CHAPTER 1
PURPOSE AND NEED

The Cadillac-Manistee Ranger District of the Huron-Manistee National Forests (HMNF) has proposed various vegetative management activities on National Forest System lands within the Black Locust Fuelwood Project Area (Project Area). The proposed Black Locust Fuelwood Project activities include approximately 23 acres of black locust non-native invasive plant species control. Firewood cutting would be allowed on 15 of the 23 acres. Black locust is a high quality species for those burning wood to heat their homes because of its high BTU output.

This Environmental Assessment (EA) is a site-specific analysis of the proposed activities. It discloses the direct, indirect, and cumulative environmental effects of implementing the Modified Proposed Action developed following public scoping, and the No Action Alternative. An interdisciplinary team (IDT) of Forest Service specialists prepared this EA (see Chapter 4).

Project Location and Size

The Project Area (see Map 1 at the end of this chapter) is located on the Cadillac-Manistee (CM) Ranger District of the HMNF in the following location: T23N, R12W, Sections 25 and 26, Springville Township, Wexford County. The Black Locust Fuelwood Project Area occurs within Compartment 52 of the CM Ranger District. The Project Area totals approximately 23 acres.

Management Direction

The Black Locust Fuelwood Project EA is tiered to the 2006 Huron-Manistee Land and Resource Management Plan as Amended (Forest Plan) (HMNF 2006a) and Final Environmental Impact Statement (HMNF 2006b). Relevant discussion from these documents would be incorporated by reference rather than repeated (40 CFR 1502.21).

The management prescription area (MA) of the Project Area is entirely within MA 2.1.

MA 2.1 is characterized by morainal hills and gently rolling plains where soils support northern hardwoods, aspen, and conifers, as outlined in the Forest Plan, page III-2.1-2. The primary purpose of MA 2.1 is as follows:

“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.”

Purpose and Need

The Purpose and Need for a project is arrived at by addressing the differences between the existing condition and the desired future condition. All management activities that occur within the HMNF are directed by the objectives of the Forest Plan. The plan identifies how different areas of the HMNF are to be managed. The Purpose and Need of the Black Locust Fuelwood Project is to: sustain forest and ecosystem health and improve timber stand conditions; provide early successional habitat; and, meet the goals and objectives of the Forest Plan for MA 2.1.
Treatments are proposed to address the Purpose and Need and accomplish the following objectives:

**SUSTAIN FOREST AND ECOSYSTEM HEALTH**

**Existing Condition:** The Project Area is composed of mixed hardwood stands encroached on by black locust (*Robinia pseudoacacia* L.). Black locust is a non-native invasive plant species in northern Michigan and quickly invades open woodlands, pastures and roadsides where it outcompetes many of the native woody-stemmed species that reside in those habitats and converts openings to woodlands. Black locust prevents the growth of native plant species by producing an allelopathic chemical.

**Desired Condition:** Stands of native species without the presence of black locust.

**Need:** There is a need to reduce current infestations, and the future spread of black locust in the Project Area, to sustain forest health.

**PROVIDE EARLY SUCCESSIONAL HABITAT**

**Existing Condition:** Many of the stands in the Project Area are over-mature. Creating openings within the Project Area would enhance wildlife habitat diversity by creating early successional habitat.

**Desired Condition:** Early successional habitat is sustained within the Project Area. The vegetative composition of upland openings consists primarily of grasses, forbs, and berry-producing shrubs.

**Need:** There is a need to provide early successional habitat in the Project Area and maintain upland openings to prevent the encroachment of tree species, and stimulate the growth of opening vegetation, berry-producing shrubs, and mast producing trees for wildlife habitat diversity.

**Proposed Action**

The Black Locust Fuelwood Project’s Proposed Action was described in the December 20, 2013, scoping letter. The range of activities has remained the same as those described in the scoping letter, but the acreage has changed due to updated information and the elimination of treatment units. The Modified Proposed Action is described below:

- **Compartment 52/Stands 3 and 36 – 15 acres (see map)**
  - These two stands of black locust would be converted to a 15 acre upland opening to reduce current infestations and future spread of non-native invasive plants, and to provide early successional habitat.
  - Black locust would be treated with a combination of herbicide spot treatment and firewood cutting. Tree species other than black locust within the stand would also be designated to cut. Hard mast producing trees and shrubs would be retained.
Temporary roads (approximately 1 mile) would be constructed into black locust firewood cutting areas. Temporary roads would be built on historical road beds. After project completion, the temporary roads would be re-shaped to allow proper drainage, blocked by means of an earthen berm (or other means), and seeded with native grasses.

Area to be cut would be designated on the ground and firewood cutting of designated trees would be permitted for those who purchase a firewood permit. Firewood removal would be completed using non-ground disturbing means (by hand).

After black locust is removed, stands would be planted with native grasses, shrubs and wildflowers, and managed as wildlife openings.

The openings created would be maintained by prescribed fire, brushing, and/or mowing.

Follow-up treatments using herbicide, brushing, and/or mowing may be necessary to meet objectives

Keeping in mind the decision to be made, it must be decided whether or not to implement the Modified Proposed Action, including vegetation management, wildlife habitat improvement, and transportation system management, and decide on the amount, type, and location of these activities.
Implementation

The majority of activities proposed in the Selected Alternative would be implemented within approximately ten years of the signing of the Decision Notice for this project. The entire process would likely take place within this 10-year timeframe, although unforeseen circumstances could alter timelines.

Scoping and Public Involvement

The Forest Service uses public involvement and an IDT of resource specialists to determine issues of concern and develop possible alternatives. Scoping is the process were comments are gathered about a site-specific proposed federal action to determine the scope of issues to be addressed and for identifying unresolved issues related to a proposed action (40 CFR 1501.7). Opportunities to comment enable concerned citizens, resource specialists from other agencies, and local governments to express their ideas and views.

Public involvement for the Black Locust Fuelwood Project included listing in the HMNF’s Schedule of Proposed Actions; a direct mailing on December 20, 2013 to approximately 72 individuals and organizations; and, a listing on the HMNF’s website. During the scoping period, 3 responses were received.

Relevant Issue

Issues result from discussion, debate, or disagreement regarding the effects of the Proposed Action. They are developed from comments received from within and outside the Forest Service. The issue that drove the development of the Modified Proposed Action was identified as a relevant issue. Other issues and management concerns are addressed in the Environmental Effects section in Chapter 3 of the EA, but were not used to develop the Modified Proposed Action. The relevant issue identified for this project is:

Impacts to Aquatic Organisms from Herbicide Use

This analysis will address the primary issue of impacts of aquatic organisms from herbicide in the Project Area. Comments were received that questioned the possibility that herbicide may get into the ephemeral stream (Smail Creek) and possible impacts herbicide may have on aquatic organisms.

Issue: Addresses the general concern about impacts of herbicide use on aquatic organisms within the Project Area.

Comments: A concern was raised in regards with use of herbicide in the Project Area.

Measurement: Square feet of herbicide use within standing or flowing water.
Resource Areas Considered for Analysis

The following issues and management concerns were also used to analyze the alternative. These issues were not used to develop the Action Alternative, but their environmental and social effects are discussed in Chapter 3. The following issues and resources have been discussed and/or evaluated in past projects. Some may be determined to be minor because they would not be affected by the project design. Only issues and resources that would be impacted by the Modified Proposed Action would be used in the evaluation of this project.

Management Indicator Species and Wildlife
The effects of the proposed activities on Management Indicator Species and wildlife have been evaluated as part of the analysis.

Vegetation Resources
The current vegetative resources and the expected changes as a result of implementing the proposed vegetative treatments, including the timber harvest treatments and opening creation have been evaluated as part of the analysis.

Soil Productivity
Potential impacts to soil resources have been evaluated as part of the analysis. Measures to minimize impacts to soil resources will be incorporated into the project.

Air Quality
Potential impacts to air resources have been evaluated as part of the analysis. Measures to minimize impacts to air resources will be incorporated into the project.

Water Quality and Fisheries
Potential impacts to water resources and fisheries that comprise the Project Area have been evaluated as part of the analysis. Measures to minimize the impacts to the water resources and the fisheries will be incorporated into the project.

Threatened, Endangered, and Sensitive Species
A Biological Evaluation has been completed as part of the analysis to determine the effects on threatened and sensitive plant and animal species.

Non-Native Invasive Plant Species
This analysis addresses the measures taken for invasive plant control of species already present in the Project Area and measures to reduce additional spread or introduction of invasive plants in areas that are to be managed.

Heritage Resources
Heritage resources have been identified in the Project Area. Recommended protection measures for these resources will be incorporated into the design of the project.

Social Economics
The environmental analysis addresses the effects of the proposed vegetative treatments on social economics and evaluates the cost-revenue of the alternatives.
Recreation and Visual Quality
The analysis evaluates how the proposed activities affect the visual quality and recreational use in the Project Area.

Transportation
The analysis addresses the effects of the project activities on the transportation system.

Civil Rights and Environmental Justice
The analysis addresses the civil rights and environmental justice impacts with implementation of the project.

Irreversible and Irretrievable Commitment of Resources
Potential irreversible and irretrievable impacts are disclosed with the implementation of the alternatives.

Availability of the Planning Record
An important consideration in preparation of this Environmental Assessment has been the reduction of paperwork as specified in 40 CFR 1500.4. In general, the objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated. The planning record contains detailed information used in creating the Environmental Assessment. This and other reference documents are available at the Cadillac-Manistee District Office in Manistee, Michigan.
CHAPTER 2
ALTERNATIVES

Introduction

This chapter describes the alternatives for sustaining forest and ecosystem health, improving timber stand conditions, and providing early successional habitat within the Black Locust Fuelwood Project Area. The Modified Proposed Action (Alternative 2) and the No Action Alternative (Alternative 1) for this project are described in this chapter. Table 2-1 displays the comparison of alternatives by activity. The Black Locust Fuelwood Project vicinity is shown on Map 1 at the end of Chapter 1.

Alternative Development Process

To prepare this analysis, a group of resource specialists, known as an interdisciplinary team (IDT), met and discussed how best to accomplish the objectives described in the Purpose and Need section of Chapter 1. The IDT members and resource specialists consulted for this project are listed in Chapter 4. The IDT identifies issues raised in the public scoping process, and from internal comments. In consideration of these issues, the IDT designs alternatives, if identified, that also address the project’s Purpose and Need. The National Environmental Policy Act regulations mandate consideration of all reasonable alternatives for a proposed action, including identification and discussion of alternatives eliminated from detailed study.

To develop alternatives, the IDT first reviewed all the comments and concerns expressed by the public and internal sources during the scoping process. These comments and concerns were then consolidated into a relevant issue. Once the relevant issue had been identified, the IDT developed strategies to be used to resolve the issue, while responding to the Purpose and Need objectives. The IDT also identified a measurement used to compare how the alternative responded to the issue for which it was developed.

Alternatives Considered in Detail

This assessment will evaluate the No Action Alternative (Alternative 1) and the Modified Proposed Action (Alternative 2). Alternative 2 is consistent with the standards and guidelines of the Forest Plan. Table 2-1: Treatment Activities by Alternative displays a summary comparison of alternatives by activity (See Appendix A for specific treatment unit card prescriptions).

Alternative 1: No Action

Alternative 1 is the No Action Alternative. Under Alternative 1, none of the proposed vegetative treatments or other management activities would occur in the Project Area on National Forest System (NFS) lands. Some activities, such as resource protection, would continue within the Project Area. Selection of Alternative 1 does not preclude future analysis or implementation of on-going management proposals within the Project Area.
Alternative 1 Summary:

- Under Alternative 1, none of the proposed vegetative treatments or other management activities would occur in the Project Area on NFS lands.
- Provides a baseline against which to describe the environmental and social effects of the Modified Proposed Action.
- Does not achieve the project’s Purpose and Need objectives.
- Does not achieve the Forest Plan’s desired condition for vegetative management or wildlife habitat improvements.

Alternative 2: Proposed Action

Alternative 2 is the Proposed Action that was described during scoping with minor changes to the original proposal. These changes are the result of portions of stands being dropped or acreage reduced due to circumstances such as wildlife issues. This Modified Proposed Action would implement the most vegetative treatments and the most wildlife habitat improvement activities in the Project Area.

