly depend on a significant amount of water to be present for at least part of the year.

**Arterial Road** – See “Road Types.”

**Aspen/Birch Vegetative Type** – Includes forest types such as quaking and bigtooth aspen, paper birch, balsam poplar, and aspen-white spruce-balsam fir mix.

**Atmospheric Deposition** – the addition of elements or substances found in the air to the surface of the earth.

**Background** – See “Visual Distance Zones.”

**Barren** – A fire dependant vegetative community characterized by widely spaced, open-grown trees in the overstory. The understory is characteristically dominated by various assemblages of fire tolerant, shade intolerant, grasses, sedges, shrubs, and forbs. The community is generally located on droughty, infertile, sandy soils of outwash plains and sandy lake plains. The specific vegetative composition of the community is dependant on its physiographic and geographic position.

**Basal Area** – Measurement of how much of a site is occupied by trees. It is determined by estimating the cross-section area of all the trees in an area at breast height (4.5 feet).

**Base Sale Schedule** – A schedule in which the planned sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade of the Planning period, and this planning sale and harvest for any decade is not larger than the long-term, sustained-yield capacity. (This definition expresses the principle of nondeclining flow.)

**Benchmark** – A reference point that shows the limits of the resource outputs that a National Forest can provide.

**Benefit (Value)** – Inclusive term used to quantify the results of a proposed activity, project, or program expressed in monetary or non-monetary terms.

**Benefit/Cost Ratio** – The total discounted benefits of an activity divided by the total discounted costs.

**Best Management Practices** – Practices (individual or in combination) that prevent non-point source of pollution or ensure that the amount is kept to a level compatible with state water quality and wetland protection goals.

**Big Game** – The large species of animals that are hunted, such as deer, bear, and moose.

**Biodiversity** – Variety of life and its ecological processes; the variety of organisms considered at all levels, from genetic variants belonging to the same species, through arrays of genera, families, and still higher taxonomic levels. Includes the variety of ecosystems, which comprise both the communities of organisms within particular habitats, and the physical conditions under which they live. The Forest Service Manual has direction on habitat planning and evaluation, including specific forest planning direction for meeting biological diversity requirements: A forest plan must address biological diversity through consideration of the distribution and abundance of plant and animal species and communities to meet overall multiple-use objectives (FSM 2622.01).

**Bioengineering** – Combining structural, biological, and ecological concepts to construct living structures for erosion, sediment, or flood control.

**Biological Potential** – The maximum production of a selected organism that can be obtained under optimum management.

**Biomass** – As used in this document, the total weight, or quantity of a tree or trees.

**Biome** – An area of land with a characteristic combination of plants and animals that pass through a sequence of stages in development and that tend to reach a point of approximate equilibrium with its environment that differs from the equilibrium reached in another biome.

**Biota** – Pertaining to any aspect of life, especially to characteristics of entire populations of organisms, including animals, plants, fungi, and microorganisms, found in a given ecosystem.

**Blowdown** – Downed trees and slash from a windstorm.

**Board Foot** – A measure of sawn material; an amount of wood equivalent to a piece 12 inches x 12 inches x 1 inch. Multiply the number of board feet by 0.167 to convert to cubic feet of raw material.

**Bog** – Wetland ecosystems made up of accumulations of peat derived from decomposed sedges and mosses. Bog water is acidic and vegetation includes mostly shrubs, sedges, and mosses, stunted black spruce, tamarack, balsam fir and cedar.

**Boreal Forest** – A circumpolar, tundra forest type consisting primarily of black spruce and white spruce with balsam fir, birch, and aspen. It is the most extensive forest type in the world.

**Broadcast Seeding** – The scattering of seed as evenly as possible over an area.

**Brush Raking** – The uprooting and piling of brush with a tractor or bulldozer to reduce competition between the brush and the favored species.

**Burning Prescription** – Written direction stipulating fire environment conditions,

techniques, and administrative constraints necessary to achieve specified resource management objectives by use of fire on a given area of land.

**Calcareous (soil)** – Soil containing sufficient calcium carbonate ( $\text{CaCO}_3$ ), often with magnesium carbonate ( $\text{MgCO}_3$ ), to effervesce visibly when treated with cold diluted hydrochloric acid (HCl).

**Cambium** – A layer of living cells between the wood and the innermost bark of a tree. In each growing season, divisions of these cells add a new layer of cells on the wood already formed as well as a layer of inner bark on the outer face of the cambium.

**Canopy** – The part of any stand of trees represented by the tree crowns. It usually refers to the uppermost layer of foliage, but it can be used to describe lower layers in a multi-storied forest.

**Capital Investment** – Includes all the activities initially required to produce a measurable and complete output. It has identifiable starting and ending dates. It reflects the cost of developed structures, facilities, or improvements in natural resources used to produce outputs, generally over a number of years.

**Carrying Capacity** – The level and types of recreational use a natural or developed area can provide without deterioration of the quality of the recreational experience or the resource.

**Cavity** – A hole in a tree often used by wildlife species, usually birds, for nesting, roosting, and reproduction.

**Channel Morphology** – The shape, structure, or form of stream channels usually as it relates to actions of flowing water or response to management.

**Clearcutting** – A regeneration method used to establish even-aged stands whereby all trees are removed in one harvest.

**Climax Vegetation** – The culminating stage in plant succession for a given environment, the vegetation being conceived as having reached a highly stable condition.

**CMAI** – See “Culmination of Mean Annual Increment.”

**Coarse Filter Management** – Land management that addresses the needs of all species, communities, environments, and ecological processes in a land area (compare to *fine filter management*). It is the concept of managing an array of representative ecosystems across the landscape, assuming that such representation will provide habitat for the majority of species.

**Cold Water** – Aquatic habitat that predominately supports fish species that have temperature tolerances up to about 70° F, and exhibit their greatest reproductive success at temperatures below 65° F (18.3° C). Salmon, trout, whitefish, and grayling are examples.

**Collaborative Planning** – Forest Service employees working with the public, state and local agencies, tribal governments, regulatory agencies, other federal agencies and others to assure the most efficient and effective conservation and sustainable multiple use management possible.

**Collector Road** – See “Road Types.”

**Commercial Forest Land** – Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, or watershed conditions; and (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting.

**Commodity Resources** – Market driven resources such as timber, boughs, minerals and wildlife fish and game that can be bought and sold.

**Common Class** – See “Variety Class.”

**Competitive Use of Off-Road Vehicles** – Off-road vehicle use involving two or more persons that are organized for the purpose of contest, match, or other trial of skill, ability, or machine.

**Composition** – As used in ecology, the mix of species present on a site or landscape or population and the species’ relative abundance.

**Concession Permit** – A permit that authorizes private individuals or corporations to operate Forest Service-owned facilities as a commercial, profit-making venture.

**Concessionaire** – See “Concession Permit.”

**Condition Class** – A classification of the amount of departure from the natural fire regime.

**Conifer** – A wide range of the tree species within the order *Gymnospermae*, typically evergreen, bearing cones, and having needle or scale-like leaves, such as pine and spruce.

**Connectivity** – The linkage of similar but separated vegetation stands by patches, corridors, or “stepping stones” of like vegetation. This term can also refer to the degree to which similar habitats are linked.

**Conservation (of species)** – The terms “conserve,” “conserving” and “conservation” mean the use of all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to [the] Act are no longer necessary. [ESA § 3(3)]

**Constant Road** – See “Road Types.”

**Constrained Maximum Level Alternative** – The highest level of a particular output that could be produced over time, subject to the production of minimum acceptable levels for all other outputs.

**Controlled Burn** – See “Prescribed Fire.”

**Cool Water (Intermediate)** – Aquatic habitat that is intermediate between cold and warm waters and supports fish species that have the greatest reproductive success in temperatures ranging from 60° F to 75° F (15° C to 24° C). Usually included in this group are such species as smallmouth bass, northern pike, walleye, muskellunge, and sturgeon.

**Cord** – A unit of gross volume measurement for stacked round or split wood. A standard cord is 4 feet x 4 feet x 8 feet or 128 cubic feet. A standard cord may contain 60 to 100 solid cubic feet of wood depending on the size of the pieces and the compactness of the stacks.

**Corridor (wildlife)** – A defined tract of land connecting two or more areas of similar habitat type through which wildlife species can travel.

**Corridor Road** – See “Road Types.”

**Cost Coefficients** – Values that relate an acre of land to particular dollar cost in a specific period of time.

**Cost Efficiency** – The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs (such as environmental, economic, or social impacts) are not assigned monetary values but are achieved at specified levels in a least costly manner.

**Cover Type (Forest Cover Type)** – Stands of particular vegetation type that are composed of similar tree species.

**Critical Habitat** – Critical habitat is a term used in the Endangered Species Act of 1973, as amended. It refers to specific geographic areas that are essential for the conservation of a threatened or endangered species and that may require special management consideration or protection. These areas do not necessarily have to be occupied by the species at the time of designation. This means that areas must be identified that will allow for the protection of the current population, and any population increases that may be required to achieve recovery (allowing the species to be removed from the endangered species list)

**CRM** – Cultural Resource Management.

**Cubic Foot** – Common unit of measure for volumes of raw wood that is equivalent to a 12-inch cube. Multiply number of cubic feet by 6.0 to convert to board feet of sawn material.

**Culmination of Mean Annual Increment** – Age at which the mean annual growth is at its maximum and begins to decline.

**Cultural Resources** – The physical remains of past human cultural systems in places or sites of importance in human history or prehistory.

**DEIS** – Draft Environmental Impact Statement. See “Environmental Impact Statement.”

**Demand Trends** – The expected future need or desire for outputs, services, and uses.

**Den tree** – Any tree with hollow areas within branches or trunk that can be used for shelter by wildlife species.

**Dense Hardwood Vegetative Type** – This category includes all hardwoods except aspen and birch; including northern hardwoods and high- and low-site oaks.

**Departure** – A sale schedule that deviates from the principle of nondeclining flow by exhibiting a planned decrease in the timber sale and harvest schedule at any time in the future. A departure can be characterized as a temporary increase, usually in the beginning decade(s) of the Planning period, over the base sale schedule that would otherwise be established without impairing the future attainment of the Forests' long-term, sustained-yield capacity.

**Desired Condition** – Description of land and resource conditions if all long-term goals are achieved.

**Desired Non-native Species** – Those species of plants or animals that are not indigenous to an area but wanted for their contribution to high social, economic or cultural value.

**Developed Recreation** – Recreation that requires facilities resulting in concentrated use of an area. Examples are campgrounds and ski areas. Facilities might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings. See “Dispersed Recreation”.

**Diameter at Breast Height** – The diameter of a tree 4.5 feet above ground level.

**Dispersed Recreation** – Recreation opportunities or use occurring away from developed recreation sites, providing very little or no contact with Forest Service or volunteer staff. There may be minor facilities associated with dispersed recreation areas, such as parking areas, bulletin board at a trailhead or no facilities for activities such as hunting or camping. See “*Developed Recreation*”.

**Distinctive Class** – See “Variety Class.”

**Distribution System** – An arrangement of transmission lines, pipelines, utility lines, and/or roads to distribute energy or resources throughout an area.

**Disturbance** – Any event, either natural or human induced, that alters the structure,

composition, or functions of an ecosystem. Examples include forest fires, insect infestations, and timber harvesting.

**Diversity** – The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan (36 CFR 219.3). See also *biodiversity*.

**Duff** – The fermentation and humus layer of the forest floor material lying below the litter and above mineral soil; it consists of partially decomposed organic matter whose origins can still be visually determined as well as the fully decomposed humus layer. This layer does not include the freshly cast material in the litter layer. See “Litter.”

**Early Successional Forest** – The forest community that develops immediately following a removal or destruction of vegetation in an area. For instance, grasses may be the first plants to grow in an area that was burned.

**Eastern Region** – The portion of the Forest Service also referred to as Region 9, which includes the National Forests and Grasslands in New England, the Mid Atlantic, the Mid-west, and the Lake States.

**Ecological Approach** – An approach to natural resource management that considers the relationships among all organisms, including humans and their environment.

**Ecological Integrity** –In general, ecological integrity refers to the degree to which the elements of biodiversity and the processes that link them together and sustain the entire system are complete and capable of performing desired functions. Exact definitions of integrity are relative and may differ depending on the type of ecosystem being described.

**ELT (Ecological Landtype)** – An area of land with a distinct combination of natural, physical, chemical, and biological properties that cause it to respond in a predictable and relatively uniform manner to the application of given management practices. In a relatively undisturbed state and/or at a given stage (sere) of plant succession, an Ecological Landtype usually is occupied by a predictable and relatively uniform plant community. Typical size generally ranges from about 10 to a few hundred acres.

**Ecological Units** – Delimit areas of different biological and physical potentials.

**Ecology** – The interrelationships of living things to one another and to their environment, or the study of these interrelationships.

**Ecosystem** – A community of living plants, animals, and other organisms interacting with each other and with their physical environment.

**Ecosystem Management** – An ecological approach to natural resource management to assure productive, healthy ecosystems by blending social, economic, physical and biological needs and values.

**Edge** –The margin where two or more vegetation patches meet, such as a meadow opening next to a mature forest stand, a red pine stand next to an aspen stand, or a clearcut stand next to a well-stocked stand.

