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Environmental Assessment

Snow Bird KW Project

Huron Shores Ranger Station
Huron-Manistee National Forests
Iosco County, Michigan

Photo by Michel Roy

Responsible Official: Susan M. Kocis

For Information Contact:

Paul Thompson
5761 N. Skeel, Oscoda, MI 48750
(989) 739-0728
TTY (989) 739-0806

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Document Structure

National Forest management is guided by congressional mandate to provide multiple benefits to American people for present and future generations. The National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Policy (CEQ) implementing regulations (40 CFR 1500-1508) establish policy, set goals and provide regulations for analyzing and documenting the environmental consequences of proposed management actions. This analysis follows the process outlined in the CEQ implementing regulations.

This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

- *Introduction:* This section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

- *Comparison of Alternatives, Including the Proposed Action:* This section provides a more detailed description of the agency's proposed action and design criteria for the project, as well as alternative methods for achieving the stated purpose.

- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource. Within each section, the affected environment is described, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.

- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Huron Shores Ranger Station in Oscoda, Michigan.

Chapter 1: Introduction

The Huron Shores Ranger Station is proposing resource management activities to meet management objectives established in the Huron-Manistee National Forests Land and Resource Management Plan. The Snow Bird Kirtland's Warbler (KW) Project includes timber management, hazardous fuels reduction, wildlife habitat improvement, and road system management.

1.1 Project Location

The Snow Bird KW Project Area is located on the Tawas Ranger District of the Huron-Manistee National Forests. It is approximately 932 acres in size and consists of two separate areas that are approximately six miles southeast of the town of Glennie in Township 24 North, Range 6 East, Sections 13 and 14, and Township 24 North, Range 7 East, Section 7 of Iosco County, Michigan. These activities are proposed for implementation between the years 2011 and 2019. Maps of the proposals are enclosed in Appendix A.

1.2 Proposed Action

Project proposals are designed to meet Forest Plan management objectives, to enhance the present condition of ecosystems, and to move the project area toward the desired future condition described in the Forests' Plan.

Proposed Actions Include:

- Regenerate approximately 717 acres to jack pine at densities required for KW nesting habitat through a combination of commercial timber harvest, site preparation, and tree planting. Commercial timber harvest would consist of clearcutting red pine and mixed jack pine/red pine/oak stands. Site preparation would consist of either mechanical methods, prescribed fire or a combination of methods to reduce slash and submerchantable trees and prepare the sites for tree planting.

- Site prep approximately 23.5 acres of submerchantable mixed bigtooth aspen and jack pine/oak with prescribed fire and/or non-commercial mechanical methods and regenerate to jack pine at densities required for KW nesting habitat.

- Thin approximately 191 acres of red pine and treat with prescribed fire, to increase the health and vigor of remaining trees while reducing wildfire potential on the landscape.

Detailed information on the proposal is contained in Chapter 2, *Comparison of Alternatives*.

1.3 Management Direction

Various laws, regulations, and policies provide the framework for all levels of National Forest planning. Some of these include the Multiple Use Sustained Yield Act of 1960, the Clean Water Act of 1972, as amended, the Endangered Species Act of 1973, the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, the National Forest Management Act (NFMA) of 1976, Regional Guides, Land and Resource Management Plans, and the current Forest Service Natural Resources Agenda.

Long-term management direction for the Huron-Manistee National Forests was established in the Huron-Manistee National Forests Land and Resource Management Plan (Forests' Plan), and accompanying Final Environmental Impact Statement (FEIS), approved in March 2006. The Forests' Plan and FEIS are land management planning documents required by the rules implementing the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976. The Forests' Plan provides direction for the multiple-use and sustained yield of goods and services from National Forest System lands in an environmentally sound manner.

The Forests' Plan identifies more than 150,000 acres of Kirtland's warbler essential habitat on state and federal lands. On the Huron National Forest, 88,000 acres of essential habitat is identified to be managed on a 40 to 70-year rotation. This amounts to an average of 1,600 acres developed into nesting habitat annually.

Planning direction and guidance for the Snow Bird KW project was obtained from the Forests' Plan, other existing Forest and district planning documents, other applicable federal and state planning documents, and a project initiation letter from the District Ranger

This analysis is tiered to the Huron-Manistee National Forests Final Environmental Impact Statement, Land and Resource Management Plan, and the accompanying Record of Decision, 2006.

The Forests' Plan incorporates the following documents, which contain important direction for the proposed project:

Kirtland's Warbler Recovery Plan (1976, revised 1985)
In compliance with provisions of Section 7 of the Endangered Species Act, as amended, a Kirtland's Warbler Recovery Plan (KW Recovery Plan) was prepared, outlining steps designed to increase the species' population. The primary objective of the Kirtland's Warbler Recovery Plan is to "reestablish a self-sustaining Kirtland's Warbler population throughout its known former range at a minimum level of 1,000 pairs".

Strategy for Kirtland's Warbler Habitat Management (2001)
The Strategy for Kirtland's Warbler Habitat Management (Strategy) updates and revises the Kirtland's Warbler Management Plan for Habitat in Michigan (1981), and provides guidelines for managing summer range and protecting individual Kirtland's warblers and their nesting habitat. This plan identifies seven Kirtland's Warbler Management Areas (KWMA) on the Huron National Forest. The Pine River KWMA is one of these areas. Each KWMA is divided into treatment blocks, with each block containing 200 acres or more of contiguous stands of essential habitat.

The following documents provide further analysis to the proposed project and are incorporated by reference in this environmental assessment:

Huron-Manistee National Forests Monitoring and Evaluation Report; Fiscal Years 1996 through 2009.
Monitoring and Evaluation Reports document the results of Forest Plan implementation by evaluating data and information gathered and the effectiveness of Forests' Plan Standards and Guidelines, and recommending a course of action to move the Forests forward.