Alternative 2:

- **Compartment 52/Stands 3 and 36 – 15 acres**
  - These two stands of black locust would be converted to a 15 acre upland opening to reduce current infestations and future spread of non-native invasive plants, and to provide early successional habitat.
  - Black locust would be treated with a combination of herbicide spot treatment and firewood cutting. Tree species other than black locust within the stand would also be designated to cut. Hard mast producing trees and shrubs would be retained.
  - Temporary roads (approximately 1 mile) would be constructed into black locust firewood cutting areas. Temporary roads would be built on historical road beds. After project completion, the temporary roads would be re-shaped to allow proper drainage, blocked by means of an earthen berm (or other means), and seeded with native grasses.
  - Area to be cut would be designated on the ground and firewood cutting of designated trees would be permitted for those who purchase a firewood permit. Firewood removal would be completed using non-ground disturbing means (by hand).
○ After black locust is removed, stands would be planted with native grasses, shrubs and wildflowers, and managed as wildlife openings.

○ The openings created would be maintained by prescribed fire, brushing, and/or mowing.

○ Follow-up treatments using herbicide, brushing, and/or mowing may be necessary to meet objectives

○ The opening creation would be removed from Land Suitability Class 500, (land suitable for timber production), to a Land Suitability Class 200(non-forested land).

- **Compartment 52/Stands 61, 62, and 39 – 8 acres**

○ These 3 stands of black locust would be converted to an 8 acre upland opening to reduce current infestations and future spread of non-native invasive plants, and to provide early successional habitat.

○ Black locust would be treated with cutting and herbicide spot treatment. Tree species other than black locust within the stand would also be designated to cut. Hard mast producing trees and shrubs would be retained.

○ After black locust is cut, stands would be planted with native grasses, shrubs and wildflowers, and managed as wildlife openings.

○ The openings created would be maintained by prescribed fire, brushing, and/or mowing.

○ Follow-up treatments using herbicide, brushing, and/or mowing may be necessary to meet objectives

○ The opening creation would be removed from Land Suitability Class 500, (land suitable for timber production), to a Land Suitability Class 200(non-forested land).

### Treatment Activities by Alternative

**Table 2-1**

<table>
<thead>
<tr>
<th>Treatment / Totals¹</th>
<th>Alt. 1 - No Action</th>
<th>Alt. 2 - Proposed Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wildlife/Plant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening Maintenance - Mechanical - acres</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Opening Maintenance - Burning - acres</td>
<td>0</td>
<td>23</td>
</tr>
</tbody>
</table>
### Activities Common to All Action Alternatives

The following mitigation measures would be required to implement treatment activities throughout the Project Area. Mitigation measures are designed to counteract potential environmental impacts or to make impacts less severe. These may include: avoiding an impact by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments. Some mitigation measures may apply only to a specific treatment unit. Mitigation measures specific to a treatment unit are described in detail in the Treatment Unit Cards (Appendix A).

#### Resource Protection

- Recommendations included in the State of Michigan Sustainable Soil and Water Quality Practices on Forest Land (BMPs) (MDNR 2009) and (USDA-Forest Service Handbook 2550, supplement No. R9 RO 2550-2012-1 would be incorporated to provide protection of soil and water resources.
- Protect known heritage resource sites in accordance with State Historic Preservation Office guidelines. Mitigation measures used to avoid site disturbance would be applied to all action alternatives. Site specific heritage resource mitigation measures are incorporated into the individual treatment units cards (see Appendix A). If any unknown heritage resource sites would be found when ground disturbing activities are taking place on the project, the activity would stop until a professional heritage resource specialist is informed and adequate protection measures are applied to avoid potential impacts.
- Protect known threatened, endangered, or sensitive (ETS) species and the immediate habitat in which they are found. If any additional ETS species are found during project implementation, the project would stop until the District Wildlife Biologist or Botanist is informed and adequate protection measures applied if needed to avoid potential impacts.
- Only black locust trees may be removed within the 100 foot RMZ on either side of the channel.
- Herbicide treatments will be conducted by State of Michigan certified pesticide applicators and will not occur in standing or flowing water to further protect water quality.

#### Rehabilitation

- After project completion, temporary roads would be re-shaped to allow proper drainage, blocked by means of an earthen berm (or other means), and seeded with native grasses.
Monitoring

Monitoring would be conducted to determine if resource management objectives for the Project Area have been met. Monitoring results would be used to verify the effectiveness of selected mitigation and protective measures in a timely manner. This process ensures that project elements are implemented as designed and that standards and guidelines are implemented to protect soil, water, and other resources. The following monitoring would be performed for the Modified Proposed Action:

Implementation Monitoring

Mitigation Measure Implementation

Objective: Ensure mitigation measures for each treatment unit are being implemented.
Desired Results: Mitigation measures are effective in addressing resource issues.
Methods: All treatment units would be visited by district personnel. Reviews would be documented in inspection reports regarding contract compliance.
Responsibility: District assistant rangers for timber, recreation, and wildlife.

Invasive Plants

Objective: Ensure that the spread of invasive plants is minimized.
Desired Result: No spread of invasive plants due to treatments would occur.
Methods: Ocular inspection within the first two years after the treatment of a unit.
Responsibility: District botanist.

Effectiveness Monitoring

Forest Plan Monitoring

The National Forest Management Act requires that national forests monitor and evaluate their forest plans. Forest plan monitoring is conducted over the entire forest on a periodic basis. Samples for Forest Plan monitoring may or may not be taken in the Project Area; however, monitoring results are designed to answer questions regarding the implementation and effectiveness of mitigation. Forest Plan monitoring results can be found in the FY2010-FY2011 Monitoring and Midterm Evaluation Report found on the HMNF’s website.

Alternatives Considered but Eliminated from Detailed Study

The IDT considered two alternatives during the analysis before the Modified Proposed Action was considered for detailed study. The alternative that was eliminated from detailed study is described as follows:

Original Proposed Action - The Black Locust Fuelwood Project Proposed Action was described in the December 20, 2013 scoping letter and in Chapter 1. After additional site-specific
resource information became available on the project. Minor changes to boundaries and specific treatments were made.
CHAPTER 3
AFFECTED ENVIRONMENT
AND
ENVIRONMENTAL EFFECTS

Introduction
This chapter presents information on the existing conditions in the Black Locust Fuelwood Project Area (henceforth referred to as the Project Area) and an analysis of the effects of the No Action Alternative (Alternative 1) and the Modified Proposed Action (Alternative 2). The affected environment for this project is the Project Area within the Huron-Manistee National Forests (HMNF). Resource-specific information, existing condition, and environmental effects are discussed together under each issue. This chapter presents a summary of the analysis and the data utilized in completing the analysis. The information used to prepare this analysis is in the Project Planning Record and is available for review at the Cadillac-Manistee Ranger District.

Area of Analysis
The area of analysis for this project includes all the compartments that make up the Project Area including private lands. In the discussion of the relevant issue and other resource areas and their effects that follows, some resources require a larger area of analysis. An example would be air quality issues that could impact areas outside the Project Area. In those cases, the area of analysis is discussed and further defined under the specific resource area.

The Project Area is made up entirely of Management Areas (MA) 2.1. According to the Forest Plan, MA 2.1 is characterized by morainal hills and gently rolling plains where the soils support northern hardwoods, aspen, and conifers. As stated in the Forest Plan, part of the purpose of MA 2.1 is to provide high volumes of firewood with special consideration for enhancing wildlife habitats. Among the goals and objectives stated in the Forest Plan there is a need to manage permanent openings to meet species habitat needs. The desired future condition includes timber stands dominated by red oak, sugar and red maples, beech, ash, black cherry, and aspen, with inclusions of red and white pines. The dominant trees in stands are the approximately 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 (Forest Plan III-2.1-2-3).

Management Indicator Species and Wildlife
Area of Analysis
The analysis area for direct and indirect effects on wildlife resources includes an area of approximately a half mile from where the proposed project activities in the Modified Proposed Action would occur on the ground. This area was chosen because this is the distance that the disturbance from the proposed activities could possibly affect most wildlife species. The cumulative effects area (CEA) for wildlife resources encompasses the Project Area and all lands within approximately a half mile from the Project Area boundary. The buffer around the
Project Area would include the majority of the habitat utilized in the home ranges of wildlife species found within, or immediately adjacent to, the Project Area. Dispersal of most wildlife species from or into the Project Area would likely be contained within the CEA. This area would also provide additional consideration for Regional Forester’s Sensitive Species (RFSS) that may occur in the area. The timeframes for the cumulative effects analysis are generally from 2004 through 2024.

**Existing Condition**

A list of the wildlife management indicator species (MIS) and management direction for these species on the HMNF are found in the Forest Plan (page II 31-34) and Final Environmental Impact Statement (FEIS) (pages III-179 to III-192). Trends for wildlife MIS on the HMNF are discussed in the 2010/2011 Monitoring and Evaluation Report (HMNF 2013). The effects of the proposed activities on wildlife MIS are summarized for both alternatives in Table 3-1 below.

### Comparison of Effects on Management Indicator Species

#### Table 3-1

<table>
<thead>
<tr>
<th>Management Indicator Species</th>
<th>Principal Habitat Characteristics</th>
<th>Existing Condition in Project Area</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bald Eagle <em>(Haliaeetus leucocephalus)</em></td>
<td>Super-canopy trees within a mile of large water bodies; secluded settings with abundant rough fish nearby.</td>
<td>Suitable habitat not present within Project Area.</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Kirtland's Warbler <em>(Dendroica kirtlandii)</em></td>
<td>Large blocks of young jack pine, age 6-23 years old, in LTA 1.</td>
<td>Suitable habitat not present within Project Area. Discussed in Biological Evaluation.</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Karner Blue Butterfly <em>(Lycaedes melissa samuellis)</em></td>
<td>Savanna or barrens habitat with an abundance of wild lupine and other nectar sources.</td>
<td>Suitable habitat not present within Project Area. Discussed in Biological Evaluation.</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Ruffed Grouse <em>(Bonasa umbellus)</em></td>
<td>Aspen and aspen-alder mixes, 5-25 years old provide brood habitat and cover, with older age classes for nesting and winter food sources.</td>
<td>Suitable habitat not present within the Project Area.</td>
<td>No change</td>
<td>Creates and maintains 23 acres of opening habitat. Would assist in meeting Forest Plan objectives for early successional habitat, which would benefit grouse.</td>
</tr>
</tbody>
</table>

...
According to the 2010/2011 Monitoring and Evaluation Report (HMNF 2013), the status of most of the vegetation types currently represented on the HMNF is generally consistent with projections in the Forest Plan. However, there is less early successional habitat than was projected in the Forest Plan. This project would create an additional 23 acres of openings early successional habitat, provide habitat for a variety of wildlife species, promote native vegetation, and control non-native invasive plants.

Wildlife surveys were conducted in the Project Area within stands proposed for treatment on various dates from 2006-2013. Ruffed grouse was the only wildlife MIS documented in the Project Area. These surveys found no federally listed species or RFSS. However, RFSS were found in other project areas outside the Black Locust Project Area. Effects to RFSS are described in the Biological Evaluation (see Planning Record). Species of wildlife commonly hunted or trapped within the Project Area include but are not limited to white-tailed deer, wild turkey, ruffed grouse, fox and gray squirrels, black bear, and coyote.

The Direct and Indirect Effects of Implementing Alternative 1

In general, the current wildlife populations would not likely change in the near future under Alternative 1. However, the non-native invasive black locust degrades wildlife habitat. As described in MDNR-MNFI (2012), black locust contains several toxic components in its leaves, stems, bark, and seeds. Black locust is poisonous to all animals if ingested (Ohio State 2014). Not only is it poisonous, it invades disturbed areas and poses a threat to open woods (MDNR-MNFI 2012). Failure to control the black locust infestation under Alternative 1 would result in the continued infestation and degradation of wildlife habitat. This alternative does not assist with meeting the Forest Plan objectives for creating early successional forest habitat and maintaining upland opening habitat.

The Direct and Indirect Effects of Implementing Alternative 2

Black locust trees would be removed in two stands totaling 23 acres and temporary road construction would occur (approximately 1 mile). Two upland openings would be created in the stands where the black locust trees are removed. A variety of treatments would be used to maintain the openings, including planting native grasses and wildflowers, brushing, brush pile creation, mowing, and burning. Planting grasses and wildflowers would increase the diversity and abundance of native herbaceous vegetation that is important to native pollinators. These activities would have minimal direct effects to wildlife as they impact small acreages with a minimal amount of disturbance.