**Emergent vegetation** – Herbaceous plants that grow in water or saturated soil, with portions that stand up out of the water.

**Endangered Species** – Species listed as nationally in danger of extinction throughout all or a significant part of their ranges by the State of Michigan Endangered and Threatened Species list of February 8, 1983, and 50 CFR Part 17, July 27, 1983.

**Environmental Analysis** – The process associated with the preparation of an environmental assessment or Environmental Impact Statement and the decision whether to prepare an environmental assessment or Environmental Impact Statement. It is an analysis of alternative actions and their predictable short-term and long-term environmental effects, which include physical, biological, economic, and social factors and their interactions.

**Environmental Assessment** – A concise public document that serves to (a) briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement or Finding of No Significant Impact and (b) aid in an agency's compliance with the National Environmental Policy Act when no Environmental Impact Statement is necessary (40 CFR 1508.9a).

**Environmental Effect** – Net change (good or bad) in the physical, biological, social, or economic components of the environment resulting from human actions. Effects and impacts as used in this document are synonymous.

**Environmental Impact Statement** – A statement of environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review. It is a formal document that must follow the requirements of the National Environmental Policy Act, the Council on Environmental Quality guidelines, and directives of the agency responsible for the project proposal.

**Erosion** – The wearing away of the land's surface by running water, wind, ice, and other geological agents. It includes detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

**Eutrophication** – The process by which a body of water becomes, either naturally or by pollution, rich in dissolved nutrients such as phosphorus.

**Even-Aged** – The condition of a forest or stand composed of trees having no or relatively small differences in age.

**Even-Aged Timber Management** – The combination of actions that result in the creation of stands in which trees of essentially the same age grow together.

**Even-Flow** – Continuous supply of products over a given time period.

**Existing Visual Condition** – The present state of visual alteration, which is measured in six degrees (untouched, unnoticed, minor disturbance, disturbed, major disturbance, drastic disturbance) of deviation from the natural-appearing landscape.

**Exotic Species** – See Non-native Invasive Species

**Experimental Forest** – A forest area set aside for research, administered by the Research branch of the Forest Service.

**Extended Rotation** – Management at rotation ages that are a minimum of 1.5 times the Culmination of Mean Annual Increment.

**Extirpated Species** – Species that formerly occurred regularly in an area but have disappeared and are not expected to recur without human assistance.

**Fall Swarming Period** – Period of time in the fall that bats forage, roost, and conduct mating activities near their hibernaculum before they hibernate, generally considered to be from September 1 through October 20 on the Huron-Manistee National Forests.

**FEAST** - Economic effects of the Forest Plan to local counties were estimated using an economic input-output model developed with IMPLAN Professional 2.0 (IMPLAN). Economic relationships generated within IMPLAN were extracted and used in the Forest Economic Analysis Spreadsheet Tool (FEAST) models. The model IMPLAN utilizing FEAST was used to help analyze the economic variation of forest management based on each alternative’s proposed management emphasis. (See IMPLAN®).

**Federal Energy Regulatory Commission License** – Licensed hydro-electric projects on the Huron-Manistee National Forests include six hydro-electric power producing dams on the Au Sable River– Mio, Alcona, Loud, Five Channels, Cooke and Foote, and two power producing dams on the Manistee River– Hodenpyl and Tippy. The Federal Energy Regulatory Commission license term is June 30, 2034.

**FEIS** – Final Environmental Impact Statement. See “Environmental Impact Statement.”

**Fen** – Wetlands that receive nutrients from direct contact with mineral enriched groundwater. A fen that has very low concentrations of plant nutrients and floristically resembles a bog is termed a “poor” fen. A "rich" fen has relatively high concentrations of nutrients, but is still characterized by the accumulation of peat (though this is likely to be primarily from the remains of plants other than sphagnum mosses, such as sedges and brown mosses).

**Fine Filter Management** – The concept of managing individual species through individual conservation measures. Individual nests, colonies, and habitats are emphasized. Management that focuses on the welfare of a single or only a few species rather than the broader habitat or ecosystem (compare to *coarse filter management*).

**Fire Management** – All activities required for the protection of resources and values from fire, and the use of fire to meet land management goals and objectives.

**Fire Management Area** – One or more parcels of land with clearly defined boundaries and with established fire management direction that is responsive to land and resource management goals and objectives.

**Fire Management Effectiveness Index** – The index value that measures effectiveness of annual fire management operational programs and serves as a planning attainment, analysis, and evaluation tool for both annual and long-term programs. Measured in dollars per 1,000 acres protected, the objective is to minimize the index value.

**Fire Regime** – A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, seasonality, intensity, duration and scale (patch size), as well as regularity or variability.

**Fire Rotation** – The interval of time between wildland fire occurrences in a specific geographic area.

**Fire Use** – The combination of Wildland Fire Use and prescribed fire application to meet resource objectives.

**Fiscal Year** – The fiscal year is the government’s accounting period. It begins on October 1, ends on September 30, and is designated by the calendar year in which it ends.

**Flood Plain** – Lowland and relatively flat areas joining inland and coastal waters, including debris cones and flood-prone areas of offshore islands. The minimum area included is subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year.

**Floodprone Area** – Land and water which lies below the elevation equivalent to two times the maximum depth at bankfull stage of a stream.

**Flora** – The plants of a given region or period.

**Flowline** – Pipe through which oil or gas flows to processing equipment or storage.

**Flow Regime** – The prevailing water flow pattern of a stream and is determined by geology, topography, climate and vegetation.

**Forage** – All non-woody plants (grass, grass-like plants, and forbs) and portions of woody plants (browse) available to domestic livestock and wildlife for food. Only a portion of a plant is available for forage if the plant is to remain healthy.

**Forage Management** – Development of the range resource to its reasonably attainable potential, and management on a sustained-yield basis in a manner, which will enhance productive harmony between humans and their environment. Forage management in the Eastern

Region will be done to the extent necessary to support combined livestock and wildlife targets while protecting and enhancing the biological and physical intensities of range ecosystems.

**Forage Utilization** – (1) The portion of current year's forage production by weight that is consumed or destroyed by grazing animals. It is synonymous with degree of use. Expressed in percent of current year's growth utilized by grazing animals on an average over time based on a system of range management. The key to forage utilization is to maintain the key forage species while achieving other management objectives such as the maintenance of watersheds, wildlife habitat, recreational values, and the protection of regenerating plants. (2) The percent expressed in the “Management Prescription” is the estimated average forage utilization allowable to meet the objectives of that prescription under sustained-yield management.

**Forb** – Any herbaceous plant other than grass or grass-like plants.

**Foreground** – See “Visual Distance Zones.”

**Forest and Rangeland Renewable Resources Planning Act of 1974, National Assessment** – A document compiled by the Secretary of Agriculture every 10 years that contains facts and analyses to develop and guide public and private forest and rangeland policies and programs.

**Forest and Rangeland Renewable Resources Planning Act of 1974, National Program** – A document compiled by the Secretary of Agriculture every 5 years that outlines Forest Service programs for National Forest System management, cooperative assistance to states and private landowners, and research.

**Forest Cover Type (Forest Type)** – See “Cover Type.”

**Forest Floor** – Distinctive feature of forest soils that designates all organic matter, including litter and decomposing organic layers resting on the mineral soil surfaces but not mixed with mineral soil material. There are layers to the forest floor: “litter layer” of unaltered dead remains of plants and animals; a layer of fragmented partly decomposed organic materials still discernible to the naked eye, and a layer of well-decomposed organic material. The forest floor provides food to micro-fauna and micro-flora provides a fund of nutrients for higher plants, insulates the surface from extremes in temperature and moisture, and improves water infiltration See “Duff..”

**Forest Health** – A forest condition that has overall structure, function, and characteristics that enable it to be resilient to disturbance, meet human needs, and to maintain normal rates of change commensurate with its stage of development.

**Forest Highway** – See “Road Types.”

**Forest Land** – Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for nonforest use.

- **(Forest Land) Not Appropriate** – Land not selected for timber production in the Forests' Plan alternative due to (a) the multiple-use objectives for the alternative preclude timber production, (b) other management objectives for the alternative limit timber production activities to the point where management requirements set forth in 36 CFR 219.27 cannot be met, and (c) the land is not cost efficient over the Planning horizon in meeting Forests' objectives that include timber production. Land not appropriate for timber production shall be designated as unsuitable in the preferred alternative and Forests' Plan.
- **(Forest Land) Suitable** – Land that is to be managed for timber production on a regulated basis.
- **(Forest Land) Tentatively Suitable** – Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.
- **(Forest Land) Unsuitable** – Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief; (b) the land is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions; (d) there is no reasonable assurance that lands can be adequately restocked within 5 years after final harvest, based on existing technology and knowledge as reflected in current research and experience; (e) there is, at present, a lack of adequate information to respond to timber management activities; or (f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the Forests' Plan.

**Forest Plan** – (Short for the Land and Resource Management Plan.) A long-range plan for management of a designated area of National Forest System lands. This plan will provide direction for all management programs and practices, resource uses, and resource protection measures on these lands.

**Forest Plan Revision** – A formal modification of an existing forest plan to address changes in the natural, social, and economic environment, new information about resources on and off National Forests, and new scientific knowledge that sheds new light on the assumptions of the existing plan and make the predicted impacts of the existing plan less accurate and/or less acceptable. Federal planning regulations require the Forest Service to revise a forest plan every 10 to 15 years.

**Forest Products** – Goods and services resulting from use of the forest. These may

include timber, wildlife, water, forage, recreation, and minerals. Also included, are recreational experiences, scenic and spiritual values, etc.

**Forest Supervisor** – The official responsible for administering National Forest System lands on an administrative unit, usually one or more National Forests. The Forest Supervisor reports to the Regional Forester.

**Forest Type** – A descriptive term used to group stands of similar character of development and species composition, due to given ecological factors, by which they may be differentiated from other groups of stands (see Cover Type).

**Forest-Wide Management Requirements** – A set of statements, which define or indicate acceptable norms, specifications or quality that must be met when accomplishing an activity or practice under a given set of conditions on the Forests.

**Fragmentation** – The process by which a landscape is broken into smaller islands of forest within a mosaic of other forms of land use or ownership. Fragmentation is a concern because of the effect of noncontiguous forest cover on connectivity and the movement and dispersal of animals in the landscape.

**Fuel Management** – The practice of planning and executing treatment or control of any vegetative material, which adversely affects meeting fire management direction, based upon resource management goals and objectives.

**Fuel Treatment** – A rearrangement or disposal of natural or activity fuels to reduce the fire hazard.

**Fuelbreak** – A strategically located strip of land, normally 100 to 400 feet wide, where fuels have been reduced or modified; used as a safe location from which fire fighters can attack and control a fire.

**Fuels** – Plants and woody vegetation, both living and dead, that are capable of burning.

**Gabion** – A wire mesh basket filled with rocks and used to protect erodible streambanks, or to create dams, deflectors, or other instream structures.

**Game Species** – Wild animals hunted for sport or food.

**Gathering Pipeline** – A pipeline used to move oil or gas from the field to a main pipeline.

**Gauging Station** – Continuous-streamflow measuring station usually operated by the U.S. Geological Survey.

**Genotype** – The genetic makeup of an organism.

**Girdling** – To make more or less continuous incisions around a living tree stem, through at least both bark and cambium, generally with the object of killing the tree; kinds of girdling include the following:

- **Chemical girdling** – Making a girdle and further, using an herbicide to kill the tree.
- **Fill girdling** – Making a series of downward, more or less overlapping incisions generally for the introduction of an herbicide.
- **Mechanical girdling** – Removing a broad band of bark, from several inches to several feet wide, all round a living bole, with some sapwood or without, so as to kill, or at least weaken the tree.

**Goal** – A concise statement that describes a desired future condition normally expressed in broad, general terms that are timeless, in that there is no specific date by which the goal is to be achieved.

**Goods and Services** – The various outputs, including on-site uses, produced by forest and rangeland resources.

**Graded and Drained Road** – See “Road Types.”

**Grassland** – A large openland community in which the characteristic plants are grasses.

- **Grassland (Dry)** – Covers a wide variety of grassland biotypes with relatively dry and nutrient-poor soils. Dry grasslands are enriched by structural elements such as bushes and trees, which provide valuable habitats for rare species of wildlife.
- **Grassland (Mesic)** – Characterized by, or adapted to, loamy, or silty soil types.

**Group Selection Harvest** – 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.

**Growing Stock Level (GSL)** – Expressed either in stems per acre or square feet of basal area of timber growing on any area.

**Guidelines** – Guidelines are preferable limits to management actions that may be followed to achieve desired conditions. Guidelines are generally expected to be carried out. They help the Forest to reach the desired conditions and objectives in a way that permits operational flexibility to respond to variations over time. Deviations from guidelines must be analyzed during project-level analysis and documented in a project decision document, but deviations do not require a Forest Plan amendment.

**Habitat** – An area or environment where an organism or ecological community normally lives or occurs. In wildlife management, the major components of habitat are considered to be

food, water, cover, and living space. **Breeding habitat:** The habitat type or types upon which a wildlife species depends for reproduction. **Foraging habitat:** The habitat type or types within which a wildlife species finds the food it needs. **Wintering habitat:** Areas where migratory, and particularly airborne (e.g., birds, bats) species find shelter or warmer weather during the winter or non-breeding season.