Removal of the black locust trees would improve the quality of wildlife habitat in the Project Area because black locust is poisonous to animals if ingested (Ohio State 2014). Habitat improvements in the created openings would assist in maintaining the quality of upland open habitat on the HMNF by providing a diversity of foraging habitats, promoting nectar sources from wildflowers and shrubs, and providing other features important to wildlife, such as sunning areas. Upland openings benefit species such as the ruffed grouse (Jones et al. 2008), eastern bluebird (Pinkowski 1991), golden-winged warbler (Rossell et al. 2003), wild turkey (Wunz and Pack 1992), small mammals (Tucker 1992), and various insects such as native bees and butterflies (Collinge et al. 2003). Alternative 2 assists in meeting Forest Plan direction for managing openings to meet species viability needs.
The openings that are created would be burned periodically. Prescribed burning in upland openings encourages native vegetation which helps support greater insect and bird abundance and diversity (Burghardt et al. 2009). These controlled burns could directly impact small numbers of wildlife, especially small and less mobile individuals. The prescribed burns would occur primarily from September 1 through May 1. This timing would assist in protecting wildlife species such as breeding birds, bats, amphibians, and reptiles as they would less likely be in the treated areas at this time or they would be in areas that would be less affected (underground). Burning may result in short-term reductions in the suitability of habitat for ground and low-shrub-nesting birds, but may improve habitat for foraging birds, such as wild turkeys and grouse, and deer (Euler and Thompson 1978, Main and Richardson 2002, Jones et al. 2008). Some studies have suggested that some amphibian populations may experience short-term benefits from fire (Hossack and Corn 2007). The proposed prescribed burns under Alternative 2 would not directly impact the viability of wildlife species within the Project Area.

Alternative 2 would slightly decrease the amount of mature forest habitat on NFS lands within the Project Area by approximately 23 acres with the black locust tree removal and the temporary road construction activities. The decrease in mature forest would not likely impact the overall numbers of mature forest habitat dependent species, such as martens, pileated woodpecker, and squirrels. The project activities encompass a small area and there is a vast amount of suitable mature forest habitat present on the HMNF. Therefore, there would not likely be adverse direct impacts to wildlife populations from the proposed project activities.

The Project Area likely contains breeding populations of various Michigan bat species as there are summer records of bat species on the HMNF (Kurta 2000, USDA 2011), including the little brown bat and the northern long-eared bat. There is a slight potential that some of the trees cut for the black locust removal and road construction activities are used by bats for den or nest sites. Numbers of bats within the Project Area are likely low due to the small size of the project and the low number of snag, den, and cavity trees. Suitable bat roost trees are considered abundant throughout the HMNF and the amount of roost tree habitat that would be lost in the Project Area is minimal. No loss of viability would occur for these bats on the HMNF due to the small amount of habitat and individuals impacted with this project.

Herbicide application of glyphosate and triclopyr, (or generic equivalents) to control black locust could occur within habitat used by wildlife on a small scale. Herbicide would be applied on a limited basis and would not likely come into direct contact with wildlife. These herbicides are not expected to bioaccumulate in the food chain (USDA 2008). Because of the small area of treatment, foods eaten by wildlife would not likely come in direct contact with herbicide spray or recently treated foliage, and would not be likely to feed solely on plant parts recently treated with herbicide sprays. Thus, chemical removal of non-native invasive species is not expected to adversely affect suitable foraging habitat for wildlife. In the long-term, mechanical and chemical removal of non-native invasive species would likely benefit wildlife by improving habitat quality, biodiversity, suitable foraging habitat, and prey availability within the Project Area.

The Cumulative Effects of Implementing Alternatives 1 and 2

Factors such as wildlife management, forest management, fire suppression, ecological succession, and development have influenced wildlife populations within the CEA and continue to do so. In general, the overall forest ecosystem within the CEA favors wildlife species preferring maturing forest types. The activities that have been conducted on NFS land in the CEA since 2004 include approximately 14.5 acres of NNIS herbicide application, 1.5 acres of mechanical NNIS control,
24 acres of hardwood shelterwood, 112 acres of red pine thinning, 17 acres of wildlife opening improvement, 3.5 acres of landing rehabilitation, 1 mile of new road construction, 1 mile of road closure, and 1 mile of snowmobile trail reroute. Activities that are planned in the near future on NFS land include wildlife opening improvement and additional vegetation treatments. These activities have improved wildlife habitats and habitat diversity. The vegetative treatments proposed in Alternative 2 along with future management direction from the Forest Plan would meet or move the Project Area towards Forest Plan objectives and provide for stable or improved habitat conditions for most of the wildlife species currently found within the CEA.

It is anticipated there would be no significant changes in activities on NFS and private lands in the CEA. Some activities such as road building, land development, timber harvest, and pesticide application could have a negative impact on wildlife habitat within the CEA. While these activities may impact habitat on private lands within the CEA, there is a significant amount of NFS land that provides suitable wildlife habitat on the HMNF. The timber harvest activities (thinning and shelterwood treatments) that were conducted within the CEA would have retained snag and den trees according to Forest Plan guidelines and would have protected some individuals and cavity nesting habitat. The HMNF would continue to be managed under the direction of the Forest Plan (HMNF 2006a), including retaining snag, cavity, and den trees, in vegetative treatment on NFS lands, where possible. In the long-term, mechanical and chemical removal of non-native invasive species would likely benefit wildlife habitat diversity by improving biodiversity, suitable foraging habitat, and prey availability within the CEA.

Bats have the potential to be present in the CEA, including little brown bats and northern long-eared bats, which have historically been common throughout their range. Many eastern North American bat populations are at risk from the quickly spreading white-nosed syndrome (WNS). Although WNS has not been documented in Michigan yet, these bat populations on the HMNF are likely negatively impacted by this disease because individuals may hibernate in areas where WNS has been found.

The vast majority of bats with WNS have been found during the winter in caves where the bats hibernate. Recent surveys of this Tippy Dam hibernaculum in 2010-2014 did not find evidence of WNS (Kurta, personal communication). To date, no confirmed cases of WNS have been found on or near the HMNF or anywhere else in Michigan. Bat swarming surveys at Tippy Dam have been suspended due to the WNS precautions (Kurta, personal communication). There would be no direct effects to the Tippy Dam wintering bat population as the CEA is about 10 miles away.

**Endangered, Threatened, and Sensitive Species**

Resource-Specific Information and Existing Condition

The area of analysis for direct and indirect effects to endangered, threatened, and sensitive (ETS) species is the NFS lands where treatments are proposed, which is included entirely on NFS land totaling 23 acres. The cumulative effects analysis area for threatened, endangered, and sensitive species is the Project Area plus all lands within a half mile buffer around the Project Area. The size of the CEA, including the Project Area and ½ mile adjacent to the Project Area is about 912 acres, including 870 acres of NFS land and 42 acres of private land. The buffer around the Project Area would include additional consideration for the habitat utilized in the home ranges of RFSS found within or immediately adjacent to the Project Area. Dispersal of most wildlife species from or into the Project Area would likely be contained within the CEA. The CEA would provide additional consideration for these species that may inhabit this area. This area would also provide additional consideration for plant and aquatic RFSS that may occur in this area.
A BE was prepared for the Black Locust Project (see Planning Record). The BE evaluated the effects of this project under both alternatives on RFSS that may inhabit the Project Area. The RFSS analyzed in the BE were species that had the potential to occur within or near the Project Area based upon suitable habitat and known occurrences. Sources of occurrences were MNFI, Forest Service Natural Resource Information System Wildlife database, and Project Area surveys.

Sensitive plant species were included in analysis for the Project Area if they had been documented within a county occupied by the Manistee National Forest or if the Project Area was within the species’ distribution in Michigan. If there were no records of a sensitive species within a county occupied by the Cadillac-Manistee Ranger District or if the Project Area was outside of the species’ distribution, it was assumed that the species was unlikely to be present within the Project Area. In addition to field surveys for sensitive species within the Project Area, several sources were checked to determine if a sensitive species had ever been documented in the area, including the Cadillac-Manistee ETS database, Biota of North America Program (www.bonap.org), MNFI, and Michigan Flora Online (http://herbarium.lsa.umich.edu/website/michflora/).

The Direct, Indirect, and Cumulative Effects of Implementing Alternatives 1 and 2

The BE documented the determinations of effects of the Black Locust Project activities on RFSS for both alternatives. The cumulative effects of other activities are considered minimal in the near future. It is anticipated there would be no significant changes in activities in the Project Area. The Forest Service has no authority over private land use, use of state or private accesses, and use of waterways. Additionally, any future local or private actions that would occur in the area on NFS lands would require a permit from the Forest Service and would require compliance with the ESA and Forest Service Manual. Biological Assessments and Evaluations would be prepared for future activities on NFS lands in the vicinity of the Project Area as well as across the HMNF in order to evaluate potential effects to ETS species and, if needed, to make habitat or species protection recommendations related to the proposed projects. Management for federally listed species and RFSS on the HMNF has generally increased the population or habitats of these species (HMNF 2013).

The BE determined that there are no federally threatened or endangered species known to occur in the Black Locust Project Area or would be impacted by the proposed activities. The determinations for RFSS wildlife, plant, and aquatic species that could occur within the Project Area are listed in the tables below. The determinations were made contingent on implementation of the Mitigation Measures listed in the BE. These Mitigation Measures were incorporated into the Mitigation Measures section in Chapter 2 of the EA. All other RFSS wildlife and plant species for the HMNF were considered but were not expected to occur within the Project Area. Therefore, they would not be affected by the proposed alternatives.
### Determination of Effects for Wildlife RFSS

**Table 3-2**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Alternative</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaucomys sabrinus</td>
<td>Northern Flying Squirrel</td>
<td>1 2</td>
<td>No impact *MINT</td>
</tr>
<tr>
<td>Martes americana</td>
<td>American Marten</td>
<td>1 2</td>
<td>No impact MINT</td>
</tr>
<tr>
<td>Myotis lucifugus</td>
<td>Little Brown Bat</td>
<td>1 2</td>
<td>No impact MINT</td>
</tr>
<tr>
<td>Myotis septentrionalis</td>
<td>Northern Long-eared Bat</td>
<td>1 2</td>
<td>No impact MINT</td>
</tr>
<tr>
<td>Accipiter gentilis</td>
<td>Northern Goshawk</td>
<td>1 2</td>
<td>No impact MINT</td>
</tr>
<tr>
<td>Buteo lineatus</td>
<td>Red-shouldered Hawk</td>
<td>1 2</td>
<td>No impact MINT</td>
</tr>
<tr>
<td>Melanerpes erythrocephalus</td>
<td>Red-headed Woodpecker</td>
<td>1 2</td>
<td>No impact MINT</td>
</tr>
<tr>
<td>Pyrgus wyandot</td>
<td>Southern Grizzled Skipper</td>
<td>1 2</td>
<td>No impact Beneficial effects</td>
</tr>
</tbody>
</table>

*MINT = May impact individuals or sub-populations, but not likely to cause a trend towards federal listing or loss of viability.