**Hardwood** – A broad-leaved flowering tree, as distinguished from a conifer. Trees belonging to the botanical group of angiospermae.

**Harvest (Timber Harvest)** – Cutting and removing trees from the forest for utilization.

**Hazardous Fuel** – Combustible vegetation (live or dead), such as grass, leaves, ground litter, plants, shrubs, and trees, that contribute to the threat of ignition and high fire intensity and/or high rate of spread.

**Herbivore** – An animal that feeds on plant substances.

**Herbivory** – The consumption of plants by animals.

**Heritage Resources** – The remains of sites, structures, or objects used by people in the past; this can be historical or pre-historic (also see cultural resources).

**High Quality Hardwoods** – Hardwood trees or stands that will yield high value timber products such as veneer, knot-free lumber, furniture or specialty product stock, and flooring.

**High-Site Oak** – Oaks where site index greater than 55. Includes white pine-northern red oak-white ash, oak-aspen, black oak, white oak, northern red oak, yellow poplar-white oak-northern red oak, mixed oak, and black locust.

**Hydro-Electric Licenses** – See Federal Energy Regulatory Commission Licenses

**Hydrologic Characteristics** – Features of a watershed relating to the flow of water, such as infiltration, evapotranspiration, runoff, water yield, peak flows, and normal annual peak flow.

**Hydrological Regime** – The sum total of water that occurs in an area on average during a given period, i.e., the quantity, timing, location, and quality of available surface water, soil water, and groundwater. Hydrological regime is defined in terms of both single events and long-term patterns. The single-event perspective describes the flood that results from a rainstorm of some intensity, duration, and frequency that falls in a drainage basin with moisture already in the soils. The water that does not infiltrate the soil or evaporate into the atmosphere flows to and through the stream channel. If the volume of water exceeds the capacity of the channel to carry it, a flood results.

**IMPLAN®** – Acronym for Impact Analysis for PLANning. IMPLAN® is an economic impact assessment modeling system. IMPLAN allows the development of economic models to estimate the impacts of economic changes in states, counties, or communities. IMPLAN® is a

computer model developed by the Forest Service in cooperation with the Federal Emergency Management Agency and the USDI Bureau of Land Management to assist the Forest Service in land and resource management planning. (See “Input-Output Analysis Model”).

**Implementation** – Those activities necessary to initiate the actions in the approved land and resource management plan.

**Implementing Regulations** – Regulations generated by an agency to implement acts of Congress. For example, 36 CFR 219 contains regulations to implement the Forest and Rangeland Renewable Resource Planning Act and the National Forest Management Act.

**Improved Road** – See “Road Types.”

**Indicator Species** – See “Management Indicator Species.”

**Indigenous (Species)** – Any species native to land or water.

**Individual Tree Selection Harvest** – A cutting method where individual trees are removed from certain size and age classes over an entire stand area. Regeneration is usually natural, and an uneven-aged stand is maintained.

**Infiltration** – The rate of movement of water from the atmosphere into the soil; that portion of rainfall or surface runoff that moves downward into the subsurface rock and soil; the entry of water from precipitation, irrigation, or runoff into the soil profile.

**Informed Public Consent** – Attaining substantial effective agreement on a course of action through various public information and involvement projects.

**Input-Output Analysis Model** – Quantitative study of the interdependency of a group of activities based on the relationship between inputs and outputs of the activities. The basic tool of analysis is a square input-output table or interaction model for a given period that simultaneously shows the value of inputs and outputs for each activity, as well as the value of transactions within each activity. It has been applied to the economy and the industries into which the economy can be divided.

**Insecticide** – An agent used to control insect populations.

**Instream Flow** – Usually used in defining the minimum flow necessary for all the uses of water while it is flowing through streams. Some of those uses are fisheries, channel stability, maintenance, riparian habitat maintenance, and aesthetics.

**Intangible Values (Intangible Outputs)** – Goods, services, uses, and conditions which are believed to have values to society but which have neither market values nor assigned values. (See “Nonmarket Values”).

**Integrated Pest Management** – An ecologically based process for selecting strategies to

regulate forest pests to achieve resource management objectives. It includes planned and systematic detection, evaluation, and monitoring techniques and all appropriate silvicultural, biological, chemical, genetic and mechanical tactics needed to prevent or reduce pest caused damage and losses to levels that are economically, environmentally, and aesthetically acceptable. (FSH 2109.14-94-1)

**Integrated Resource Management Approach** – All resources are planned in the same area and scheduled over the next decade using an interdisciplinary approach. All further Forest Plan implementation actions are united and coordinated to achieve the Forest Plan goals and objectives.

**Integrity (heritage resources)** – In terms of heritage resources, it is evidence of the authenticity of a property’s historical character, as indicated by the survival of physical characteristics that existed during the property’s historical or pre-historical period of use (see “Ecological Integrity”).

**Interdisciplinary** – The combination of two or more academic disciplines or fields of study.

**Interdisciplinary Team** – A group of individuals with skills from different resources. An Interdisciplinary Team is assembled because no single scientific discipline is sufficient to adequately identify and resolve issues and problems. Team member interaction provides necessary insight to all stages of the process.

**Interior Forest** – A large contiguous forest with a closed or partially open canopy of relatively mature trees.

**Intermediate Harvest** – Any removal of trees from an even-aged stand between the time of its formation and the regeneration cutting.

**Intermittent Road** – See “Road Types.”

**Intermittent Stream** – A stream that flows only at certain times of the year as when it receives water from springs, rainfall or run-off from some surface source, such as melting snow.

**Interpretive Site** – A developed site at which a broad range of natural or cultural history is interpreted or described for the enjoyment of the public.

**Intolerant Species** – Those plant species that do not grow well in shade.

**Introduced Pest** – Any insect or disease not native to a particular region.

**Intrusive** – Rocks formed from solidification of fluid flowing into or between other rocks. Solidification occurs before surface contacts.

**Invasive Species** – See non-native invasive species.

**Inversion** – A reversal of the normal atmospheric temperature gradient; cool air layer trapped beneath a layer of warm air.

**Isolated Find** – An historic or prehistoric archaeological object found unassociated with other archaeological objects.

**Issue** – A subject or question of widespread public discussion or interest regarding management of National Forest System lands.

**Kirtland's Warbler Recovery Plan** – A joint Forest Service, State, and USDI-Fish and Wildlife Service management plan that provides for the essential habitat of the Kirtland's warbler.

**K-V Funds** – The Knutson-Vandenberg Act of 1930, as amended by the National Forest Management Act, authorizes the collection of funds (K-V funds) for improvement activities within a timber sale area, such as reforestation, timber stand improvement work, wildlife and fisheries projects, and other resource activities.

**Lacustrine Nesting Habitat** – Nesting region that is associated with lakes.

**Land Allocation** – The decision to use land for various resource management objectives to best satisfy the issues, concerns, and opportunities.

**Land and Resource Management Plan** – See Forest Plan.

**Land Exchange** – A discretionary, voluntary transaction involving mutual transfers of land or interests in land between the Secretary of Agriculture acting by or through the Forest Service and a non-federal entity.

**Landscape** – A relatively large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate, and human impacts. Landscapes are often used for coarse filter analysis.

**Landscape Ecosystem** – The land and vegetation systems that occur naturally on the landscape. Landscape Ecosystems are one or more Landtype Associations grouped together.

**Landscape Scale** – Forest or area-wide planning, and watershed analysis scale; polygons representing 1,000's to 10,000's of acres. 1:250,000 to 1:60,000 range scale. Land unit scale – project and management area planning and analysis scale; polygons representing 10's to 1,000's of acres. 1:24,000 to 1:60,000 range scale. Legacy Data: Data (tabular or spatial) in which the Forest Service has already invested considerable time and money, but which has not yet been migrated into a corporate database.

**Landtype Association** – An ecological unit based on similar geologic landform, soils, climate, and vegetation that is part of the “National Hierarchical Framework of Ecological Units.” Landtype associations are smaller than subsections and larger than landtypes.

**Large Wood** – Large pieces of wood in stream channels or on the ground, includes logs, pieces of logs, and large chunks of wood; provides streambed stability and/or structural habitat diversity. Also called down wood or coarse wood. Previously referred to as large woody debris.

**Late Successional Forest** – The stage of forest succession in which most of the trees are mature or overmature.

**Lateral Migration** – Channel migration, the movement of a river or stream channel across its valley bottom.

**Leadership Team** – Decision-making group consisting of the Forest Supervisor, Deputy Forest Supervisor, Staff Officers, and District Rangers.

**Leaching** - A process of soil nutrient removal through the erosive movement and chemical action of water.

**Leasable Minerals** – Coal, oil, gas, phosphate, sodium, potassium, oil shale, and geothermal steam.

**Legal Administrative Status** – Identifier to show specific legal or administrative requirements that may restrict management options on an area.

**Linear Program Model** – A mathematical method, expressed in the form of equations, used to determine the best use of resources to achieve a desired result and limitations on available resources.

**Linear Programming** – A mathematical technique for determining the effects of alternative resource allocations.

**Litter (Forest Litter)** – The top layer of the forest floor directly above the duff layer, which includes freshly fallen or only slightly decomposed plant material, including leaves, needles, bark flakes, cone scales, fruits (including acorns and cones), dead matted grass and other vegetative parts that are little altered in structure by decomposition. See “Duff.”

**Local Road** – See “Road Types.”

**Long-lived Conifer Vegetative Type** – Consisting of red pine, white pine, white pine-hemlock, hemlock, Norway spruce, white spruce, white spruce-balsam fir-Norway spruce, black spruce (upland), and northern white cedar (upland).

**Long-lived Tree Species** – Trees species, including red pine, white pine, white spruce, black spruce, oak, balsam fir, tamarack, northern white cedar, northern hardwoods, and lowland hardwoods.

**Long-Term** – Action governed by the Forest Plan generally taking place over a period of 10 years or more from the present.

**Long-Term Sustained-Yield Capacity** – The highest uniform wood yield from lands being managed for timber production that may be sustained, under specified management intensity, consistent with multiple-use objectives.

**Lowland Conifer Vegetative Type** – Consists of black spruce, northern white cedar, tamarack, mixed swamp conifers, and cedar-aspen-paper birch mix.

**Lowland Hardwood Vegetative Type** – Consists of black ash-elm-red maple, red maple (wet), and mixed lowland hardwoods.

**Low-Site Oak Vegetative Type** – Consists of oak and mixed oak forest types with site index less than 55, and includes jack pine-oak, red pine-oak, white pine-northern red oak-white ash, black oak, white oak, northern red oak, mixed oak and black locust.

**Management Area** – A portion of a landscape with similar management objectives and a common management prescription. The Forests are divided into management areas with specific direction for each management area described through desired conditions, objectives, Standards and Guidelines.

**Management Concern** – A matter of importance to the management of National Forest System lands, which is identified internally by the agency.

**Management Direction** – A statement of multiple-use and other goals, objectives, management prescriptions, and Standards and Guidelines for attaining those objectives and desired conditions.

**Management Goal** – A concise statement that describes a desired condition of the land to be achieved some time in the future.

**Management Indicator Species and Habitats** – Management indicator species and habitats are “...plant and animal species, communities, or special habitats selected for their emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent” (Forest Service Manual 2620.5, Washington Office amendment 2600- 91-5). Management indicators provide a means of monitoring and evaluating the effects of actions on biotic resources, including specific species, communities, habitats, and interrelationships among organisms. As part of the planning process, the Forest Service is directed to “...select management indicators that best represent the issues, concerns, and opportunities to support recovery of federally-listed species, provide continued viability of sensitive species, and enhance management of wildlife and fish for commercial, recreational, scientific, subsistence, or aesthetic values or uses. Management indicators representing overall objectives for wildlife, fish, and plants may include species, groups of species with similar habitat relationships, or habitats that are of high concern.” (Forest Service Manual 2621.1) Management indicators are also selected to meet 1982 planning regulations 36 CFR Sec. 219.19 (a) (1) that require the Forest Service to consider the use of management indicator species. See Appendix G of the Environmental Impact Statement for more information.

**Management Intensity** – The management practice or combination of management practices and their associated costs designed to obtain different levels of goods and services.

**Management Opportunity** – A statement of general actions, measures, or treatments that address the public issue or management concern in a favorable way.

**Management Practices** – A specific activity, course of action, or treatment that is designed to move the forest toward desired conditions.

**Management Prescription** – Management practices selected and scheduled for application in a specific area to attain multiple use and other goals and objectives. At the forest level for a management area, a Management Prescription includes (a) the management practices selected and scheduled, (b) a description of the desired future condition of the land, and (c) the Standards and Guidelines necessary to control the management practices and achieve and maintain the desired future conditions. See Plan chapter IV for a further discussion of this term.

**Management Problem** – A major problem of long-range significance, derived from public issues and management concerns, to be addressed when formulating Forests' Plan alternatives.

**Marginal Analysis** – A type of analysis in which only the costs and benefits considered are those about which decisions can be made. Fixed benefits and costs are not considered.

**Market Value (Market Output)** – Goods, services, and uses which commonly are bought and sold and which are priced or valued directly from existing markets.

**Marshes** – Wetlands dominated by grasses and grass-like plants, including sedges and rushes.

**Mast tree** – Any tree producing fruit that is used for food by wildlife species.

**Mass Movement** – Downslope unit movement of a portion of the land's surface, such as a single landslide or the gradual, simultaneous downhill movement of a whole mass of loose earth material on a slope face.

**Mature Tree or Stand** – A tree or stand that has attained full development, particularly in height, and is in full seed production.

**Maximum Modification** – See “Visual Quality Objective.”

**Mean Annual Increment of Growth** – The total increase in size or volume of individual trees; or, it can refer to the increase in size and volume of a stand of trees at a particular age, divided by that age in years (also see culmination mean annual increment).

**Memorandum of Understanding** – The instrument used for a written plan between the Forest Service and other parties for carrying out their separate activities in a coordinated and

mutually beneficial manner and for documenting a framework for cooperation.

**Mesic** – Sites or habitats characterized by intermediate moisture conditions, i.e., neither decidedly wet or dry.

**Mesotrophic** – A water body or wetland containing moderate quantities of nutrients and are moderately productive in terms of aquatic animal and plant life.

**Metapopulation** – A subpopulation of a species linked to other subpopulations by more or less restricted migration.

**Middle Ground**– See “Visual Distance Zones.”

**Mineral Development** – The inventory and extraction of mineral materials.

**Mineral Exploration** – A search for mineral materials.

**Mineral Material** – Includes the common varieties of sand, gravel, stone, and similar materials.

**Mineral Soil** – Soil that consists mainly of inorganic material, such as weathered rock, rather than organic matter.

**Minimal Class** – See “Variety Class.”

**Minimum Level Management** – The management strategy that would meet only the basic statutory requirements of administering unavoidable nondiscretionary land uses, preventing damage to adjoining lands of other ownerships, and protecting the life, health, and safety of incidental users.

**Minimum Viable Population** – The minimum numbers and distribution of reproductive individuals required to ensure a continued existence.

**Mitigation** – Action taken for the purpose of eliminating, reducing, or minimizing negative impacts of management activities on the environment.

**Modification** – See “Visual Quality Objective.”

**Monitoring** – A systematic process of collecting information to evaluate changes in actions, conditions, and relationships over time and space relative to a pre-determined standard or expected norm.

**Monitoring and Evaluation (Forest Plan)** – The periodic evaluation of Forest Plan management activities to determine how well objectives are met, and how closely management Standards and Guidelines have been applied.

**Moraine (glacial)** – A distinct accumulation of unsorted, unstratified glacial drift, predominantly till, with an initial topographic modifier related to its deposition as a direct action of glacial ice. Includes the following:

- **End Moraine** – Hilly ridges that characterize a deposit produced at the front of the ice mass any time it was stationary long enough to permit an accumulation of debris.
- **Ground Moraine** – A thinner, more level till deposited as ice retreated rapidly.
- **Lateral Moraine** – Stony ridges deposited along the outer edges of the ice mass and parallel to the direction of its movement.
- **Terminal Moraine** – An end moraine that marks the farthest advance or maximum extent of the glacier (often used as synonym of end moraine).

**Mosaic** – Areas with a variety of plant communities over a landscape, such as areas with trees and areas without trees occurring over a landscape.

**Motorized Use** – Land use requiring or largely dependent on motor vehicles and roads.

**Multiple-Use** – The management of all various resources of the National Forests so that they are used in the combination that will best meet the needs of the American people. The management makes the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions. Some land would be used for less than all of the resources in a harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land. Consideration is given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

**National Environmental Policy Act** – Public law that outlines specific procedures for integrating environmental considerations into agency planning. Congress passed NEPA in 1969 to encourage productive and enjoyable harmony between people and their environment. One of the major tenets of NEPA is its emphasis on public disclosure of possible environmental effects of any major action on public land. The Act requires a statement of possible environmental effects to be released to the public and other agencies for review and comment.

**National Forest Management Act** – Public Law of 1976 that provides for planning and management of National Forests, and requires the preparation of forest plans.

**National Forest System** – All of the management units, national forests, and national grasslands that the Forest Service manages.

**National Forest System Land** – Federal lands that have been designated by Executive order or statute as National Forests, National Grasslands, National Tallgrass Prairie, or other

lands under the administration of the Forest Service.

**National Forest System Road** – Classified forest roads under Forest Service jurisdiction being wholly or partly, or adjacent to, and serving the National Forest System and necessary for the protection, administration, and use of the National Forest System and the use and development of its resources. The term “National Forest System Road” is synonymous with the term “forest development road.”

**National Forest Visit** – The entry of one person upon a National Forest to participate in recreation activities for an unspecified period of time. A National Forest visit can be composed of multiple site visits.

**National Register of Historic Places** – A list maintained by the National Park Service of areas which have been designated as being of historic significance.

**National Wild and Scenic River System** – Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition (also see Wild, Scenic, and Recreational Rivers Act).

**National Wilderness Preservation System** – All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction.

**Native Species** – With respect to a particular ecosystem, a species that historically occurred in that ecosystem. Native species do not include species introduced by humans.

**Natural** – Existing and/or formed by nature; not artificial.

**Natural appearing** – The existing natural character of the landscape is integrated into management activities, such as harvesting. The landscape shows few signs of forest management activities; however, the effects of naturally occurring disturbances (fire or windstorm) may be noticeable.

**Natural Disturbance** – Disruption of existing conditions by wind, fire, flooding, drought, insects, and disease at a scale from one tree to hundreds of thousands of acres.

**Natural Opening** – Area of forest whose vegetation is predominantly contained in the ground-layer or mid-layer, e.g. grasses, forbs, shrubs, or saplings, with minor representation in the canopy-layer, e.g. mature trees. Such areas typically are the product of natural stand replacing disturbance processes, e.g. fire, wind, or ice storms, and typically will return to a forested state dominated by canopy-layer and shrub-layer vegetation. Depending upon eco-type, natural openings can vary in size from less than one acre to hundreds or thousands of acres.

**Natural Processes/Conditions** – Plant and animal communities where people have not directly impacted either of those communities or their soils by such activities as logging, fire

suppression, grazing, or cultivation.

**Nectar Plant** – A species of flowering plant that provides a sugary liquid (nectar) as a food/energy source. Invertebrates, such as butterflies, are the primary users of nectar-providing plants. The invertebrate species may use a suite of plant species as nectar sources.

**Net Value Change (Also Net Resource Value Change)** – The sum of the changes resulting from increases (benefits) and decreases (damages) in the value of outputs from the land area affected as the consequences of fire.

**Nitrogen Fixation** – the conversion of elemental nitrogen from the atmosphere to organic combinations or to forms readily utilizable in biological processes.

**No Action Alternative** – The most likely condition expected to exist in the future if current management direction continues unchanged.

**Nondeclining Yield** – A level of timber production planned so that the planned sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade.

**Non-Forest Land** – Land never having or incapable of having 10 percent or more of the area occupied by forest trees, or land previously having such cover and currently developed for non-forest uses.

**Non-Forest Vegetative Type** – Noncommercial forestland (for example, shrubs, forbs, and grasses in wildlife openings).

**Non-Game Species** – Animal species that are not usually hunted in this State. This classification is determined by the State Legislators.

**Non-indigenous Species** – A species that is not naturally present in an ecosystem within its historical range or naturally expanded from its historical range, in the state. See “Non-native invasive species.”

**Nonmarket Values (Nonmarket Outputs)** – Goods, services, and uses which are not commonly bought or sold in existing markets; assigned dollar values for some have been derived from willingness-to-pay analyses for use in comparing alternatives. See “Intangible values”.

**Nonmotorized Use** – Land uses requiring or largely dependent on isolation from motor vehicles and/or roads.

**Non-native Invasive Species** – Non-native species are any species that occupy an ecosystem outside its historical range. Invasive species are any non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive species are those species that spread from their original native habitat, to one that is not their native habitat. Non-native Invasive Species explode in population because they are not in

their original ecosystem where they were kept in check by many factors, such as parasites and predation. Frequently these species are aggressive and difficult to manage. Non-native Invasive Species differ from noxious weeds in that Non-native Invasive Species can be animals or plants, and they are strictly non-native species.

**Non-point Source Water Pollutants** – Pollutants contributed to runoff and seepage from land areas, often resulting from multiple, difficult to define, points of origin. Agricultural and urban runoff, runoff from construction activities and runoff from forestry practices are example sources of non-point pollutants. The following forest management activities are potential nonpoint sources of pollution: prescribed burning, pest and fire control, surface drainage, and road construction and maintenance from which there is natural runoff.

**Nonstocked Vegetative Type** – Potential commercial forestland that is open or not presently stocked with trees (for example, abandoned agricultural field).

**Nonstructural Range Improvement** – A modification of existing vegetation to improve the grazing resource. Examples are spraying or plowing sagebrush and seeding to grass.

**Northern Hardwood Vegetative Type** – Forests containing the following cover types: northern hardwoods-hemlock, mixed northern hardwoods, sugar maple-beech-yellow birch, sugar maple-basswood, black cherry-white ash-yellow poplar, red maple (dry site) sugar maple, beech and mixed upland hardwoods.

**Nutrient Cycling** – Circulation or exchange of elements such as nitrogen and carbon between non-living and living portions of the environment. Includes all mineral and nutrient cycles involving mammals and vegetation.

**Oak Barren** – A fire dependant vegetative community characterized by widely spaced, open-grown oaks (commonly white, bur, or Hill’s oak) in the overstory. Various assemblages of fire tolerant, shade intolerant, grasses, sedges, shrubs, and forbs characteristically dominate the understory. The community is generally located on droughty, infertile, sandy soils of outwash plains and sandy lake plains. The specific vegetative composition of the community is dependant on its physiographic and geographic position.

**Oak-Pine Barren** – A fire dependant vegetative community characterized by a combination of oaks and pines in the overstory. Various assemblages of fire tolerant, shade intolerant, grasses, sedges, shrubs, and forbs characteristically dominate the understory. The community is generally located on droughty, infertile, sandy soils of outwash plains and sandy lake plains. The specific vegetative composition of the community is dependant on its physiographic and geographic position.

**Objective** – A concise, time-specific statement of measurable and planned results that respond to pre-established desired condition. An objective forms the basis for further planning by defining both the precise steps to be taken and the resources to be used in achieving identified desired conditions. Objectives are action oriented and specifically describe measurable results.

**Obliteration** – The returning of the land occupied by a road or trail to vegetative cover.

**Occupancy Trespass** – The illegal occupancy or possession of National Forest land.

**Off-Highway Vehicle (OHV):** Any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland or other natural terrain.

**Old Forest** – An age class older than the mature age class.

**Old Growth** – Ecosystems where natural biological processes predominate and are characterized by older, larger trees; native species and minimal human disturbance. Old growth structural diversity includes multi-layered canopies, canopy gaps, tip-up mounds, and an accumulation of dead woody material. Old growth tracts vary from small isolated forested areas to larger landscape complexes that may include ecologically important non-forested openings, younger patches produced by natural disturbances, wetland and water bodies.

**Open to Public Travel** – A road open to the general public for use with a standard passenger automobile. Such roads may be closed during scheduled periods, extreme weather conditions, or emergencies. They do not have restrictive gates, signs labeled “prohibited,” regulations except those needed for general traffic control, or restrictions based on size, weight, or class of vehicle registration.

**Opportunity Costs** – The value of benefits foregone or given up due to the effect of choosing another management alternative that either impacts existing outputs or shifts resources away from other activities so that they are no longer produced and their benefits are lost.

**Organic Matter** – Plant and animal residues, or substances made by living organisms. All are based upon carbon.

**Organization Camp** – This designation includes camps of a public or semipublic nature that are developed by the special use authorization holder, by the federal government, or jointly by both. Normally, only nonprofit organizations or governmental agencies qualify for special use authorizations in this category. (Forest Service Manual 2721.13)

**Outcomes** – The impact on a resource or landscape of program activities, for example water quality changes and improved habitat condition.

**Output Coefficient** – Value, which relates an acre of land to a particular quantity of output in a specific period of time.

**Outputs** – The goods, end products, or services that are purchased, consumed, or used directly by people.

**Outwash (glacial)** – Stratified sand and gravel, sorted, and deposited by water that originated mainly from melting of glacial ice; may occur as valley fill (valley trains or outwash

terraces) or as widespread level outwash plains.

**Overstory** – Relative to even-aged stands, the mature trees that overtop younger trees.

**Partial Cut/Harvest** – A harvesting system that leaves at least 30 ft<sup>2</sup> basal area and up to 80 ft<sup>2</sup> basal area. This harvest method facilitates reaching a desired stand conditions in terms of structure and age while at the same time producing timber volume. Partial cuts with a smaller retention are like shelterwood systems, while partial cuts with more retention are considered multiple-aged management. Partial cuts can be used with all forest types.

**Patch Size** – A group of forest stands of similar aged forests that may be made up of different forest cover types.

**Perennial Stream** – A stream that maintains water in its channel throughout the year.

**Permit** – A special-use authorization that provides permission, without conveying an interest in land, to occupy and use National Forest System lands or facilities for specific purposes, and which is both revocable and terminable.