### Determination of Effects for Plant RFSS

**Table 3-3**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Alternative</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabis missouriensis</td>
<td>Missouri rock cress</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Asclepias purpurascens</td>
<td>Purple milkweed</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Berula erecta</td>
<td>Wild parsnip</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Botrychium oneidense</td>
<td>Oneida grape fern</td>
<td>1 2</td>
<td>Beneficial effects MINT</td>
</tr>
<tr>
<td>Botrychium rugulosum</td>
<td>Ternate grape fern</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Carex schweinitzii</td>
<td>Schweinitz’s sedge</td>
<td>1 2</td>
<td>MINT MINT</td>
</tr>
<tr>
<td>Cirsium hillii</td>
<td>Hill’s thistle</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Cynoglossum virginianum var. boreale</td>
<td>Northern wild comfrey</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Dalibarda repens</td>
<td>False violet</td>
<td>1 2</td>
<td>Beneficial effects MINT</td>
</tr>
<tr>
<td>Dryopteris goldiana</td>
<td>Goldie’s wood fern</td>
<td>1 2</td>
<td>Beneficial effects MINT</td>
</tr>
<tr>
<td>Eleocharis engelmannii</td>
<td>Engelman’s spike rush</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Geum triflorum</td>
<td>Prairie smoke</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Juglans cinerea</td>
<td>Butternut</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
<tr>
<td>Juncus brachycarpus</td>
<td>Small-headed rush</td>
<td>1 2</td>
<td>MINT Beneficial effects</td>
</tr>
</tbody>
</table>
The Black Locust Fuelwood project area is located in the Smail Creek watershed. Smail Creek is a perennial tributary to the Manistee River confluent with the Hodenpyle Reservoir that transitions into intermittent/ephemeral flow about 300 feet upstream of the old M-37 road. Forest Road 5036 crosses Smail Creek via culvert within the project area and in 2013 and 2014 this portion of the channel was dry with no indication of water movement in over a year. The bed of the old closed road running north-south along the western boundary of the unit crosses what would be the dry channel of Smail Creek. This site has no existing culvert and shows no sign of
stream flow, ponding, or over-topping in many years. (See Images 3-1 – 3-3) Perennial flow occurs upstream of the project area with a downstream terminus at County Road 24.

In August 1997 the segment of Smail Creek located in the project area was identified as dry, however flowing water was mapped upstream and downstream. An 800-foot segment of Smail Creek on National Forest System lands located about one mile downstream of the project area and upstream of M-37 was surveyed that year for fisheries resources. Data records indicate the presence of a reproducing population of brook trout; no other fish species was recorded. A species of frog was also observed and noted during this survey. The presence of this self-sustaining trout population is further evidence that flow in the lower portion of Smail Creek is perennial.

Aquatic Endangered Species Act Listed and Region 9 Sensitive Species
As identified by the USFWS, there are no federally listed (Threatened, Endangered, Proposed or Candidate) aquatic species on the Manistee National Forest. The Regional Forester has identified nine sensitive aquatic species that may occur in the surface waters that may occur in surface waters of the HMNF; redside dace (Clinostomus elongatus), channel darter (Percina copelandi), lake sturgeon (Acipenser fulvescens), river redhorse (Moxostoma carinatum), greater redhorse (Moxostoma valenciennesi), and pugnose shiner (Notropis anogenus. None of these species are known to occur within the Smail Creek watershed. Implementation of the proposed activities may impact individuals of these respective aquatic RFSS, but is not likely to cause a trend to federal listing or loss of viability.

Region 9 sensitive freshwater mussels that are known to occur on the Manistee National Forest include slippershell (Alasmidonta viridis), black sandshell (Legumia recta), and creek heelsplitter (Lasmigona compressa). To date, no surveys have been conducted for R9 sensitive mussels in Smail Creek. Surveys that have been made in similar stream habitats across the Manistee National Forest rarely find any of these three species. As a mitigation measure, surveys for these species will be made previous to the implementation of the project. Given the spatial scale and separation of the proposed activities from any aquatic habitat, implementation of these activities may impact individuals but are not likely to cause a trend to federal listing or loss of viability for any of these three freshwater mussel species.

Aquatic MIS Species
There are two aquatic management indicator species (MIS) identified in the Forest Plan, brook trout (Salvelinus fontinalis) and mottled sculpin (Cottus bairdi). The 1997 fisheries survey identified brook trout but no sculpin in Smail Creek. The Smail Creek watershed contains 0.25 mi of state road (M-37), 6.54 miles of county road, and 27.1 miles of forest roads open to the public. This equates to a total road mileage of 33.89 miles and a road density of 2.78 mi/mi², most of which occurs within the ephemeral portions of the drainage. In a study evaluating the probability of brook trout extirpation, Thieling (2006) identified a threshold range of 1.8-2.0 mi road/mi² for predicting extirpation at the watershed scale. Thieling’s criteria suggest that road/trail densities in the project area are high enough to cause concern for brook trout populations, which are an MIS species on the HMNF. It should be noted that Thieling’s criteria were developed for a wide variety of watershed types; given the relatively low-to-moderate relief of the watershed, its spatially dominant dry/ephemeral channel pattern, and the groundwater driven hydrology of its perennial surface flow, brook trout populations may not be at as high a risk of extirpation. In Smail Creek, the limited amount of perennial habitat, combined with fragmentation by upstream and downstream roads and the history of vegetation management, suggests this spatially limited population could be at risk of extirpation in the event of one or
more natural disturbance events. Continued monitoring at the forest scale will help better understand the distribution and health of this and other brook trout populations.

Smail Creek is a sub-watershed of the larger Hodenpyle Dam Pond watershed that is composed of 27% open space. Thieling (2006) found that managers should be concerned when agricultural land cover (a subset of open space) is in the 12-19% range, or higher. While data describing agricultural land cover is not available for the Hodenpyle Dam Pond watershed in the HMF GIS database and precludes such an analysis, Thieling’s recommendation reflects how open space can impact brook trout and potentially other aquatic species and is worth considering.

The proposed action will remove 23 acres of forest cover that will also be maintained via burning, mechanical, and herbicide treatments. In addition, less than 1 mile of temporary road will be constructed and then obliterated and re-vegetated as part of project close-out activities. Forest Plan guidance is to adhere to State of Michigan Best Management Practices (BMPs) for vegetation management activities adjacent to streams. The state BMPs, amended in 2009, refer to riparian management zones (RMZ) on perennial and intermittent channels, and recommend a minimum 100 foot buffer width from either side of a stream to protect water quality. Activity within the RMZ buffer is acceptable where there is little chance of significant soil disturbance, no chance of water sedimentation, and only select trees are being removed. As mitigation to protect water quality, only black locust trees may be removed within the 100 foot RMZ on either side of the channel. Motorized traffic occurring as part of fuel wood removal by the public is limited to the surface of FR 5036 and the two temporary roads. All trees removed will be done on foot using only chainsaws and or other hand saws/equipment, and therefore water quality is protected from the risks associated with tree removal activities. Herbicide treatments will be conducted by State of Michigan certified pesticide applicators and will not occur in standing or flowing water to further protect water quality.

Given the spatial scale and intensity of the proposed activities, implementation of these activities would pose minimal risk to watershed or stream condition, and is not likely to impact the brook trout population in Smail Creek. As mottled sculpin are absent from this stream system, there is no risk of the project upon this species.

The Direct and Indirect Effects of Implementing Alternative 1

Under Alternative 1, no action would occur and the existing condition and trends in aquatic populations and habitat condition in Smail Creek are expected to remain the same as described above. There would be no direct or indirect effects to aquatic resources.

The Cumulative Effects of Implementing Alternative 1

Watershed management in this watershed would continue to concentrate on reducing erosion introduction and routing into streams, upgrading roads and stream crossings in Smail Creek to provide for aquatic organism passage and stream function, lowering road densities, maintaining/restoring riparian buffer zones, and restoring in-stream habitat. These types of projects should lead to improved water quality and aquatic habitat. The trend in human-caused deforestation was at its worst after the intense period of logging in the late 1800’s, followed by a period of re-forestation and agricultural and urban development. By 2013, approximately 27% of the drainage area in the project area is considered non-forested (cropland, open fields, or early successional forest). Loss of wetland/swamp habitat in the project due to drains as part of agricultural/urban development is considered to be relatively minor. Combined, the above types
of land conversion can impact the flood hydrograph, increasing the rates of flow delivery and bank erosion, changing channel morphology, and reducing groundwater recharge. As the human population continues to increase within the watershed, the patterns of development will continue to expand, further aggravating these impacts to hydrologic function and aquatic resources.

The Direct and Indirect Effects of Implementing Alternative 2

The area of analysis for direct and indirect effects to aquatic resources encompasses the Smail Creek watershed (7,813 acre, 12.2 mi²). Smail Creek is a sub-watershed of the larger Hodenpyle Dam Pond hydrologic unit code (HUC) that is composed of 27% open space. The proposed action would remove 23 acres of forest cover that would also be maintained via burning, mechanical, and herbicide treatments. In addition, less than 1 mile of temporary road would be constructed, followed by closure and re-vegetation as part of project close-out activities. Forest Plan guidance is to adhere to State of Michigan Best Management Practices (BMPs) for vegetation management activities adjacent to streams. The state BMPs, amended in 2009, refer to riparian management zones (RMZ) on perennial and intermittent channels, and recommend a minimum 100 foot buffer width from either side of a stream to protect water quality. Activity within the RMZ buffer is acceptable where there is little chance of significant soil disturbance, no chance of water sedimentation, and only select trees are being removed. As mitigation to protect water quality, only black locust trees may be removed within the 100 foot RMZ on either side of the channel. Motorized traffic occurring as part of fuel wood removal by the public is limited to the surface of FR 5036 and the two temporary roads. All trees removed would be done on foot using only chainsaws and or other hand saws/equipment, and therefore water quality is protected from the risks associated with tree removal activities. Herbicide treatments will be conducted by State of Michigan certified pesticide applicators and will not occur in standing or flowing water to further protect water quality. Given the spatial scale and intensity of the proposed activities, implementation of these activities would pose minimal risk to watershed or stream condition, and is not likely to impact the population of brook trout in Smail Creek.

Vegetation treatments would create pockets of non-forest cover (i.e., open acres) in the watershed, resulting in indirect effects to the flood hydrograph, stream bank integrity, channel geomorphology, and sediment budget. In a 7,813 acre watershed that has about 27% open space, the addition of 23 acres as a result of this project would not change the percent open space and would not exceed the desired future condition guideline of 66% described in the Forest Land and Resource Management Plan (LRMP). Adherence to the LRMP Watershed Management standards and guidelines (pages II-18 to II-22), particularly the Streamside Management Zone (SMZ/RMZ) guideline should protect aquatic resources from any direct and/or indirect impacts to habitat from various vegetation treatments.

The Cumulative Effects of Implementing Alternative 2

Watershed management in this watershed would continue to concentrate on reducing erosion introduction and routing into streams, upgrading roads and stream crossings in Smail Creek to provide for aquatic organism passage and stream function, lowering road densities, maintaining/restoring riparian buffer zones, and restoring in-stream habitat. These types of projects should lead to improved water quality and aquatic habitat. The trend in human-caused deforestation was at its worst after the intense period of logging the late 1800’s, followed by a period of re-forestation and agricultural and urban development. By 2013, approximately 27% of the drainage area in the project area is considered non-forested (cropland, open fields, or early successional forest). Loss of wetland/swamp habitat in the project due to drains as part of
agricultural/urban development is considered to be relatively minor. Combined, the above types of land conversion can impact the flood hydrograph, increasing the rates of flow delivery and bank erosion, changing channel morphology, and reducing groundwater recharge. As the human population continues to increase within the watershed, the patterns of development will continue to expand, further aggravating these impacts to hydrologic function and aquatic resources. Vegetation treatments proposed under Alternative 2 would further increase open space within the affected HUCs but is considered relatively minor.

**Vegetation Resources**

**Resource-Specific Information & Existing Condition**

The area of analysis for the direct, indirect, and cumulative effects on vegetation is the NFS lands where treatments will occur. This area represents where impacts from the proposed treatments will occur.

The dominant tree species in the Project Area are directly related to either landtype or historic events. Black locust was planted in these locations around 1936 principally to reduce soil erosion. Other native tree, shrub and herbaceous species occur with the black locust, but because of elevated nitrogen effects, are less common (USDA 2014) (http://www.fs.fed.us/database/feis/plants/tree/robpse/all.html).

### Existing and Desired Vegetation Classes

**Table 3-5**

<table>
<thead>
<tr>
<th>Vegetation Class</th>
<th>Acres</th>
<th>% of Existing Vegetation</th>
<th>% of Desired Vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Hardwood</td>
<td>757</td>
<td>59</td>
<td>8 - 14</td>
</tr>
<tr>
<td>Long-lived Conifer</td>
<td>205</td>
<td>16</td>
<td>17 - 23</td>
</tr>
<tr>
<td>Aspen/Birch</td>
<td>88</td>
<td>7</td>
<td>10 - 16</td>
</tr>
<tr>
<td>Openings</td>
<td>60</td>
<td>5</td>
<td>4 - 10</td>
</tr>
<tr>
<td>Short-lived Conifers</td>
<td>160</td>
<td>12</td>
<td>2 - 8</td>
</tr>
<tr>
<td>Lowland Hardwoods/Conifers</td>
<td>19</td>
<td>&lt; 1</td>
<td>4 - 15</td>
</tr>
</tbody>
</table>

The Project Area occurs within Compartment 52, with approximately 1,289 acres of NFS lands; vegetative treatments are being considered only in stands 3, 36, 39, 61 and 62, a total of 23 acres. **Table 3-5 Existing and Desired Vegetation Classes** shows the amounts of forested and non-forested National Forest land in this compartment. Desired Vegetation is the Forest Plan Composition Objective for the Manistee National Forest in 2016.