**Pests** – Insects, diseases, or animals that interfere with objectives for management of forests.

**Physiographic Province** – Region of similar structure and climate that has had a unified landform history.

**Pine Barren** – A fire dependant vegetative community characterized by widely spaced, open-grown jack pine and, to a lesser extent, red pine in the overstory. The understory is characteristically dominated by various assemblages of fire tolerant, shade intolerant, grasses, sedges, shrubs, and forbs. The community is generally located on droughty, infertile, sandy soils of outwash plains and sandy lake plains. The specific vegetative composition of the community is dependant on its physiographic and geographic position.

**Pioneer** – By extension, any new arrival in the early stages of succession, generally with particular reference to certain species whose presence appears to promote the establishment of more exacting species.

**Planned Ignition** – A fire started by a deliberate management action.

**Planning Area** – The area of the National Forest System controlled by a decision document.

**Planning Criteria** – Criteria prepared to guide the Planning process and management direction.

**Planning Horizon** – The 50-year time frame for which goods, services, and effects were projected in the development of the Forest Plan.

**Planning Period** – Decade 1 (2005-2015). The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

**Plant Communities** – An assemblage of plants that, in general, occur together on similar site conditions.

**Plantation** – A forest crop or stand raised artificially, by either seeding or planting of young trees.

**Play (geology)** – The extent of a petroleum-bearing formation.

**Pole** – A tree of a size between a sapling and a mature tree.

**Pole Timber** – As used in timber surveys, a size class definition for trees 5.0 to 8.9 inches at DBH. As used in logging operations, trees from which pole products are produced, such as telephone poles and pilings.

**Porosity** – The volume of pores in a soil sample (non-solid volume) divided by the bulk volume of the sample.

**Post Market** – The market of trees to be used as fence posts. They normally are 4 to 10 inches in diameter and 6 to 10 feet long.

**Prairie** – A grass dominated vegetative community characterized by rich fertile soils and very few to no trees. The suite of associated grasses, shrubs, and forbs are somewhat predictable and diagnostic of the community.

**Precision** – Degree of accuracy; generally refers to the number of significant digits of information to the right of the decimal point. Statistical, the degree of variation about the mean.

**Pre-Euro-American** – The time period before European settlement, approximately mid- to late-1800s (previously referred to as pre-settlement).

**Preferred Alternative** – The alternative favored for implementation by the Forest Service based on relative merits including physical, biological, social, and economic considerations and the agency's statutory missions.

**Preparatory Cut** – See “Shelterwood Cutting.”

**Prescribed Fire/Prescribed Burning/Management Ignited Fire** – The intentional use of fire to accomplish specific resource objectives under prescribed conditions and circumstances. Prescribed fire is used to accomplish specific resource objectives such as preparing sites for natural regeneration of trees, reducing fuels, or controlling unwanted vegetation.

**Prescription (Fire or Silvicultural)** – A planned series of treatments designed to change current stand structure to one that meets management goals.

**Present Net Value** – The difference between the discounted benefits of all outputs to which monetary values or established market prices are assigned and the total discounted costs.

**Preservation** – See “Visual Quality Objective.”

**Pre-settlement** – See pre-Euro-American.

**Primary Constituent Elements** – Physical or biological habitat features needed for life and successful reproduction of the species. These features are known as primary constituent elements and include, but are not limited to:

- space for individual and population growth and for normal behavior;
- food, water, air, light, minerals, or other nutritional or physiological requirements;
- cover or shelter;
- sites for breeding and rearing of offspring; and
- habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Areas containing these elements of the habitat are identified in the landscape. By law, the Forest Service is required to identify sufficient areas containing these characteristics to ensure conservation of a listed species.

**Primitive** – See “Recreation Opportunity Spectrum.”

**Primitive Road** – See “Road Types.”

**Primitive Recreation Opportunity Spectrum Class** – Part of the Recreation Opportunity Spectrum. Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

**Project** – An organized effort to achieve an objective identified by location, activities, outputs, effects, and time period and responsibilities for execution.

**Protection Zones** – An area protected from activities that would be detrimental to a species or its habitat.

**Protective Element (Fire)** – The support element, such as fire suppression, that provides protection to the Forests' resources and uses.

**Psychological Fencing** – Fencing used in concert with predator exclosures to prevent people from approaching piping plover exclosures out of curiosity. Fencing is usually bailing twine with piping plover closed area signs.

**Public Issue** – A subject or question of widespread public discussion or interest

regarding management of National Forest System lands and identified through public participation.

**Puddling** – A severe alteration of soil structure that greatly reduces gas exchange and infiltration of water into the soil. Associated with fine-textured soils with high water content. Puddling may or may not result in an increase in soil density and with rutting, compaction often occurs. Puddling may occur at the bottom of a rut. Detrimental puddling results from an alteration of soil structure severe enough to reduce the permeability and infiltration of the soil and is caused by depressions in the soil surface caused by an animal, foot, or mechanical traffic.

**Pulpwood** – Trees that yield logs of suitable size and quality for production of pulp.

**Range of Natural Variability** – The variation of physical and biological conditions within an area due to natural processes with all of the elements present and functioning.

**Rangeland** – Land on which the natural plant cover is composed principally of native grasses, forbs, or shrubs valuable for forage

**Rare Natural Resources** – These are plants, animals, and natural communities that are defined as threatened, endangered, sensitive, special concern, or very uncommon.

**Reclamation** – Returning disturbed lands to a form and productivity level that will be ecologically balanced and in conformity with the predetermined Land and Resource Management Plan.

**Record of Decision** – The official documentation of the decision on an action evaluated in an environmental impact statement.

**Recovery (of federally listed species)** – Improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in the Endangered Species act.

#### **Recreation Experience Levels –**

- **Primitive** – At this level, recreational opportunities attempt to satisfy basic needs by requiring a high degree of basic outdoor skills. It provides opportunities for extreme isolation and a feeling of being a part of both nature and a wilderness heritage. Primitive areas occur in the natural environment, although some areas may be modified for resource protection. There is no motorized access at this level. No facilities are provided except those needed for resource protection. Native materials are utilized where possible. There is natural weathering of surfaces.
- **Level 1** – At this level, recreational opportunities attempt to satisfy basic needs to a near-maximum extent. Feeling of physical achievement at reaching opportunities without mechanized access is important to the user. There is a feeling of being nearly primitive and closely associated with nature. It occurs in an essentially

unmodified natural environment. Modifications for comfort and convenience are minimal. Spacing is informal and dispersed to minimize contacts with other individuals or groups. There is no motorized access at this level. There are only essential facilities for resource protection with on-site materials used whenever possible. Facilities appear inconspicuous, substantial, and harmonious.

- **Level 2** – At this level, recreational opportunities attempt to satisfy basic needs to an extent tempered by motorized access. Opportunities to socialize with others are important although less so than at more developed experience levels. It occurs in a slightly modified environment. Rustic or rudimentary facilities for comfort and convenience of users are provided. Improvements are mostly for the protection of the resources. Motorized access is provided or permitted. Primary access is provided over primitive roads or trails or by experienced boat or aircraft users. Facilities are more for resource protection than for the comfort of users. Architecture is functional and historic in nature. Color schemes blend into local environment with little contrast.
- **Level 3 (Intermediate)** – At this level, recreational opportunities require moderate outdoor skills. Opportunities to socialize with others are equally as important as isolation while providing a feeling of being close to nature. Natural environment dominates but there are some modifications for comfort and convenience of users. Facilities are about equal for protection of resources and comfort/safety of users. There are hard surface roads and trails built mostly with native materials at this level. Primary access is over well-traveled roads or by capable boat or aircraft operators. Visitor information services (VIS) are informal. Facilities harmonize with the environment in form and color and are constructed primarily of wood and masonry.
- **Level 4** – At this level, recreational opportunities require only a moderate degree of basic activity skills. Regimentation and fairly obvious controls are important. User is aware of the opportunity to meet and be with other people - this level is obviously not isolated. Some opportunity to use contemporary skills such as snow and water skiing are important. The environment is substantially modified. Facilities are primarily for comfort and convenience of users but luxury facilities may be provided. Traffic controls are present. Visitor information services are frequently available. Facilities generally harmonize with surrounding environment but may contain focal points or trim of contrasting color, texture, or form.
- **Level 5 (Modern)** – At this level, recreational opportunities require few basic outdoor skills. There is abundant opportunity to develop and use contemporary outdoor skills such as snow and water skiing. A feeling of being “next to nature” rather than closely associated with it exists. There is a high degree of environmental modification in these areas. Many facilities provide for comfort and convenience of users - modern sanitation and electrical systems and hookups, showers, and laundry facilities, equipment rental, and sales and services. Overstory, ground vegetation, and landforms are graded or modified as necessary. Plant materials may be exotic

or native. Privacy often is provided by walls, structures, and screening. There is obvious control of users for security and resource protection. This level has a somewhat urbanized environment surrounded by and interspersed with a natural environment. Formal visitor information services usually are available.

**Recreation Opportunity Spectrum** – A system of classifying the range of recreational experiences, opportunities, and settings available on a given area of land. Classifications include:

- **Primitive** – Characterized by essentially unmodified environment where trails may be present but structures are rare. Probability of isolation from the sights and sounds of humans is extremely high.
- **Semiprimitive Nonmotorized** – Characterized by few and/or subtle human modifications and with a large probability of isolation from the sights and sounds of others.
- **Semiprimitive Motorized** – Characterized by moderately dominant human alterations with strong evidence of permanent roads and/or trails.
- **Roaded Natural** – Characterized by a predominately-natural environment with evidence of moderately permanent alternate resources and resource utilization. Evidence of the sights and sounds of humans is moderate but in harmony with the natural environment. Opportunities exist for both social interaction and moderate isolation from sights and sounds of others.
- **Rural** – Characterized by an area on which the sights and sounds of humans are frequent and the landscape has been considerably altered by humans.
- **Urban** – Characterized by a natural setting that is dominated by structures built by humans; the sights and sounds of humans predominate.

**Recreation Residence Site** – House or cabin permitted on National Forest System lands for the recreational use of the owner but not as a primary residence.

**Recreation Visitor Day** – Recreational use of National Forest System land totals 12 hours. It may consist of one person for 12 hours, two people for 6 hours, or any combination that totals 12 hours.

**Recreational River** – Wild and Scenic Rivers Act Usage - Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

**Reforestation** – The natural or artificial restocking of an area with forest trees.

**Reforestation Backlog** – Areas that need to have trees reestablished. This can be done by planting, seeding, or preparing the site for natural regeneration.

**Regeneration** – (1) The actual seedlings and saplings existing in a stand. (2) The act of establishing young trees naturally or artificially.

**Regeneration Cut** – Removal of trees with the intention of establishing a new crop of seedlings.

**Regulated** – Forestland managed for timber production under sustained-yield principles.

**Removal Cut** – See “Shelterwood Cutting.”

**Research Natural Area** – Land areas classified by order of the Chief of the Forest Service containing natural plant communities that have not been modified by humans and are protected and studied to obtain more information about the ecosystem.

**Resilient, Resiliency** – The ability of a system to respond to disturbances. Resiliency is one of the properties that enable the system to persist in many different states of successional stages. In human communities, refers to the ability of a community to respond to externally induced changes such as larger economic or social forces.

**Resource Management Prescription** – Written direction on the resource management practices selected and scheduled for application on a specific area to attain goals and objectives.

**Responsible Line Official** – The Forest Service employee who has the authority to select and/or carry out a specific planning action.

**Restoration (of ecosystems)** – Actions taken to alter an ecosystem to achieve a healthy and functioning condition.

**Revegetation** – The reestablishment of a plant cover. This may take place naturally through the reproductive process of existing flora or artificially through the direct action of humans.

**Right of Eminent Domain** – The taking of property for necessary public use, with reasonable compensation being made to the property owner. See “Condemnation.”

**Right-of-way** – Land authorized to be used or occupied for the construction, operation, maintenance, and termination of a project or facility passing over, upon, under, or through such land.

**Riparian Areas** – Riparian areas include aquatic ecosystems, riparian ecosystems, and wetlands. They are three-dimensional: Longitudinal (extending up and down streams and along the shores); lateral (to the estimated boundary of land with direct land-water interactions); and vertical (from below the water table to above the canopy).

**Riparian Corridor** - The riparian corridor includes the riparian area along all perennial and intermittent streams with defined, recognizable channels. It also includes areas around

ponds, lakeshores, wetlands, springs, and seeps (Environmental Impact Statement, Figure III-3). Where necessary, the riparian corridor also includes any adjacent terrestrial areas needed to protect or restore riparian function.

**Riparian Ecosystems** – Areas that are adjacent to aquatic ecosystems and extend away from the bank or shore to include lands with direct land-water interactions. Interactions may affect abiotic and biotic structure, function, and composition. As a minimum, this will include all lands that are adjacent to surface water and which have hydric soils or distinctive vegetative communities that require free or unbound water.

**Riparian Management Zone** – A site-specific area with boundaries established to define limits of management activities, and associated standards and guidelines, within riparian areas. Size and placement of riparian management zones will be determined by management objectives for riparian areas and may not include all of the riparian area.

**Riprap** – Material such as rocks and concrete that are placed along a watercourse to stabilize the banks.

**Road** – A motor vehicle travelway over 50 inches wide, unless designated or managed as a trail. A road may be classified, unclassified, or temporary.

**Road Classification (functional)** – Forest system roads are defined on the National Forests by three functional classifications to describe their function within the transportation system: Arterial: Provides service to large land areas, and connects with other arterial routes or public highways. These are usually through-routes. Collector: Serves smaller land areas than arterials, and connects arterials to local roads or terminal facilities. Local: Serves as a single purpose road, and connects terminal facilities with collectors or arterials.

**Road Decommissioning** – Activities that result in the stabilization and restoration of unneeded roads to a more natural state.

**Road Density** – The measure of the degree to which road miles occupy a given land area (for example, 1 mile per square mile is 1 mile of road within a given square mile).

**Road Maintenance Level** – A formally established criterion that prescribes the intensity of maintenance necessary for the planning operation of a road. The five levels are:

- **Maintenance Level 1** – This level is used for intermittent service roads during the period of time that management direction requires the road to be closed or blocked to traffic. Basic custodial maintenance is performed as required to protect the road investment and to see that damage to adjacent lands and resources is minimal. Drainage facilities and runoff patterns are maintained. While being maintained at Level 1, roads will be closed or blocked to traffic.
- **Maintenance Level 2** – This level is used on roads where management direction requires that the road be open for a limited amount of traffic. Traffic normally is

minor, usually consisting of one use or a combination of uses: administrative, permitted, dispersed recreation, or other specialized uses. Level 2 roads are normally characterized as single lane, primitive-type facilities intended for use by high clearance vehicles; passenger car traffic is not a consideration.

- **Maintenance Level 3** – This level is used on roads where management direction requires the road to be open and maintained for safe travel by passenger cars. Traffic volumes are minor to moderate. Level 3 roads normally are characterized as low speed, single lanes with turnouts and spot surfacing. This level normally is used for local or minor collector roads.
- **Maintenance Level 4** – This level is used on roads where management requires the road to provide a moderate degree of user comfort and convenience at moderate travel speeds. Some Level 4 roads may be single lane and some may be paved and/or dust abated. This level normally is used for collector or minor arterial roads.
- **Maintenance Level 5** – This level is used where management direction requires the road to provide a high degree of user comfort and convenience. Level 5 roads normally are characterized as double lane, paved facilities. Some Level 5 roads may be aggregate surfaced and dust abated. This level normally is used for arterial roads.

**Road Obliteration** – A road decommissioning technique used to eliminate the functional characteristics of a travelway and re-establish the natural resource production capability. The intent is to make the corridor unusable as a road or a trail and stabilize it against soil loss, which can involve re-contouring and restoring natural slopes.

#### **Road Types and Terminology –**

- **Aggregate** – Same as “Graded and Drained” but with a surface of gravel instead of native soil.
- **Arterial** – Provides service to large land areas and usually is a public highway connecting with other Forests' arterial roads to form an integrated network of primary travel routes. Its location and standard is often determined by a demand for maximum mobility and travel efficiency rather than specific resource management service. It is usually developed and operated for long-term land and resource management purposes and constant service.
- **Collector** – Usually a county public road and serves smaller land areas than an arterial road, and is usually connected to a public highway. Collects traffic from Forest local roads and/or terminal facilities. Its location and standard is influenced by both long-term, multi-resource service needs and travel efficiency. May be operated by either constant or intermediate service, depending on land use and resource management objectives for the area served by the facility.
- **Constant (Constant Entry Road)** – A road developed and operated for continual

or annual recurrent service.

- **Corridor** – A linear strip of land identified for present or future location of transportation or utility rights-of-way within its boundaries.
- **Forest Development** – A road that has been included in the Forests' development transportation plan.
- **Forest Highway** – A forest road under the jurisdiction of and maintained by a public authority and open to public travel. (Title 23 USC 101, as amended by the Surface Transportation Act of 1978.)
- **Graded and Drained** – A road constructed with the surface graded and crowned, sometimes with ditches. The road surface is native soil. The width is 14 feet or more.
- **Improved** – A road developed by construction or reconstruction and perpetuated by maintenance as contrasted with an “unimproved travelway” developed and perpetuated by use.
- **Intermittent** – A road developed and operated for periodic service and closed for more than 1 year between periods of use.
- **Local** – Connects terminal facilities with collector or arterial roads. Its location and standard usually are controlled by a specific resource activity rather than travel efficiency. A forest local road may be developed and operated for either long-term or short-term service.
- **Primitive** – A low standard road created and perpetuated by use, not constructed. The road surface is native soil partially grass covered. The width is less than 10 feet. Commonly called “two-track.”
- **Short-Term or Temporary Facility** – A facility developed and operated for a limited period of time, which will cease to exist as a transportation facility after the purpose for which it was constructed, is completed and the occupied land is reclaimed and managed for natural resource purposes.
- **Specified Road** – A road specified in a timber sale contract for construction or reconstruction to access timber for harvesting activities.

**Roaded Natural Recreation Opportunity Spectrum Class** – Part of the Recreation Opportunity Spectrum. Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interactions between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize

with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

**Roadless Area** – An area inventoried in a National Forest that meets specific criteria. Some of the criteria include (1) is approximately 2500 acres, or if smaller, is contiguous to a designated wilderness or primitive area, or lies east of the 100th Meridian, and therefore, under the jurisdiction of the Eastern Wilderness Act; and (2) can include up to ½ miles of improved Forest Service road per 1000 acres; and (3) has been inventoried for further study as a possible inclusion in the Wilderness Preservation System.

**Roadless Area Review and Evaluation** – A Forest Service analysis of potential wilderness areas.

**Rodenticide** – An agent that kills, repels or controls rodents.

**Roost Tree** – A tree used by animals for perching, resting, or raising their young. Bats are one of the more consistent users of roost trees. Depending on the species, they will use exfoliating bark, cavities, cracks, or leaves for roost sites.

**Rotation** – The number of years required to establish and grow timber crops, to a specified condition of maturity.

**Roundwood** – Trees that are used without being milled, such as fence posts, telephone poles, and pulpwood.

**Route** – Used to specify a travelway for uses such as off-highway vehicle, horse, snowmobile, or bike. "Trail" is used when there is a specifically constructed travelway for assigned use/uses. "Route" is used when the travelway uses existing means such as Forest System roads.

**Rural Recreational Opportunity Spectrum Class** – Part of the Recreation Opportunity Spectrum. An area that is characterized by a natural environment, which has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available.

**Rutting** – Severe rutting is an extreme form of detrimental puddling. Often associated with clay and organic soils. The ruts are molded and typically have well defined berms. They severely disrupt soil structure and porosity, can adversely alter local groundwater hydrology and wetland function and provide conduits for runoff.

**Salvage** – The removal of dead trees or trees being damaged or dying due to injurious

agents other than competition, to recover value that would otherwise be lost.

**Sapling** – A young tree more than a few feet tall and between 1.0 to 4.9 inches diameter at breast height that is typically growing vigorously. A young tree larger than a seedling, but smaller than a pole.

**Savannah** – Grassland regions with scattered trees, grading into either open plains or woodlands.

**Sawtimber** – As used in timber surveys, a size class definition for trees more than 9 inches at DBH for conifers and 11 inches at DBH for hardwoods.

**Scale** – 1. The degree of resolution at which ecosystems are observed and measured. 2. The relation between the size of an object on a map and its size in the real world. A large scale represents drawing closer to real world, while a small scale represents a larger unit of measure allowing viewing of more surface/area. Geographic extent; for example, region, sub-regional, or landscape.

**Scale, Spatial** – The size of area at which different ecological processes occur; for example, photosynthesis occurs at a cellular scale, measured in microns, while tornadoes occur at a landscape scale, measured in tens to thousands of square miles.

**Scarification** – The loosening of the topsoil in open areas to prepare for regeneration by direct seeding or natural seed fall.

**Scenery** – General appearance of a place or landscape, and a natural resource of the Forests and composed of existing natural features including vegetation, water, landforms, and geology.

**Scenery Management System** – Tool incorporated into Forest Plans to determine the relative value and importance of scenery on National Forest System lands. The process involves classifying landscapes, and setting goals and objectives for maintaining, enhancing, restoring, and monitoring scenic integrity.

**Scenic Byway** – National Scenic Byway usage - the roads or section of roads, which traverses an area, which may have outstanding aesthetic, cultural, historic, or interpretive forest values.

**Scenic Class** – Scenic classes are the measure of the value of scenery in a National Forest. Scenic classes are determined and mapped by combining scenic attractiveness classes with distance zones and concern levels of landscape visibility. Scenic classes are a product of the inventory process that is used for analysis and planning purposes. Generally, scenic classes 1 and 2 have high public value, classes 3 through 5 have moderate value, and classes 6 and 7 have low value.

**Scenic Easement** – Relative to the Wild and Scenic Rivers Act (P.L. 93-621) of 1975

and by definition of the Act: the right to control the use of land (including the air space above such land) within the authorized boundaries of the component of the Wild and Scenic River System for the purpose of protecting the natural qualities of a designated wild, scenic, or recreational river area. Such controls shall not affect any regular use exercised prior to the acquisition of the easement without the owner's consent.

**Scenic Integrity** – The state of naturalness, or conversely, the state of disturbance created by human activities or alteration. It is a measure of the degree to which a landscape is usually perceived to be “complete.” The degrees of deviation are used to describe the existing scenic integrity, proposed scenic integrity levels, and scenic integrity objectives.

**Scenic Integrity Objectives** – Scenic Integrity Objectives guide the amount, degree, intensity, and distribution of management activities needed to achieve desired scenic conditions. They are:

- **Very High** (unaltered) scenic integrity refers to landscapes where the valued landscape character “is” intact with only minute, if any, deviations. The existing landscape character and sense of place is expressed at the highest possible level.
- **High** (Appears Unaltered) scenic integrity refers to landscapes where the valued landscape character “appears” intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such a scale that they are not evident.
- **Moderate** (Slightly Altered) scenic integrity refers to landscapes where the valued landscape character “appears slightly altered.” Noticeable deviations must remain visually subordinate to the landscape character being viewed.
- **Low** (Moderately Altered) scenic integrity refers to landscapes where the valued landscape character “appears moderately altered.” Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed, but compatible or complimentary to the character within.
- **Very Low** (Heavily Altered) scenic integrity refers to landscapes where the valued landscape character “appears heavily altered.” Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles within or outside the landscape being viewed. However, deviations must be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.

**Scenic River** – Wild and Scenic Rivers Act Usage – The rivers or sections of rivers that

are free of impoundments, where shorelines or watersheds are still largely primitive and shorelines largely undeveloped, but accessible by road at places.

**Section** – Term used to describe an ecological unit. Sections are defined by glacial deposits, topography, distribution of plants and regional climate.

**Sediment** – Solid materials, both mineral and organic, that are in suspension, are being transported, or have been moved from their site of origin by air, water, gravity, or ice and have come to rest on the earth's surface.

**Sediment Yield** – Amount of solid waste washed into a watercourse.

**Seed Cut** – See “Shelterwood Cutting.”

**Seed-Tree Cutting Method** – A cutting method in which all trees are removed in one cut except for a small number of seed-bearing trees left singly or in small groups. This practice eventually results in an even-aged stand.

**Seed Tree Harvest** – A cutting method in which the mature timber crop is removed from an area in one cut, except for a certain number of widely dispersed seed-bearing trees.

**Seedbed** – In natural regeneration, the soil or forest floor in which seed falls. In nursery practices, the prepared area which is seeded.

**Seedling** – As used in timber surveys, a size class definition for trees less than 1-inch diameter at 4.5 feet.

**Seen Area (Leaf Off)** – Area along a travelway that is visible during the time when trees are bare.

**Selection Harvest Cut** – A system, which removes trees individually in a scattered pattern from a large area each year. (1) Individual-tree selection cutting involves the removal of selected trees of all size classes on an individual basis. Regeneration is established under the partial shade of the overstory canopy after each cut. (2) Group selection cutting involves the removal of selected trees of all size classes and groups of a fraction of an acre up to 2 to 3 acres in size. Regeneration occurs in the groups under conditions similar to those found in small clearcuts.

**Semiprimitive Motorized** – See “Recreation Opportunity Spectrum.”

**Semiprimitive Motorized Recreation Opportunity Spectrum Class** – Part of the Recreation Opportunity Spectrum. Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of 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 would be subtle. Use of local, primitive, or collector roads with predominantly natural surfaces and trails suitable for motorbikes is permitted.

**Semiprimitive Nonmotorized Recreation Opportunity Spectrum Class** – Part of the Recreation Opportunity Spectrum. Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. 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 would be subtle. Motorized recreation use is not permitted, but local roads used for other resource management may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.

**Sensitive Areas** – Areas with high erosion hazards, areas that may be susceptible to compaction, or areas with nonstable slopes.

**Sensitive Species** – Species designated by the Regional Forester and included on the Eastern Region Sensitive Species list (R-9 Draft Supplement, FSM 2670.3). The list includes species identified by the criteria below that are known, reported, or suspected to occur on or in the immediate vicinity of the planned area in the Eastern Region. The criteria are:

- Species in an officially proposed status by the Federal Register - Proposed Rule Making.
- Species on a Notice of Review List in the Federal Register (such as 47 CFR 58454-58460, December 30, 1982).
- Species placed on Region 9's Sensitive Plant or Animal List at the discretion of the Regional Forester if he/she deems they require special management attention. Examples of situations that may cause such listings include:
  - Species common elsewhere, but a disjunct population of unique, popular, or scientific interest occurs on National Forest System land.
  - Locally endemic population in unique habitats that warrant continued monitoring or special management to assure jeopardy is not occurring and will not occur in the future.