Compartment 52 is located in a large area of LTA 2 where the northern hardwood vegetation class is the predominant, and where plantation conifers were established decades ago. Black locust is classified as a component of the northern hardwood vegetation class, as it is most frequently found on soils capable of supporting component species of this vegetation class.

See the Treatment Unit Cards in Appendix A for information on specific units.
The Direct and Indirect Effects of Implementing Alternative 1

The area of analysis for the direct and indirect effects on forest vegetation is the NFS lands where treatments will occur, and adjacent National Forest and private lands within ¼ mile of treatment sites. The area of analysis for the cumulative effects on all vegetation is the Manistee National Forest (including State of Michigan and private lands) within its proclaimed boundary. This large area represents where manipulation of similar forest ecosystems, in response to market and non-market forces, affects current and future forest vegetation patterns.

Retaining 23 acres of this Vegetation Class (1.7%) would have minor and local effects to the Manistee National Forest overall Desired Vegetative Composition. In approximately 10-20 years, these stands would potentially begin to be replaced by native vegetation, and most likely be dominated by maples, beech, and oak when the black locust begins to naturally die; however, a component of black locust is likely to remain as root suckers will occur and survive because of natural disturbances (Cleland et. al. 1994).

The Cumulative Effects of Implementing Alternative 1

The FEIS for the Forest Plan (USDA 2006a) and the Forest Plan (USDA 2006) provide a general description of the Forests’ vegetation from pre-European settlement conditions through the desired future condition. Pre-European settlement vegetation in the Project Area was generally sugar maple, hemlock, beech in the uplands and a variety of hardwoods, such as red maple and green ash, in the lowlands (Comer and Albert 1998). Retaining the black locust in these locations would allow a slow succession (black locust is known to live 80+ years) to these native species; and it is likely that black locust would naturally be reduced via natural mortality processes. However, seedlings of black locust could persist and become mature trees again. There are currently no other known or proposed activities in this Project Area that would change vegetation qualities.

The Direct and Indirect Effects of Implementing Alternative 2

The proposed conversion of 23 acres of this Vegetation Class (1.7%) to the Openings Vegetation Class would have minor and local effects to the Manistee National Forest overall Desired Vegetative Composition. Black locust would be treated using herbicides, and this species and other non-mast producing hardwoods and any conifers would be felled. Hardwood stems not treated with herbicide would sprout, and growth of smaller trees and woody shrubs would be encouraged by removal of the overstory; herbaceous species would also be stimulated by these actions. The seedbank is likely to contain black locust seeds, which remain viable for several decades (USDA-FS 2014), and could regenerate from seed. Periodic maintenance would minimize the potential for this, and other hardwood species, to re-occupy these areas. Robust growth of *rubus* species is expected, and combined with other shrub and herbaceous species planting, is likely to reduce the development of hardwood trees in the next decade.

The Cumulative Effects of Implementing Alternative 2

Upland openings would be infrequent, and occupy a small amount of the landscape. Native herbaceous and shrub species, once established, would require periodic maintenance treatments to remove encroaching tree species and to retain desired shrubs and herbaceous species to persist.
These would likely be additional periodic mechanical or prescribed fire treatments to reduce encroaching hardwood and conifer trees. There are currently no other known or proposed activities in this Project Area that would change vegetation qualities.

**Soil and Air Resources**

**Resource-Specific Information & Existing Condition**

The topography in the Project Area is rolling with slopes, in some places, in excess of 25%. Elevation in the Project Area ranges between 1,050 to 1,150 feet above sea level. The Project Area is located in Landtype Association (LTA) 2; soil features of LTA 2 are moderately-developed, well-drained sands with medium texted banding. The ecological landtype phase (ELTP), is a mapping unit which describes the potential natural vegetation community and soil physical properties. The ELTP units of this area are 240, sugar maple-beech/maianthemum on well-drained morainal sands (stand 3) and 245, sugar maple-white ash/osmorhiza on well to moderately well drained morainal sands with sandy clay loam or finer bands greater than 6” thick in the B horizon (stand 61).

LTA and ELTP descriptions for the Project Area and the Forest are summarized from Cleland et al. (1994).

The Project Area is not in a protected airshed (US-EPA 2014).

**Area of Analysis**

The area of analysis for the direct, indirect, and cumulative effects on soil is the NFS lands where treatments will occur. This area represents where impacts from the proposed treatments will occur.

The direct and indirect effects analysis area for the air resource consists of the atmosphere covering the HMNF and surrounding private lands. Due to the extent of the burning proposed this document will address the direct and indirect effects on Wexford County of Michigan. This county surrounds the Project Area and would experience the greatest impact to their air resource.

The cumulative effects analysis for the air resource related to particulate matter emissions consist of the atmosphere over the HMNF and adjacent private lands up to 5 miles from the Project Area. The reason this analysis area is used is because the smoke modeling for this project indicates that emissions beyond this distance from the burn location are negligible (about 1μg/m3 (24-hour average)). The timeframe for the cumulative effects analysis is 5 to 10 years, since that is the expected time period for the implementation of this project. The cumulative effects analysis area for the air resource related to other gas emissions consists of the atmosphere with no maximum boundaries. This analysis area was used since these gases are emitted into atmosphere and persist for long periods of time.

**The Direct and Indirect Effects of Implementing Alternative 1**

There would be no project-induced changes to soil resources from Alternative 1. Without harvesting, total biomass levels would continue to increase. Soil productivity levels would remain similar, or increase, as organic matter accumulates within the upper soil profile. This would occur as black locust and other hardwood trees occupy these sites, and no events occur that
export or reduce litter and biomass. Alternative 1 would result in the highest above and below ground biomass levels (Pritchett and Fisher 1987). Black locust alters nitrogen cycling by adding litter high in nitrogen that cycles rapidly, leading to elevated nitrogen pools and enhanced net nitrogen mineralization rates. This, combined with reduced light levels, lowers rates of nitrogen cycling, and decreases native plant diversity (Rice et al. 2004).

Soil erosion in these areas would continue to recover from past management activities as biomass accumulates and soil development resumes. Soil erosion would continue at locations where the slope exceeds 2% and ground vegetation is sparse or non-existent (Pritchett and Fisher 1987).

Air quality would not be affected by management activities; ozone and particulates and oxides of nitrogen and sulfur would continue to be transported into these locations, mainly from fossil fuel power plants and vehicles from metropolitan areas upwind of the vicinity (MDEQ 2013).

The Cumulative Effects of Implementing Alternative 1

The soil resource in these two locations was impacted in the late 1800s and early 1900s by logging practices, conversion of forests to agriculture and range lands. The soil productivity was reduced by soil erosion, reduced water-holding capacity, and organic matter losses. These two areas were planted with black locust in 1936; since then, soil productivity has generally been stabilized or improved due to organic matter accumulation as individual groups of trees, shrubs, and herbaceous species complete their life cycles, and from nitrogen inputs from this species. Live vegetation would be retained, but dead and down timber could be removed for use as firewood, resulting in higher levels of biomass and soil organic matter accumulation and increase soil productivity. These locations are unlikely to attain pre-management soil productivity levels because of topsoil loss from wind and water erosion prior to black locust planting and the natural growth of other trees. As the nitrogen fixing effects of black locust trees diminishes over the next few decades, native trees, shrubs and forbs would naturally re-occupy these sites (USDA-NRCS 2014), but black locust seedlings could persist and continue to spread in the Project Area.

There would be no emissions related to management activities under Alternative 1. However, vehicle use for motorized recreation would likely increase in the future, increasing local emissions. Ambient air quality has been negatively affected, and would continue to be variable, primarily due to atmospheric transport of ozone and sulfuric and nitrogen oxides from sources south and west of the Project Area (MDEQ 2013).

Past management activities, including recent timber harvesting and wildlife habitat treatments, did not affect these two locations. There are currently no other known or proposed activities in this Project Area that would change soil or air qualities.

The Direct and Indirect Effects of Implementing Alternative 2

Under Alternative 2, both forested areas would be converted to upland openings by application of herbicide(s) and felling of black locust trees; other native tree species, particularly oak and black cherry and beech, would be retained. In addition, prescribed fire or mechanical equipment would be used to supplement these activities to further promote and maintain herbaceous and shrub vegetation establishment. Temporary vehicle access to facilitate firewood removal would be constructed, then closed and re-vegetated in one location. Planting and seeding of herbaceous and shrub vegetation would occur in both locations. These activities would comply with the Best Management Practices for Water Quality Management (USDA 2012), and (Forest Service
Eastern Region Handbook 2509.18 Chapter 2). Specific parts of these references would be used to monitor the effects on the soils in the Project Area.

Under Alternative 2, the effects on the Project Area’s soil resources would be local in scale and minor in severity. Stone (2000, 2002) has documented soil compaction and loss of site productivity effects for similar harvest sites on the Huron National Forest. The sandy soils and relatively flat terrain where tree felling and removal occur would minimize the potential for erosion caused by vehicle use. Soil compaction and organic matter removal would occur on temporary road locations, but would not be detrimental to soil productivity if a small percentage of the area (i.e. <5%) received these impacts. Firewood removal would retain the majority of woody material <2” in diameter from harvested trees and this woody material would reduce the negative effects of soil compaction, help retain above and below-ground organic matter, and provide a substrate for fungi, bacteria, and other micro-organisms in the soil. Re-growth of existing and planted herbaceous and woody vegetation would minimize nutrient export via leaching (Hallett and Hornbeck 2000). However, elevated nitrogen levels are likely to remain in the soil, and could affect native community restoration processes, unless mitigated by leaching, burning, or immobilized by additions of woody debris (Rice et al. 2004).

Temporary roads would occupy a small percentage of the area, and organic matter removal or relocation will not cause a significant loss of inherent soil productivity. Temporary road construction activities include shaping, filling, or realigning road entrances to improve access to the Stand 3. Temporary road construction activities disturb the soil because vegetation would be cleared from the surface and the roadbed would be shaped to reduce soil erosion. Temporary roads would be constructed on historical roadbeds to reduce the area of soil compaction.

Under Alternative 2, both areas would be treated with non-persistent herbicides to kill and reduce the sprouting of black locust (USDA 2003). The herbicide would be applied with handtools to black locust stems in a 10-20% solution during the growing season. The mobility of herbicides would vary with soil texture and organic matter content. Due to the chemical binding properties of non-persistent herbicides to the soil and the small area to be treated, no adverse effects on the soil resource are expected.

Implementing the proposed activities would have minor and local effects on air quality. Exhaust emissions and some additional road dust from vehicles removing firewood would not adversely affect short-term air quality. The closest residences to the Project Area are approximately 1 mile from treatment sites.

The herbicides proposed for use have low volatilities; that is, they are unlikely to vaporize and be carried by wind (drift) to unintended locations (Tu et al. 2001a.) in a non-diluted form. Various formulations of non-persistent herbicides are available; the most common formulations are diluted with water. The proposed basal bark application would result in little or no drift as applications are made close to the ground surface and directly on the stems; however, this treatment would result in a risk of skin and eye irritation that could persist at the spray site. Temporary signs adjacent to treated sites would notify residents and visitors of potential irritation effects.

There would be no effects from herbicide application to aquatic and riparian habitats under Alternative 2.

The Cumulative Effects of Implementing Alternative 2
The soil resource in these two locations was impacted in the late 1800s and early 1900s by logging practices, conversion of forests to agriculture and range lands. The soil productivity was reduced by soil erosion, reduced water-holding capacity, and organic matter losses. These two areas were planted with black locust in 1936; since then, soil productivity has generally been stabilized or improved due to organic matter accumulation as individual groups of trees, shrubs, and herbaceous species complete their life cycles, and from nitrogen inputs from this species. Some woody vegetation and organic matter would be retained, but the majority would be removed for use as firewood, resulting in lower levels of biomass and soil organic matter accumulation and a small decrease in soil productivity. These locations are unlikely to attain pre-management soil productivity levels because of topsoil loss from wind and water erosion prior to black locust planting and the natural growth of other trees.

Regrowth of trees, shrubs, and herbaceous species would slowly increase the amounts of biomass and soil organic matter accumulation, and stabilize soil productivity, but at a somewhat lesser level. Periodic maintenance of this regrowth, using mechanical equipment or prescribed fire, would favor shrubs and herbaceous species over native tree species, and decrease the nitrogen to carbon ratio in the soil (Rice et al. 2004).

Soil disturbances associated with temporary road construction and use would be of short duration and local in scale. Blocking the road to vehicle use, and allowing natural and planted vegetation to become re-established, would return the roadbed to resource production within a few years. Periodic use of mechanical equipment or prescribed fire for vegetation maintenance would follow Forest Service BMP’s for soil disturbance and rehabilitation, and result in sufficient vegetation cover to prevent soil erosion.

Herbicide application(s), sufficient to reduce the density of black locust, would have only short term impacts to the soil and air resources. Natural degradation of the herbicide(s) used, and basal bark application to the black locust, would not result in any adverse effects to the soil and air resources of the Project Area.

Under Alternative 2, there would be minimal adverse effects to air quality within the Project Area. Motor vehicle use associated with transportation and motorized recreation would likely increase in the future, increasing emissions from these vehicles throughout the Project Area. There would be minor short-term increases in emissions and dust resulting from firewood removal under this alternative. Ambient air quality has been negatively affected, and would continue to be variable, primarily due to atmospheric transport of ozone and sulfuric and nitrogen oxides from sources south and west of the Project Area (MDEQ 2013).

Past management activities, including recent timber harvesting and wildlife habitat treatments, did not affect these two locations. There are currently no other known or proposed activities in this Project Area that would change soil or air qualities.

Non-Native Invasive Plant Species

Resource-Specific Information & Existing Condition

The analysis area for direct and indirect effects for this issue includes NFS lands within the Project Area. This area was chosen because these are the lands where black locust treatments would occur. The cumulative effects analysis area includes the NFS and private lands included within and adjacent to the Project Area. This CEA was chosen because the adjacent lands could
be impacted by NNIP spreading to them from the Project Area in the foreseeable future. The adjacent land could also act as a source for NNIP to continue to infest the Project Area. NNIP could also be treated with herbicide on adjacent lands, thereby adding to the overall amount of herbicide used within the area.

The activities that have been conducted on NFS land in the CEA since 2004 include approximately 14.5 acres of NNIS herbicide application, 1.5 acres of mechanical NNIS control, 24 acres of hardwood shelterwood, 112 acres of red pine thinning, 17 acres of wildlife opening improvement, 3.5 acres of landing rehabilitation, 1 mile of new road construction, 1 mile of road closure, and 1 mile of snowmobile trail reroute. Activities that are planned in the near future on NFS land include wildlife opening improvement and additional vegetation treatments.

Black locust is a non-native invasive species. A non-native invasive species is defined as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health” (Executive Order 13112 1999). The HMNF have identified certain plants as non-native invasive plants (NNIP). Each species has a priority ranking for treatment based on completed Risk Analyses. Black locust is ranked as a Priority 3 species, “control source populations, eradicate outliers.” The stands that are proposed for treatment are source populations.

Black locust is native to the Appalachians and Ozarks, but has been planted in 48 states. It was noted as spreading in jack pine barrens in Michigan as early as 1888. As a legume, black locust fixes nitrogen and soil nitrogen levels increase with the length of time it is present in an area. It produces more leaf litter than native trees and that litter has much higher nitrogen concentrations than most native tree species. Soils under black locust also have elevated levels of calcium and phosphorous. Although black locust initially invades disturbed areas, it also poses a particular threat to prairies, savannas, and open woods. Black locust sprouts from the roots, forms clones, and easily sprouts from stumps in response to damage. In most cases, effective control requires the use of herbicides because it is a clonal species. Cutting alone can stimulate intense sprouting, accelerate growth rates, and stimulate flowering at three years of age rather than the usual seven, which allows it to reproduce that much sooner (Michigan DNR 2012).

Black locust contains several toxins in its leaves, stems, bark, and seeds which result in gastrointestinal and neurological effects after ingestion (Michigan DNR 2012). Black locust is poisonous to all animals if ingested and although fatal cases are rare, recovery may take several days or even weeks. Children have been poisoned by chewing on the inner bark or eating seeds. The toxic young shoots appear to be desirable to livestock, even if there is plenty of other forage nearby. Birds, rabbits, and deer may be able to eat the seeds safely even though other parts of the plant are toxic (Ohio Perennial & Biennial Weed Guide 2014). As inedible or less desirable NNIP become more prevalent in an area, herbivory becomes increasingly concentrated on native plant species, producing more space for NNIP to invade and giving the non-native plants a competitive edge. This cycle creates conditions that increase NNIP populations and reduces the populations of native plants.

Black locust provides good forage for bees (Wisconsin DNR 2004), but the large, fragrant blossoms of black locust compete with native plants for pollinating bees (Plant Conservation Alliance 2005). When non-native invasive plants become prevalent, they can alter the composition of pollinating insects. Since pollinating bees, flies, butterflies, moths, and skippers are adapted to certain flower shapes, sizes, colors, and other characteristics, if the invading plant has flowers that are different from the original native plant community, the pollinator community can shift to predominantly those pollinators adapted to the flowers of the invading...
species, which in turn causes a reduced level of pollination and fertilization for plants with other flower types. As non-native invasive plants become dominant, they not only force out native plants, but also their associated pollinators. In cases where the NNIP has similar floral structures to the native plants, pollinators are more likely to carry a mixed pollen load and may deposit the pollen of the NNIP rather than the pollen needed by the native plants for reproduction, thereby decreasing the reproductive potential of the native species (Larson 2008).

Non-native plants fail to support the insect diversity and biomass that native plants do. Most insects cannot or will not eat non-native plants. About 90% of herbivorous insects are specialists and will only feed on a few plant lineages. The remaining 10% of herbivorous insects are able to feed on multiple species and may adapt to a non-native plant if it is similar enough to their host plants (Tallamy 2007). Preliminary study results indicate that native woody plants and vines support far more insect species and biomass than non-natives. Comparisons of Lepidoptera and sawfly caterpillar use of native versus non-native woody plants indicate that the natives support 35 times more caterpillar biomass. Since Lepidoptera and sawfly caterpillars are the largest component in the diets of insectivorous birds, this decline in caterpillar biomass could impact these species as well (Tallamy 2007). As black locust displaces native plants, fewer insects would be available to other members of the food web, causing a ripple effect throughout the animal community.

Herbicides would be applied according to the product label (FSH 2109.14, 52.11), the specifications in the Forest Service Manual 2150, Pesticide Use Management and Coordination, and in the Forest Service Handbook 2109.14, Pesticide Use Management and Coordination Handbook. Also, compliance with all federal, state, and local regulations regarding herbicide use would be followed. Herbicide application would be conducted by State of Michigan pesticide applicator certified personnel.

The Direct and Indirect Effects of Implementing Alternative 1

Under Alternative 1, there would be no direct effects to RFSS plants since no treatments would occur to control black locust, however there would be indirect effects. The existing infestations would go unchecked and the diversity of native plants in the Project Area would decline over time as black locust replaces native plants and alter natural ecosystems. The diversity of native insects would likely decrease with the decline in the prevalence of native plants, which would eventually impact birds and other wildlife species (Tallamy 2007). As black locust spreads through the Project Area, it would continue to degrade the habitat available for RFSS plants to colonize.

The lack of mechanical activity associated with the proposed fuelwood cutting, opening creation and maintenance, temporary road opening, and prescribed fire proposed in Alternative 2 would result in slower or fewer invasions by other NNIP than if these treatments occurred, since soil disruption is a major avenue for the introduction and spread of NNIP. However, the existing black locust would go untreated and continue to spread within the Project Area. It would continue to alter nitrogen levels and nutrient cycling in the soil. It would continue to occupy valuable native plant and wildlife habitat.

The Cumulative Effects of Implementing Alternative 1

Under Alternative 1, existing black locust would colonize a larger percentage of the Project Area due to lack of treatment. Black locust would also spread to adjacent public and private land,
especially in open areas or areas adjacent to roads. Black locust is a member of the legume family and, like other legumes, adds nitrogen to the soil, increases nitrogen availability, and increases rates of nitrogen cycling. Once established, black locust can add up to 75 kilograms of nitrogen per hectare per year and facilitate the spread of other non-native invasive plants. Black locust can also reduce soil levels of iron and aluminum and increase levels of phosphorus, calcium, and magnesium. This alteration of nutrient cycling can impact successional patterns and species composition (Rice et. al 2004). Changes in soil nutrient levels and nutrient cycling not only degrades habitat for native plants, but also for their associated mycorrhizal fungi.

In Stand 3 black locust and sugar maple are dominant in the canopy and black locust is growing in thickets along the roadside. In Stand 61 black locust, sugar maple, and American beech are dominant in the understory. Seedlings are present in the ground layer and it is also common in the canopy. Black locust is a shade-intolerant species and becomes rare in late-successional communities, however, black locust seedlings, saplings, and trees are present in both stands proposed for treatment and will continue to be a source population for decades without treatment.

Major highway corridors close to the Project Area would continue to bring visitors and vehicles into this area and promote the spread of invasive species. Disturbance associated with recreational use of an area contributes to the proliferation of invasive plant species. In addition to disturbing the soil, recreational activities also facilitate the dispersal of seeds and other propagules. Seeds and plant material are transported as vehicles move from one area to another. They are also transported in the shoes of hikers, the fur of dogs, and the hoofs, feed, fur, and feces of horses. In the future, the Project Area would continue to be used for recreational purposes, thus continuing to expose the area to new invasions of black locust. Without treatment of black locust, the Project Area would also continue to be a source of spread to other areas as recreationists, wildlife, vehicles, and equipment travel to relatively uninfested areas.

Over time the lack of black locust treatment could lead to the replacement of the native plant community. Since black locust competes with native plants for pollinators or contaminates the pollen carried by bees, the lack of treatment could lead to the replacement of native plant communities as they are less able to reproduce. The increased levels of herbivory on the more palatable native plants as black locust occupies increasingly more space could also lead to the replacement of the native plant community with NNIP.

The Direct and Indirect Effects of Implementing Alternative 2

Under Alternative 2, black locust would be treated with herbicide because it is the most effective treatment for controlling species that root sprout and form clones. Herbicide treatments would include using glyphosate or triclopyr for spot spraying, basal bark application, injection, etc. These methods minimize the amount of herbicide used as well as the potential for accidental application to non-target species. Only herbicides approved for aquatic habitats would be used due to the closeness of the water table to the surface and to minimize risk to aquatic organisms in Smail Creek or the roadside swales.

Approximately 23 acres are proposed for herbicide treatment in Alternative 2. The actual herbicide application would only be to stems or individual plants, thus the actual area of herbicide application is much less than the approximate acres of infestation. Treatments would take place throughout the year as weather allows. Re-treatments of these species would depend on the results of the initial treatments. Any new discoveries of NNIP that are considered to be of
high treatment priority would be treated as necessary. The proposed NNIP treatments were considered the most effective and cost efficient control measures for the specific NNIP. Activities associated with prescribed fires, fuelwood harvesting, and opening creation and maintenance would increase the opportunities for NNIP to spread or invade since equipment can transport NNIP seeds and propagules into new areas and soil-disturbing activities would create conditions for NNIP to invade. Revegetating disturbed areas with either native or non-persistent non-native species would decrease the possibility of NNIP invading a disturbed area. Since the Project Area would be re-visited for several years to verify efficacy of treatments and to herbicide any new black locust seedlings or root sprouts, Forest staff would also be able to scout for new NNIS and arrange for them to be treated through the Forest-wide NNIP EA as necessary.