**Sensitivity Level** – As used in Cultural Resource Management, the degree of cultural resource development potential and/or the degree of conflict with other uses for a given area. As used in Visual Quality Management, a particular degree or measure of viewer interest in the scenic qualities of the landscape. The degrees are: 1-most sensitive, 2-sensitive, and 3-less sensitive.

**Seral Stage** – The stage of succession of a plant or animal community that is transitional. If left alone, the seral stage will give way to another plant or animal community that represents a further stage of succession (climax).

**Serotinous** – Pertaining to fruit or cones that remain on a tree without opening for one or more years. For example, jack pine cones open and seeds are shed when heat is provided by fires or hot and dry conditions.

**Severance Deed (minerals)** – A deed in which mineral interests are retained upon sale of the land through language in the deed of conveyance reserving specified mineral rights to the seller. Ownership of severed minerals has often become very obscure and fractionalized. See “Severed Mineral Rights.”

**Severed Mineral Rights** – A severance is a separation of the ownership of the minerals from the ownership of the surface of the land.

**Severely Burned Conditions** (also known as detrimentally burned soil) – Entire forest floor is consumed or reduced to charred material. In addition, fine roots and organic matter are charred in the upper one-half inch of mineral soil. Vaporized substances may condense and form a water repellent layer.

**Shade-Tolerant** – A tree or other plant species having the capacity to grow without receiving direct sunlight.

**Shearing** – Using a bladed tractor to clear all vegetation from the land in preparation for planting.

**Sheet Erosion** – Removal of a fairly uniform layer of soil from the land surface by runoff water without the development of conspicuous water channels.

**Shelterwood Cutting** – A cutting method used in even-aged management. It is the removal of a stand of trees through a series of cuttings designed to establish a new crop with seed and shade provided by the retained portion of the stand.

**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.

**Short-lived Conifers Vegetative Type** – Includes jack pine, scotch pine, conifers, and balsam fir-aspen-paper birch.

**Short-Term Road** – See “Road Types.”

**Silvicultural Prescriptions or Treatment or Practices** – Activities prescribed for tending, harvesting, and re-establishing a stand of trees.

**Silvicultural System** – A process following accepted silvicultural principles whereby forests are tended, harvested, and replaced resulting in a forest of distinctive form.

**Silviculture** – The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of society on a sustainable basis.

**Site** – An area of suitable habitat or restorable habitat that is separated from other suitable habitat; separation distance will vary depending on the nature of the intervening habitat and the

dispersal capabilities of the species through that habitat type.

**Site Index (Forestry)** – A numerical expression commonly accepted as an indicator of the quality or timber productivity of a site; an expression of the height-age relationship of the tallest trees (dominants and codominants) in normal stands at some designated age, such as 50 years.

**Site Preparation** – The general term for removing unwanted vegetation, slash, roots, and stones from a site before reforestation. Naturally occurring wildfire, as well as prescribed fire, can prepare a site for natural regeneration.

**Size Class** – One of the three intervals of tree stem diameters used to classify timber in the Forest Plan database. The size classes are: Seedling/sapling (less than five inches in diameter); pole timber (five to seven inches in diameter); sawtimber (greater than seven inches in diameter).

**Skid Trail** – Travelway used to drag or transport cut trees or logs from the stump to the road for collection.

**Skidding** – Hauling logs by sliding from stump to a collection point.

**Slash** – The residue left on the ground after timber cutting or after a storm, fire, or other event. Slash includes unused logs, uprooted stumps, broken or uprooted stems, branches, bark, etc.

**Snag** – A standing dead tree used by birds for nesting, roosting, perching, courting, and/or foraging for food. Many mammals use snags for denning and foraging for food.

**Snowmobile** – Any self-propelled vehicle designed for travel on snow or ice and steered by skis or runners.

**Social Analysis** – An analysis of the social (as distinct from the economic and environmental) effects of a given plan or proposal for action. Social analysis includes identification and evaluation of all pertinent desirable and undesirable consequences to all segments of society, stated in some comparable quantitative terms, such as persons or percent of population in each affected social segment. It also includes a subjective analysis of social factors not expressible in quantitative terms.

**Softwood** – A coniferous tree. Trees belonging to the botanical group gymnospermae.

**Soil Compaction** – A physical change in soil properties that results in a decrease in porosity and an increase in soil-bulk density and strength. Detrimental compaction is the condition with increased soil density and strength that hampers root growth, reduces aeration, and inhibits soil water movement.

**Soil Hydrology** – Movement of water into and through the soil.

**Soil Nutrient Drain (or Loss)** – A process in which more nutrients are removed from an area than are replaced by natural nutrient inputs. The nutrient removal can be natural or human-caused.

**Soil Productivity** – Soil potential to produce biomass that depends on the interaction of physical, chemical, and climatic characteristics of the site.

**Soil Profile** – A progression of distinct layers of soil, beginning at the surface, that have been altered by normal soil-forming processes such as leaching, oxidation, or accretion

**Soil Quality** – The inherent capacity of a specific soil, as determined by its inherent physical, chemical, and biological characteristics, to perform its biologic, hydrologic, and ecological functions (Forest Service Handbook 2509.18, 2002).

**Spatial Feasibility** – The capacity of a management activity to be practically implemented on the ground.

**Special Interest Area** – Areas not meeting the criteria for Research Natural Area designation may become Special Interest Areas under USDA Regulations, Title 36, Section 194.1, National Natural Landmarks (U.S. Department of Interior program).

**Special Land Use** – The occupation or reservation of land or water for a particular use or uses and excluding other land uses.

**Special Management Area** – Designated area where unique characteristics exist (for example, experimental forests, Research Natural Areas, and Wild and Scenic Rivers).

**Special-use Permit** – See “Permit.”

**Species Viability** – A viable species consists of self-sustaining and interacting populations that are well distributed through the species’ range. Self-sustaining populations are those that are sufficiently abundant and have sufficient diversity to display the array of life history strategies and forms to provide for their long-term persistence and adaptability over time. The implementing regulations for the 1982 National Forest Management Act provides specific direction concerning viability: Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one that has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support at least, a minimum number of reproductive individuals, and that habitat must be well distributed so that those individuals can interact with other in the planning area (36 CFR 219.19).

**Specified Road** – See “Road Types.”

**Spectrum** – A computer-based analytical tool for building natural resource management

models. Spectrum is a software package that simultaneously analyzes the trade-off between the many goals, constraints, management activities, timing options, and landtypes, which are necessary to manage a large forest.

**Spring Staging Period** – Period of time when bats stage near their hibernaculum in the spring before moving to their summer habitat, generally considered to be from May 1 to June 15 on the Huron-Manistee National Forests.

**Staminate** – In plant reproduction terminology, staminate literally means, “bearing stamens.” Staminate plant parts, or stamens are "male": i.e., they produce pollen.

**Stand (of trees)** – A community of trees or other vegetation sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities and so form a silvicultural or management entity.

**Stand Replacement Disturbance** – A disturbance that kills or removes trees and creates a new age class of trees, usually fire, wind, insects, or harvesting.

**Standards** – Requirements found in a forest plan, which impose limits on natural resource management activities, generally for environmental protection. Standards are required limits to activities. These limitations allow the Forest to reach the desired conditions and objectives. Standards also ensure compliance with laws, regulations, executive orders, and policy direction. Deviations from standards must be analyzed and documented in Forest Plan amendments.

**Stemwood** – The wood of the stem(s) of a tree, i.e., of its main axis (or axes) as distinct from the branches (branchwood), stump (stumpwood), or roots (rootwood).

**Stochastic** – Referring to patterns of random effects. Containing elements of probability.

**Stocking Level** – The number of trees in an area as compared to the desirable number of trees for best results, such as maximum wood production.

**Stratigraphic Record (geology)** – Is the geological result of layered sedimentary and volcanic rocks. Other rocks can be layered (foliated metamorphic rocks and mineralogically layered igneous rocks) but these, once recognized, are excluded because the layers do not record the passage of time in an obvious way.

**Stream Geomorphology** – The study of water and earth forces that form stream channels, drainage patterns, floodplains, and explain erosion, transportation, and deposition of sediments moved by water.

**Stream Riffle** – A shallow area extending across a streambed and causing a “break” in the water surface, usually in the form of a succession of small waves.

**Stream Stability** – The tendency of streams to persist relatively unchanged through time.

Stable streams have a pattern and profile such that, over time, channel features are maintained and the stream system neither aggrades nor degrades.

**Streamside Management Zone** (Environmental Impact Statement, Figure III-4)- Often referred to as filter or buffer strips, the streamside management zones in the state Best Management Practices are areas directly adjacent to streams and water. Provisions within the streamside management zones typically contain sediment filter strips, a base shade level, restriction on ground disturbance and protection of stream banks and streambeds.

**Structural Diversity** – Variation of vegetation at the landscape or site level. At the landscape scale, this might include non-forest and forest areas. At the site level, this refers to the different vegetation heights and characteristics.

**Structural Range Improvement** – Any type of fabricated range improvement, such as fences and corrals.

**Structure** – How the parts of ecosystems are arranged, both horizontally and vertically. Structure might reveal a pattern, or mosaic, or total randomness of vegetation.

**Stumpage Price** – The value of standing timber.

**Subpopulation** – A self-reproducing population of a species that is associated with a site or patch.

**Subsection** – Term used to describe an ecological unit. Subsections are defined by glacial forming processes, bedrock formations, local climate, topography, soil groups, and the distribution of plants.

**Subsoil** – The layer below the soil surface in which roots normally grow.

**Subsurface Rights (Mineral Rights)** – Ownership of, or right to use, the resources and improvements under the surface of the land which includes the right to use as much of the surface as is necessary to exercise the subsurface rights.

**Subsurface Values (Subsurface Resources)** – Resources and improvements under the surface of the land only. As used in this document, the term means minerals.

**Succession** – An orderly process of biotic community development that involves changes in species, structure, and community processes with time; it is reasonably directional and, therefore, predictable.

**Successional Stage** – A stage of development of a plant community as it moves from bare ground to climax. In the plan revision process, these are generally referred to as early, mid, and late successional stages as follows:

- **Early Successional Species** – Typically colonize sites immediately following

catastrophic disturbances.

- **Mid-Successional Species** – Tolerant of conditions that exist as community moves toward late succession.
- **Late-Successional Species** – Adapted to environmental conditions that exist at steady state equilibrium with respect to natural disturbance regimes.

**Suitable Forest Land** – Land to be managed for timber production on a regulated basis.

**Suitable Habitat** – Habitat that is sufficient to support a reproducing subpopulation of a species.

**Suitable Range** – Range, which is accessible to livestock or wildlife and can be grazed on a sustained-yield basis without damage to other resources.

**Suitable Timber Lands** – Lands that include timber harvesting as an identified and scheduled management practice.

**Summer Maternity Habitat** – Habitat used by female bats during the period of May through August for raising their young. Generally includes a number of potential roost trees, water sources, and foraging habitat.

**Surface Fire** – A fire that burns surface litter, debris, and small vegetation.

**Surface Rights** – Ownership of the surface of the land only; right to use the surface of the land on a regulated basis.

**Survey** – An exercise in which a set of qualitative or quantitative observations are made, usually by means of a standardized procedure and within a restricted period of time, but without any preconception of what the findings ought to be.

**Sustainable (ecological)** – The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

**Sustainable (human)** – Each generation acts in a manner allowing every future generation the option of being as well off as its predecessors.

**Sustained Yield** – The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest without impairment of the productivity of the land.

**Swamps** – Wetlands dominated by woody plants, including trees and shrubs.

**System Roads** – See National Forest System roads.

**Targets** – A National Forest’s annual goals for accomplishment for natural resource programs. Targets represent the commitment the Forest Service has with Congress to accomplish the work Congress has funded. Targets are often used as a measure of the agency’s performance. Targets are not the same as objectives.

**Temporary Openings** – Areas of grass/forbs and shrubs usually resulting from timber harvest that will be replaced by tree saplings over a period of a few years: in contrast to permanent nonforested openings.

**Temporary Roads** – Roads authorized by contract, permit, lease, other written authorization, or emergency operation that are not intended to be a part of the forest transportation system, and not necessary for long-term resource management. These roads are not included on the National Forest System road inventory and are decommissioned after use.

**Tentatively Suitable Forest Land** – Forest land that is producing or is capable of producing crops of industrial wood; and a) has not been withdrawn by Congress, the Secretary, or the Chief; b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within five years after final harvest; and d) adequate information is available to project responses to timber management activities.

**Terrestrial Ecological Unit Inventory** – An inventory of the national hierarchical classification system based on biotic and environmental factors. At the Ecoregion scale, ecological map units are domain— division—province (global or national); at the Subregional scale, map units are sections and subsections (statewide, multi-forest, multi agency); at the Landscape scale, map units are landtype associations (Forest or area-wide); and at the Land unit scale, map units are (ecological) landtypes, and landtype phases (project and management area).

**Thermal Cover** – Vegetative cover used by animals against weather.

**Thinning** – Silvicultural treatment where trees are removed to provide improved growing conditions for remaining trees. This method is used in immature stands to reduce stand density of trees primarily to improve growth and/or form, enhance forest health, or recover potential mortality.