The Cumulative Effects of Implementing Alternative 2

Under Alternative 2 the currently known populations of black locust would be reduced; however, other NNIP species would continue to be introduced or distributed by natural or human vectors. There would be more soil disturbance and more visitors to the Project Area to harvest fuelwood, but revegetation mitigation measures should reduce the risk of new infestations due to Project activities. Healthy plant communities resulting from prescribed fire and other management activities are more likely to resist invasion from NNIP. Controlling source populations of black locust would also reduce the likelihood of additional areas becoming infested. Since the Project Area would be re-visited for several years to verify efficacy of treatments and to herbicide any new black locust seedlings or root sprouts, Forest staff would also be able to scout for new NNIP and arrange for them to be treated through the Forest-wide NNIP EA as necessary.

Burdock, Canada thistle, bull thistle, autumn olive and a non-native honeysuckle are already being treated in the surrounding area. Spot treatment, basal bark application, injection, or other treatments with herbicides would be used instead of broadcast spraying wherever possible to minimize the amount of herbicide used and decrease the risk to non-target species.

Private landowners may use chemical means to reduce the presence of weeds on their properties. NNIP also would be treated using herbicides in other National Forest Project Areas such as Toman School, Wagon Wheel, etc. The proposed herbicide use in the Project Area would add incrementally to the herbicide use on adjacent lands since herbicide use is proposed on 23 acres of the approximately 250,000 acres of NFS lands within the Cadillac-Manistee Ranger District of the HMNF. In addition, since spot spraying, basal bark application, and stem injection methods would be used instead of broadcast spraying, only a small portion of the 23 acres would actually be treated with herbicide.

Increasing public awareness of the impacts of NNIP and emphasis on reducing populations of NNIP should also decrease the prevalence of NNIP in the cumulative effects analysis area. Many organizations have been created to address the impacts and decrease the populations of NNIP and have been increasing their eradication and educational efforts. The Northwest Michigan Cooperative Weed Management Area was established in 2005 to address garlic mustard and has added many other terrestrial invasive plants to their education and control repertoire. The Michigan Dune Alliance was established in 2004 to address the spread of baby’s breath (*Gypsophila paniculata*) along the Lake Michigan shoreline and began tackling Lyme grass (*Leymus arenarius*) in 2007. The Michigan Dune Alliance has also increased their education and control efforts to many other NNIP. Sleeping Bear Dunes National Lakeshore,
various land conservancies, Michigan Department of Transportation, Michigan DNR, and multiple watershed councils have been increasing NNIP control efforts on the lands they are responsible for managing. Through these combined efforts and continued public education, there would be increasing control of NNIP.

Invasive plants are a concern for all current environmental analyses and are expected to become increasingly important over time and in all future projects. Therefore, it is likely that control of NNIP would continue to take place in the cumulative effects analysis area in the future.

Heritage Resources

Resource-Specific Information & Existing Condition

The analysis area for the heritage resources encompasses all the NFS lands within the Project Area. Any heritage resource that could be affected by management activities would be limited to this area.

Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effect of a project on any district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register of Historic Places. The Archeological Resources Protection Act covers the discovery and protection of historic properties that are excavated or discovered on federal lands. The federal government has trust responsibilities to tribes under a government-to-government relationship to ensure that tribal rights are protected. Consultation with tribes helps ensure that these trust responsibilities are met. The HMNF consulted with potentially affected tribes and no tribal concerns were identified for this project. A heritage resource survey was conducted in the Project Area, in accordance with the HMNF’s heritage resource guidelines.

Heritage resources are the physical remains left by people who occupied or visited the forest in prehistoric or historic times. These are fragile, non-renewable resources. They include, but are not limited to prehistoric and historic Native American settlements, logging industry related resources, Euro-American pioneer farms or homesteads, and former villages and towns.

The Direct, Indirect, and Cumulative Effects of Implementing Alternatives 1 and 2

The known heritage resource sites would be protected as recommended by the HMNF’s archaeologist, and in accordance with State Historic Preservation Office guidelines. Mitigation measures used to avoid disturbance to archaeological sites would be applied to the Modified Proposed Action (Chapter 2). These heritage resource mitigation measures are incorporated into the Treatment Unit Cards (Appendix A). If additional heritage resource sites are found during project implementation, project work would cease, a heritage resource professional would be consulted, and adequate protection measures applied.

If these recommendations are implemented, any and all cultural resources within the Project Area will have been documented, protected, and/or removed from the APE. No cumulative effects to heritage resources are expected from these actions.
Social Economics
Resource-Specific Information & Existing Condition

The analysis area for this section includes Wexford County. The towns of Mesick, Boon, Meauwataka, Wellston, Buckley and Yuma occur within 10 miles of the Project Area. Only four communities, Boon, Mesick, Harrietta and Wellston, appear in US Census data, and their combined populations are 1401 people. Highways M-37, M-55, and M-115 are within 10 miles of the Project Area. People traveling on these heavily traveled highways provide support and income to Wexford County and nearby community businesses resulting in an economic benefit to the local economy.

The economic analysis for this project does not attempt to analyze all resource values or how economic benefits circulate through the economy indirectly affecting various industries. Many of the values generated by both alternatives (both positive and negative) involve goods and services that are not priced, such as the value of a hunting experience, a hike in the woods, mushroom gathering, etc. Many of the effects of the alternatives on these goods and services are discussed in the other sections of this environmental analysis.

The Project Area provides a mix of commercial and non-commercial uses to local communities. Local communities receive indirect social and economic benefits through direct employment, as well as products and services that are generated from management activities on NFS lands.

The Direct and Indirect Effects of Implementing Alternative 1

Under Alternative 1, none of the proposed vegetative treatments or other activities would be implemented.

Recreation use of the area would remain the same and would not affect the local economy. The loss of early successional habitats could reduce population of game species which may indirectly affect the local economy through the loss of hunting generated revenue. Game hunting, mushroom hunting, and other recreation activities would continue to provide tourism and income to the local communities.

The Cumulative Effects of Implementing Alternative 1

No harvesting would result in decreased numbers of game animals with the loss of early successional habitats, resulting in loss of revenues from sport hunters in the area in the long-term.

The Direct and Indirect Effects of Implementing Alternative 2

Table 3-6 displays the estimated revenues and costs for activities proposed for both alternatives; however, it does not include the cost of conducting the environmental analysis. These costs are broad estimates and may fluctuate depending on specific treatments. The project costs and revenue estimates are used a comparison of alternatives.

Because of the limited size of the wildlife habitat treatments and invasive plant control activities, these alternatives would result in little or no effect on local or regional social conditions such as
traffic, overcrowding, school size, or crime rates. Similarly, these projects would have no substantial direct or indirect effect on local or regional infrastructure requirements. The local economy may experience reduced indirect economic costs when short-term visual disturbances results in reduced visitation to an area as the result of firewood timber harvest activities. The long-term benefit from the timber harvest is that early successional habitat is improved, thereby improving hunting opportunities.

The proposed opening creation would provide a local source of firewood for local communities. This source of firewood would be more accessible and condensed compared to standard spread out locations of permitable firewood collection on National Forest lands.

**Estimated Costs and Revenues of Alternatives**

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<th>Alternative 2</th>
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<td>Estimated Harvest Acres (Firewood)</td>
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<td>Firewood Cutting Area Preparation Costs @ $38/acre</td>
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<td>Invasive Plant Control@$200/acre</td>
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The Cumulative Effects of Implementing Alternative 2

Due to the minor nature of this project, there would not be any cumulative economic effects.

**Outdoor Recreation**

**Resource-Specific Information & Existing Condition**

The analysis area for the direct and indirect effects on outdoor recreation is NFS lands located within the Project Area boundary. The activities associated with this project would not be anticipated to have direct or indirect effects on outdoor recreational activities or opportunities outside of this area. The area of analysis for the cumulative effects on outdoor recreation for this project is all lands within the Manistee National Forest. This area was selected as it would be within a one day commuting distance for those using the Forest for outdoor recreation.

There are approximately 23 acres of NFS lands within the Project Area. All are within MA 2.1. The Forest Plan provides the following direction for the management of the recreational resources within this management area:

**MA 2.1 (Roaded Natural Rolling Plains and Morainal Hills)**

*Forest Plan, III-2.1-1 through 1-3*
Purpose: *A broad variety of recreational opportunities is available.*

Goals and Objectives:
- Provide moderate amounts of motorized recreational opportunities.
- Provide moderate amounts of non-motorized recreational opportunities and a moderate number of developed recreation sites.
- Provide a roaded natural recreational experience.

Desired Future Condition: “…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 recreation sites, law enforcement and visitor information…The area will provide roads and trails appropriate for motorized and non-motorized uses. Road closures are evident.”

The opportunities within the Project Area are limited to dispersed recreation. This use is limited due to the finite size of the Project Area. No developed sites occur within the Project Area. As it relates to recreation on NFS lands within the Project Area, the existing setting and facilities are consistent with the Roaded Natural classification.

**The Direct and Indirect Effects of Implementing Alternative 1**

As identified in Chapter 1, the Purpose and Need for this project is not related to the creation, modification, or enhancement of outdoor recreation opportunities within the Project Area. As a result, no actions were proposed relating specifically to these opportunities under the action alternative. Therefore, any effects on recreation on NFS lands within the Project Area would occur as a result of the actions proposed to meet other resource objectives.

Under Alternative 1, opportunities for dispersed recreation would continue to be provided on NFS lands.

**The Direct and Indirect Effects of Implementing Alternative 2**

Under Alternative 2, those that utilize NFS lands within the Project Area for dispersed recreational activities would be directly impacted during the period of time that management activities occur. The timing, location, and activities associated with dispersed recreation would continue to be variable. Due to this variability in use patterns, dispersed recreationists would be displaced from specific areas during firewood cutting operations, opening maintenance activities (prescribed burning), and herbicide applications. Recreationists relying on early-age successional habitat would be provided for under this alternative. Those who rely on contiguous blocks of more mature forest types would be displaced to other areas.

**The Cumulative Effects of Implementing Alternatives 1 and 2**

Combined, the HMNF consists of approximately 970,000 acres within a proclaimed boundary of approximately 2,021,000. The proclaimed boundary of the Manistee National Forest is approximately 1,328,000, with about 535,000 acres (40%) being NFS lands. The majority of these lands were purchased from private landowners under the Weeks Act in the 1930s. Other portions were acquired through state and private land-for-land exchanges. At the time of acquisition, the primary activities associated with the management of the Forest were focused on reforestation. Recreation on the Forest consisted primarily of hunting and fishing. Private lands consisted mainly of large tracts dedicated to agriculture.
In addition to hunting and fishing, outdoor recreation on the Forest now includes a wide variety of other dispersed opportunities and developed sites. Across the Forest, dispersed opportunities include such activities as camping, hiking, forest product gathering, wildlife watching, snowmobiling, cross-country skiing, hiking, mountain biking, horseback riding, and canoeing. Developed sites include various types of trailheads, boating sites, camping facilities, beaches, picnic areas, fishing sites, information and observation sites, and others. To assist in determining the type and amount of recreational opportunities and facilities in a particular area, the Forest utilizes the Recreation Opportunity Spectrum in conjunction with the Forests Plan Management Area direction and the associated Standards and Guidelines. Currently, in addition to recreation, the primary activities on the Forest include timber and fuels management, wildlife and fisheries habitat management, and special-uses. The private property within the proclaimed boundary has become more fragmented, as larger parcels are divided and sold.

The interface between the implementation of the management activities on NFS lands and recreational use has occurred historically and will continue to occur in the future. These are considered on an individual basis and mitigation measures are established accordingly. The activities proposed in this project are similar to those that have occurred in the past, with the mitigation measures serving to protect against user-conflicts, while preserving user-enjoyment.

In the reasonably foreseeable future, recreational opportunities on the Forest will be provided based on Recreation Opportunity Spectrum classes, emerging recreational trends, and operational budgets. Within the Roaded Natural Class, the Forest would continue to provide dispersed opportunities and developed sites with an emphasis on the areas of highest use. Impacts from recreational use and the demand for additional facilities and amenities are expected to continue to increase. Other activities on the Forest (such as timber and fuels management, wildlife and fisheries habitat management, and Special-Uses) would continue and there would continue to be a need to mitigate for recreational use during the implementation of these activities. The development of private land to commercial and residential uses throughout the Forest is expected to increase. With this increase in development there would be an increase in the seasonal and permanent population. This larger population would place an increase in the demand on recreational opportunities and facilities across the Forest.

Under both alternatives, a variety of opportunities would continue to be provided through a combination of motorized, non-motorized, dispersed, and developed outdoor recreation. The resulting setting and facilities would continue to be consistent with the Roaded Natural classification.

**Scenery Management**

Resource-Specific Information and Existing Condition

For this analysis, the scenic integrity of the Project Area is considered as the result of the interrelationship of the landscape character elements as viewed from existing travel ways and use areas, using typical on-the ground observer positions. For all effects, this would include the NFS lands within the Project Area.

For all management areas, the Forest Plan (2006) lists the following guideline (page II-15):

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.”
The following information relates to the processes of consideration that are outlined in the handbook and how they apply to the Black Locust Project Area.

Landscape character is a combination of physical, biological, and cultural attributes that give a geographic area its visual and cultural image, and often, unique character. Landscape character represents different attributes of landform, vegetation, surface water features, and cultural features that exist throughout the area of interest.

- **Landform:** The Forest uses an Ecological Classification system to describe the landforms that are within it. On a landscape scale, the most appropriate descriptor is the Landtype Association (LTA). The most evident LTA within the Project Area is LTA 3 or Sandy Morainal Hills.

- **Vegetation:** The Ecological Classification system links the dominant vegetative types to the prevalent landtypes. Based on this, the dominant natural vegetative types throughout the Project Area would include long-rotation conifers and hardwoods, with areas that are non-forested. Currently, the vegetative classes are not consistent with the expected natural types because they consist of a planted non-native species (black locust) throughout the Project Area.

- **Water Features:** Smail Creek (an ephemeral stream) is present within the Project Area.

- **Cultural Features:** Prior vegetative management activities are evident within the Project Area.

Landscape character descriptions are a way to measure landscape characteristics based on human perception of the intrinsic beauty of landform, water characteristics, vegetative patterns, and cultural land-use and for this Project Area is described as:

- **Distinctive:** Landscapes associated with a combination of water features and high visibility and little to no evidence of other development.

- **Typical:** Landscapes associated with a combination of topographical features, vegetative variances, and minor evidence of other development.

- **Indistinctive:** Landscapes with little topographical or vegetative variance and evidence of other developments are common.

The landscape character description is also used as a reference for the scenic integrity of all lands. Scenic integrity indicates the degree of intactness and wholeness of the landscape character. Conversely, scenic integrity is a measure of the degree of visible disruption of the landscape character. A landscape with very minimal visual disruption is considered to have high scenic integrity. Those landscapes having increasingly discordant relationships among scenic attributes are viewed as having diminished scenic integrity. Scenic Integrity is expressed in terms of very high, high, moderate, low, very low, and unacceptably low.

- **Very High:** Landscapes are unaltered with no deviation from the landscape character; landscape character is fully expressed.
- **High**: Landscape appears unaltered, with deviations subtle and not evident; landscape character is largely expressed.

- **Moderate**: Landscape appears slightly altered, with deviations beginning to dominate; landscape character is moderately expressed.

- **Low**: Landscape appears moderately altered, and deviations may be strongly dominant; low expression of landscape character.

- **Very Low**: Landscape appears heavily altered, and deviations may be strongly dominant; very low expression of landscape character.

- **Unacceptably Low**: Landscape is extremely altered, with deviations extremely dominant; landscape character is unrecognizable.

Based on the landscape character description, a numerical scenic class-rating is assigned to all lands. These ratings, 1 - 7, indicate the relative scenic importance, or value, of discrete landscape areas.

- **Scenic Classes 1 and 2**: High Public Value
- **Scenic Classes 3 to 5**: Moderate Public Value
- **Scenic Classes 6 and 7**: Low Public Value

Table 3-7 summarizes the existing condition of the scenic quality for the management areas within the Black Locust Project Area.

### Existing Scenic Quality within the Black Locust Project Area

<table>
<thead>
<tr>
<th>Element</th>
<th>Management Area</th>
<th>Description</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Area (approximate)</td>
<td>2.1</td>
<td>23 acres</td>
<td>NFS lands in these management areas within the Project Area boundary.</td>
</tr>
<tr>
<td>Classification of Landscape Character</td>
<td>2.1</td>
<td>Typical</td>
<td>NFS lands have varying topography and vegetative types and other developments are noticeable.</td>
</tr>
<tr>
<td>Scenic Class</td>
<td>2.1</td>
<td>6</td>
<td>The low level of recreational use indicates that the public places a low value on the scenic importance.</td>
</tr>
<tr>
<td>Scenic Integrity</td>
<td>2.1</td>
<td>Low to moderate.</td>
<td>Evidence of past forest management activities are present.</td>
</tr>
</tbody>
</table>

The NFS lands within the Project Area contain components of landtype, vegetation, water, and cultural features consistent with a rating of low to moderate.
The Direct and Indirect Effects of Implementing Alternative 1

Under Alternative 1, the scenic integrity of NFS lands within the Project Area would change slowly, affected only by natural events. Within MA 2.1, the Landscape Character would remain typical as there would be little noticeable change to the topography or vegetation. Any change would occur through natural processes over time or through periodic and infrequent events. The Scenic Class would remain at a level 6 (of low public value), as it would continue to be similar to other general forest areas. Scenic integrity would continue to be considered low to moderate as past forest activities would remain visible.

The Direct and Indirect Effects of Implementing Alternative 2

Under Alternative 2, the vegetation would be the element most directly affected. Tree cutting activities would create variations within and adjacent to the stands proposed for these activities. In the short-term, the removal of the black locust trees would provide a more open landscape of greater scenic contrast. This contrast would remain in place over time, as the stands would be maintained in an open state. The level of visual impact that these activities would have would be dependent on the existing condition. Project Area lands would remain typical. The proposed vegetative treatments would increase diversity and opening maintenance/creation would provide noticeable contrast to surrounding areas of mature forest. These activities would not shift the Scenic Class within this Management Area and would be consistent with a scenic integrity of a low to moderate level. This would be due to a combination of the visible effects of management activities and the continued presence of Forest roads. The proposed activities would serve to increase the interest of the scenic class, as the existing black locust stands are removed, non-forested areas become defined, and the field-of-view for the forest visitor increases.

The Cumulative Effects of Implementing Alternatives 1 and 2

In the past, there has not been a special emphasis in maintaining visual quality within the Project Area. Land ownership throughout the Project Area consists entirely of NFS lands. As a result, the past and present management activities on these lands can have a greater influence on the scenic integrity. As the majority of the Project Area is in MA 2.1, those traveling through and utilizing the Forest for recreation are accustomed to the visuals associated with active forest management (i.e. timber harvests, road construction, etc.). These activities are likely to continue to be evident throughout the Project Area in the future.

Under both of the alternatives considered in this project, the Project Area would continue to retain a low level of scenic integrity. The combination of past management activities and fragmentation would continue to be consistent with a low to moderate rating.

Transportation
Existing Condition & Resource-Specific Information

The analysis area for direct and indirect effects for transportation includes all NFS lands within the Project Area within Compartment 52 of the Cadillac-Manistee Ranger District in Springville Township, Wexford County, MI.

There are approximately 4 miles of open public forest system road within Compartment 52. This project does not manage the National Forest transportation system.
The Direct and Indirect Effects of Implementing Alternative 1

There would be no changes made to the system roads in the Project Area. All NFS roads that are currently open would remain open. All NFS roads that are currently closed would remain closed. The open roads would continue to be minimally maintained. There will be no change in the road densities within the project area.

The direct effects of taking no action would be that the public would continue to be able to utilize the current roads throughout the Project Area. People that use the Project Area for recreation or access to homes would experience no displacement or loss of access.

The Cumulative Effects of Implementing Alternative 1

Historically, the transportation system throughout the Project Area was used mainly for logging and transporting local people and agricultural commodities. Scattered throughout the Project Area are old railroad grades. These old railroad grades were used primarily for extracting timber from the area. As the land was cleared and converted to agricultural land, some of the railroad grades were converted into the current road system. Since that time, the land has converted back to forested land. The Forest Service has used some of the existing roads and built needed roads in the area for modern day logging operations. Some of these roads have remained open after harvesting and others have been closed.

The Direct, Indirect and Cumulative Effects of Implementing Alternative 2

There would be no changes made to the system roads in the Project Area. All NFS roads that are currently open would remain open. All NFS roads that are currently closed would remain closed. The open roads would continue to be minimally maintained. The NFS roads would be subject to closure at any time in accordance with the Forest Plan and the Travel Management Rule. There will be no change in the road densities within the project area.

Two temporary roads would be constructed on existing road beds in the western-most treatment unit to allow access for firewood cutting. After these roads have served this purpose, they would be blocked with an earthen berm, re-shaped to allow for proper drainage and seeded with native warm season grasses and native shrubs.

Civil Rights and Environmental Justice

Resource-Specific Information & Existing Condition

The analysis area for civil rights and environmental justice encompasses Wexford County where all of the activities will take place.

Forest Service activities must be conducted in a discrimination-free atmosphere. Contract work that may be generated from this project would include specific clauses offering civil rights protection. The Forest Service would enforce these policies.

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups should bear disproportionately high
and adverse human health or environmental effects resulting from Federal agency programs, policies, and activities. Environmental justice is also the identification of projects that are located near minority and low-income communities that have an adverse environmental impact. The purpose of the evaluation is to determine if a disproportional number of projects that have adverse environmental effects are located near minority and low-income communities.

Based on figures obtained from the 2005-2009 American Community Survey 5-Year Estimates (US Census 2010), the percent of minority populations for Wexford County is less than the State of Michigan as a whole (3.7% versus 20.3%) (Table 3-8). The percent of low-income population for Wexford County is greater than the State of Michigan (16.4% versus 14.5%) (Table 3-8). This information indicates that Wexford County does not qualify as an environmental justice community.

### Demographics of Wexford County and the State of Michigan

Table 3-8

<table>
<thead>
<tr>
<th>Locality</th>
<th>Percentage of Minority Population (%)</th>
<th>Percentage of Low-income Population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wexford County</td>
<td>3.7</td>
<td>16.4</td>
</tr>
<tr>
<td>State of Michigan</td>
<td>20.3</td>
<td>14.5</td>
</tr>
</tbody>
</table>

### The Direct, Indirect, and Cumulative Effects of Alternatives 1 and 2

The Modified Proposed Action is not expected to disproportionately impact human populations. There are no human health or safety factors associated with Alternative 2 that would disproportionately affect low-income or minority populations in or around the Project Area.

No activities are expected to affect the civil rights of any landowners, or other individuals, near the Project Area. Any contracts would be issued in accordance with USDA regulations. There would be no discrimination based on race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. The laws, rules, and regulations governing nondiscrimination conduct in government employment would be adhered to.

### Irreversible and Irretrievable Commitment of Resources

Resource-Specific Information & Existing Condition

Irreversible commitments are decisions affecting non-renewable resources such as heritage resource sites. Such commitments are considered irreversible, because the commitment would deteriorate the resource to the point that renewal can occur only over a long period of time or at great expense. Commitments are also irreversible if the resource has been destroyed or removed.

Irretrievable commitments of natural resources are commitments that result in the loss of productivity or use of resources due to management decisions made in Alternative 2. These are opportunities foregone for the period of time that the resource is unavailable. Foregoing future timber harvest opportunities in the area converted from commercial forest land into a permanent upland opening represents an irretrievable commitment of resources because a decision to not grow trees can be changed by either natural or artificial regeneration in the future.
The Direct, Indirect, and Cumulative Effects of Alternatives 1 and 2

Loss of soil due to erosion would be an irreversible commitment of resources. However, due to incorporation of BMPs, Forest Plan standards and guidelines, and mitigation measures specified in this document, it is not anticipated that there would be any measurable soil loss under the Alternative 2.

Loss of heritage resource sites resulting from accidental damage or vandalism would be an irreversible commitment of resources. The mitigation measures specified in this document provide reasonable assurances there would be no irreversible loss of heritage resources.

There is no other irreversible commitment of resources associated under the Modified Proposed Action.

There would be no irretrievable damage to resource productivity under the Modified Proposed Action.
CHAPTER 4
LISTS

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