**Threatened Species** – Species listed as nationally threatened, or according to the State of Michigan Endangered and Threatened Species list of February 8, 1983, and 50 CFR Part 17, July 27, 1983. Also, official designation by US Fish and Wildlife Service applied to any species, which is likely to become endangered throughout all, or a significant portion of its range within the foreseeable future.

**Tiering** – Incorporating information contained in an Environmental Impact Statement, such as the Forest Plan Environmental Impact Statement, by reference in subsequent environmental documents.

**Till (glaciation)** – Unstratified glacial drift deposited directly by ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion.

**Timber Production** – The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees for cutting into logs, bolts, or other round sections for industrial or consumer use. For purposes of forest planning, timber production does not include fuelwood or harvests from unsuitable lands (Forest Service Manual 1900).

**Timber Stand Improvement** – Usually related to activities conducted in young stands of timber to improve growth rate and form of the remaining trees. Examples are thinning, pruning, fertilization, and control of undesirable vegetation.

**Topsoil** – The original or present dark-colored upper soil that ranges from a fraction of an inch to several feet deep.

**Total Maximum Daily Load** – The maximum amount of a pollutant that a water body can receive and still meet water quality standards. Also refers to the process of allocating pollutant loadings among point and non-point sources. Also refers to a written plan and analysis of an impaired water body established to ensure that the water quality standards will be attained and maintained throughout the water body in the event of reasonably foreseeable increases in pollutant loads.

**Trail** – An existing one-track path or way capable of travel by a pedestrian or a motorized vehicle less than 50 inches wide.

**Trailhead** – The parking, signing, or other facilities available at the beginning of a trail.

**Trail Maintenance Priorities** –

- Priority 1 – Maintenance activities that would correct an unsafe condition relative to management objectives.
- Priority 2 – Maintenance activities that minimize unacceptable resource and trail damage.
- Priority 3 – Maintenance activities that fully restore the trail to the planned design standard.

**Trails - National Forest System Trails** – As defined in 36 CFR 212.1 and 261.2, those trails wholly or partly within or adjacent to and serving, the National Forests and other areas administered by the Forest Service that have been included in the Forest Transportation Atlas. These trails are part of the National Forest Trail Systems and are included in the corporate level Infrastructure databases.

**Transmission Pipeline** – A pipeline that carries gas or liquid from a producing field or central collection facility to a storage or consumption facility, usually over long distances.

**Travel Ways** – Travel ways represent linear concentrations of public viewing, including but not limited to highways, Operational Maintenance Level 3, 4, and 5 roads, trails, and waterways.

**Treatment (Vegetation)** – Any activities undertaken to modify or maintain the existing condition of the vegetation (Vegetative management).

**Treaty Rights** – Rights related to hunting, gathering, and fishing retained by Native American tribal members.

**Tree Species Suitable for the Site** – Tree species that a given site is capable of growing based on natural conditions of soil, microclimate, and topography. For application to management on the Huron-Manistee National Forests, also refers to cover types or tree components that are characteristic of one or more vegetative growth stages of the landscape ecosystem of the site in question.

**Tribal Sovereignty** – The inherent governmental power from which specific political powers are derived. Indian governmental powers, with some exceptions, are not powers granted by Congress, but are inherent powers of a limited sovereignty that have never been extinguished. Congress has the authority to limit or abolish tribal powers. However, without congressional action, a tribe retains the inherent right to self-government and no state may impose its laws on a reservation.

**Tribe** – Term used to designate a federally recognized group of American Indians and their governing body. Tribes may comprise more than one band.

**Tributary River Segments** – Tributary River segments include unclassified rivers and streams. These segments are not navigable by watercraft and hold low potential for recreation development. Land ownership is mixed with seasonal residence and some year round residence. Typically, these segments flow into larger creeks, rivers, or lakes. Generally, these segments are not named.

**Unclassified Roads** – Roads on National Forest System land that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization.

**Unconstrained Maximum** – Level of management defined as the highest possible level of a given output along with the costs associated with achieving it.

**Understory** – All forest vegetation growing beneath the overstory.

**Uneven-aged** – A term usually used as “uneven-aged stand” or “uneven-aged management,” which identifies a stand containing three or more age classes of trees. 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.

**Unplanned Ignition** – A fire started at random by either natural or human causes.

**Unregulated (Pre-1980 Terminology)** – Forest land that is suitable and available but not organized for timber production under sustained-yield principles; where timber harvest is permissible but is not a goal of management.

**Unsuitable Lands or Non-Suitable for Timber Production** – National Forest System land that is not managed for timber production, because of policy, ecology, technology, silviculture, or economics.

**Upland** – Any area that is not a wetland. (See Wetlands)

**Urban Recreation Opportunity Spectrum Class** – Part of the Recreation Opportunity Spectrum. Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreation activities. Vegetation cover is often exotic and manicured. Sights and sounds of humans are predominant on site. Large numbers of users can be expected, both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

**User-Developed Recreation Facilities** – Trails, campsites, water access sites, or other facilities that have been developed by users or through use and are not maintained as recreation facilities by the Forest Service or other public/private entity.

**Utility Corridor / Rights-of-Way** – A tract of land of varying width forming a passageway across the Forest through which various commodities such as oil, gas, and electricity are transported.

**Variety Class** – A particular level of visual variety or diversity of landscape character, described as:

- **Distinctive (Variety Class A)** – Refers to unusual and/or outstanding landscape varieties that stand out from the common features in the character type.
- **Common (Variety Class B)** – Refers to prevalent, usual, or widespread landscape variety within a character type. It also refers to ordinary or undistinguished visual variety.
- **Minimal (Variety Class C)** – Refers to little or no visual variety in the landscape. A monotonous or below-average landscape when compared with the common features in the character type.

**Vegetation** – The plant cover of an area or region.

**Vegetative Community** – A grouping of forest types from the forest inventory that is

commonly associated in similar environments. This grouping is used to identify Management Areas with common goals, objectives, and direction.

**Vegetative Growth Stages** – The combination of successional and developmental stages used to describe a stand (e.g., 80 to 100 years old, multiple-age, aspen-fir).

**Vegetative Manipulation** – The change of one vegetative type to another by tractor, fire, or chemicals. Usually, this is done to increase forage for livestock and can be a beneficial tool for wildlife.

**Vegetative Types** – See “Aspen/Birch,” “Dense Hardwood,” “Long-lived Conifer,” “Low-site oak,” “High-site Oak,” “Lowland Conifer,” “Lowland Hardwood,” “Nonforest,” “Nonstocked,” “Short-lived Conifer.”

**Vertical Diversity** – The diversity in an area that results from the complexity of the above-ground structure of the vegetation; the more tiers of vegetation or the more diverse the species make-up, or both, the higher the degree of vertical diversity.

**Viable Population** – A population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its range in the Planning area. For Forests' Planning purposes, a Planning area is one or more identified National Forest(s).

**Viewshed** – Total visible area from a single observer’s position or the total visible area from multiple observer positions. Viewsheds are accumulated seen areas from highways, trails, campgrounds, towns, cities, or other view locations. Examples are corridors, feature or basin viewsheds.

**Visitor Information Service** – A service provided to the public by National Forests in which the public is supplied with information regarding opportunities or activities on National Forest System land; usually, but not always recreational opportunities.

**Visual Absorption Capacity** – Indicates the relative difficulty or cost of achieving Visual Quality Objectives. It measures the land's capacity to absorb the visual impact of management activities. See “Visual Quality Objective.”

**Visual Distance Zones** – Areas of landscape denoted by specified distances from the observer. Used as a frame of reference in which to discuss landscape characteristics or activities of man. The three zones are:

- Background – The distant part of a landscape; surroundings, especially those behind something, and providing harmony and contrast; the area located from 3 to 5 miles or more from the viewer.
- Foreground – That part of a scene or landscape nearest the viewer and in which detail is evident, usually 1/2 to 1/4 mile from the viewer.
- Middle Ground – That part of a scene or landscape, which extends from the

foreground zone to 3 to 5 miles from the observer. Textures are discernible at that distance.

**Visual Management Program** – Also referred to as “Landscape Management” or “Visual Quality Management.” The art and science of planning and administering the use of forestlands in such ways that the visual effects maintain or upgrade visitors' psychological welfare. It is the planning and design of the visual aspects of multiple-use land management.

**Visual Resource** – A part of the landscape important forest scenic quality. It may include a composite of terrain, geologic features, or vegetation.

**Volatilization** – Transfer of a chemical from liquid to vapor; evaporation.

**Warm Water** – Aquatic habitat that supports fish species that have their best reproductive success and summer water temperature tolerance between 75° F and 85° F (23° to 29° C) or about 80° F. The various sunfish species and largemouth bass are examples.

**Warm-water Fish** – Warm-water fish have preferences for summer water temperatures that are greater than approximately 75° F.

**Water Permeability** – The state of being penetrable, especially having pores or openings that permit liquids or gases to pass through.

**Water Quality Index** – A numeric integration of eight weighted water quality parameters to yield a comparative index ranging from 0 to 100, with 100 being the best quality.

**Water Yield** – The total net amount of water produced on the Forests including streamflow and groundwater recharge.

**Watershed** – The area from which all surface water drains to a common point, commonly thought of as the area that drains water into a given lake or stream.

**Watershed Health** – The expression of ecological composition, structure, and function at the scale of the watershed. Same as watershed integrity.

**Wetlands** – Wetlands are areas that are inundated or saturated by surface or ground water at a frequency sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas and have been identified as palustrine areas by the U.S. Fish and Wildlife Service.

**Wheeled Skidder** – An internal combustion wheeled vehicle specifically designed to skid logs.

**Whole Tree Logging / Removal** – Felling and transporting the whole tree with its crown, and sometimes even its roots, for trimming and crosscutting at a landing or mill.

**Wild and Scenic River Corridor** – See “Wild River” and “Scenic River.”

**Wild, Scenic and Recreational Rivers Act** – Rivers or sections of rivers designated by Congressional actions under the 1968 Wild and Scenic Rivers Act as wild, scenic or recreational by an act of the legislature of the state or states through which they flow. Rivers may be classified and administered under one or more of the following categories: Wild River: River or section of river that is free of impoundments with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads. Scenic River: River or section of river that is free of impoundments, with watersheds still largely undeveloped, but accessible in places by roads. Recreational River: River or section of river that is readily accessible by road or railroad that may have some development along its shoreline and that may have undergone some impoundment or diversion in the past.

**Wilderness** – The National Wilderness Preservation Act of 1964 defined a wilderness as an area of undeveloped federal land designated by Congress that has the following characteristics: 1) It is affected primarily by the forces of nature, where people are visitors who do not remain. It may contain ecological, geological, or other features of scientific, educational, scenic, or historical value. 2) It possesses outstanding opportunities for solitude, or a primitive and unconfined type of recreation. 3) It is an area large enough so that continued use will not change its unspoiled natural condition.

**Wilderness Area** – A Congressionally designated tract of Federal land retaining its primeval character and influence without permanent improvements or human habitation. Management is intended to retain these characteristics.

**Wilderness Condition** – Describes the environment of a wilderness area that may or may not be designated for wilderness area management.

**Wilderness Permit** – Authorization in writing by a Forest Officer to enter and be in wilderness.

**Wilderness Study Area** – One of the areas selected by Congress from an inventory of unroaded and undeveloped National Forest System lands as having apparent high quality for wilderness. The area will be studied to determine whether it should be recommended for addition to the National Wilderness Preservation System.

**Wild River** – Wild and Scenic Rivers Act Usage - Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

**Wildfire** – Any fire that requires a suppression response.

**Wildland Fire Use** – Prescribed natural fire is a fire burning under specified conditions, to accomplish certain planned objectives; the fire may result from either planned or unplanned ignitions. A prescribed natural fire plan is one that permits certain fires to burn in a manner that duplicates natural conditions as much as possible. The policy allows for fire ignited by lightning

to burn under pre-planned, specific conditions and objectives.

**Wildland Urban Interface** – The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

**Wildlife and Fish User Day** – A 12-hour day of hunting, fishing, trapping or observing wildlife. This may be one person for 12 hours, two people for 6 hours, or any combination that totals 12 hours.

**Wildlife Habitat** – The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.

**Wildlife Structure** – A site-specific improvement of a wildlife or fish habitat. For example, spring development or dugout to provide water, brush pile for cover, nest box for birds, or rock and log placement in a stream for fish cover and pool creation.

**Windthrow** – Trees uprooted by wind.

**Winter Road** – Roads only used during frozen roadbed conditions and closed in other seasons. They usually are constructed to reduce ground disturbance, often without removal of existing topsoil and utilizing snow and ice as part of the road surface. They are typically Operational Maintenance Level 1 roads when not maintained for winter use, and move up to an Operational Maintenance Level 2 road when used.

**Woody Debris** – Dead, natural woody material greater than 4 inches diameter and longer than 3.2 feet, usually composed of poles and large branches. Various terms, such as large woody debris, coarse woody debris, and large organic debris, have been used to describe this material.

**Yard** – A place where logs are accumulated. Also describes the act of moving logs or trees to a landing; for example, by dragging with a cable or wheeled skidder.



## Huron-Manistee National Forests

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