Exhaust Fire KW (2010)
Exhaust Fire KW EA was the most recent analysis written for the Pine River KWMA. This project replaced occupied habitat lost in the Exhaust Fire. This document describes similar management as Snow Bird KW, and brought forward similar issues, proposals, and effects.

Warbler Haven (2003)
Warbler Haven EA was the previous analysis written for the Pine River KWMA that utilized timber sales to create habitat for Kirtland's warbler. This analysis dealt with the same management as Snow Bird KW, and brought forward similar issues, proposals, and effects.

Warbler 67 Habitat and Klondyke Fuels Reduction Projects Environmental Assessment (2002)
Warbler 67 Habitat and Klondyke Fuels Reduction Projects EA analyzed the use of prescribed fire as an alternative to achieving the purpose and need for KW and fuels projects. This alternative is considered, but not studied in detail in the Snow Bird KW Project EA.

1.4 Purpose of the Proposal

Implementation of site-specific projects is guided by Forests' Plan direction through management prescriptions, which are designed to attain a desired future condition. The Snow Bird KW Project falls within Management Area (MA) 4.2 KW-Roaded Natural Sandy Plains and Hills, with an emphasis on Kirtland's warbler habitat management. The proposed activities address site-specific needs and opportunities designed to move the project area from the existing condition to the desired future condition set forth in the Forests' Plan (Forests' Plan, pages II-1 through II-40, and III-4.2-1 through III-4.2-15).

General management area direction is to enhance and increase the variety of wildlife habitats with emphasis given to managing deer, grouse, wildlife and Kirtland's warbler essential habitat. Emphasis includes producing high volumes of timber products, providing a variety of recreation and visual opportunities, and reducing life-threatening and property damaging wildfire potential. **The primary purpose of the Snow Bird KW Project is to maintain and develop essential nesting habitat for the Kirtland's warbler in compliance with the Kirtland's Warbler Recovery Plan and Strategy for Kirtland's Warbler Habitat Management.** Implementation of the Forests' Plan of March 2006 increased the annual acreage of essential habitat to be created on the Huron National Forests from 1,070 acres to 1,600 acres.

Kirtland's warbler (KW) has very restrictive habitat requirements. In addition to being ground nesters, Kirtland's warblers prefer jack pine stands over 200 acres in size. Those stands, which are most suitable for breeding, are characterized by having dense clumps of trees interspersed with numerous small, grassy openings, sedges, ferns, and low shrubs. The birds nest on the ground under the living branches of the small trees. Jack pine stands are used for nesting when trees are about five feet high or about five to eight years of age. Nesting continues in these stands until the lower branches of the trees start dying, or when the trees reach about 16 to 20 years of age. A breeding pair of warblers usually requires about 10 to 20 acres for their nesting territory within suitable habitat.

Fire always has been an important disturbance factor in the jack pine barrens. Young jack pines, upon which Kirtland's warbler depend, grow after fire removes older trees and rejuvenates the forest. Heat from fire opens jack pine cones on mature trees to release seeds. Fire also prepares the ground for germination of the seeds.

Modern wildfire suppression has reduced much of the natural disturbance that sustained Kirtland's warbler habitat for thousands of years. Without wildfire, land management agencies must take an active role in conserving and enhancing the jack pine ecosystem through active habitat management, under the guidance of the Kirtland's Warbler Recovery Plan, to ensure a sustained supply of occupiable habitat over the long term.

"Essential habitat" in Kirtland's Warbler Management Areas (KWMA's), is regulated for sustained yield of warbler nesting habitat and commercial timber production. Forest Plan direction specifies that a minimum of 1,600 acres of suitable nesting habitat be created annually on the Huron National Forest. Where possible, 15 to 25% of each Kirtland's Warbler Management Area is developed into nesting habitat every decade. Treatment blocks in each management area are sequentially scheduled for habitat development, close to other blocks in space and time, because larger blocks of habitat are more desirable to Kirtland's warblers, and to better mimic the effects of large scale wildfires. Nesting habitat is distributed across and within KWMAs to minimize the risk of catastrophic losses due to wildfire and other causes.

1.5 Project Objectives

The following project objectives are based on the primary purpose and other objectives of MA 4.2 KW and the Strategy for Kirtland's Warbler Habitat Management, and will be used as a means to measure how each of the alternatives achieves Forests' Plan goals and objectives.

- Maintain and develop essential nesting habitat for the Kirtland's warbler in compliance with the Kirtland's Warbler Recovery Plan.
- Reduce wildfire intensity by reducing hazardous fuels and reintroduce fire to the ecosystem.

1.6 Need for Action

The need for the project is established through the comparison of the existing condition and the desired condition. The desired condition is determined using guidance from the Forests' Plan, federal and state laws and regulations, current agency direction, and consideration of the issues and concerns expressed by the public.

Maintain and Develop Kirtland's warbler Habitat

This project is needed to continue the ongoing management for Kirtland's warbler recovery on the Huron National Forest. In compliance with the *Huron-Manistee National Forests' Land and Resource Management Plan* (Forests' Plan, March 2006), a minimum of 1,600 acres of future breeding and nesting habitat must be created annually on the Huron National Forest to ensure the sustainability and recovery of this population. There is a need to regenerate this area to conditions that provide suitable nesting habitat for the Kirtland's warbler.

Hazardous Fuels Reduction

Management Area direction includes reducing life-threatening and property-damaging wildfire potential (Forests' Plan, pages III-4.2-2). The Snow Bird KW project area is in the Oscoda West and Oscoda West Central townships, a wildland/urban interface community which is identified in the Federal Register (8/17/01) as a community at risk.

Forest replacement fire regime classes (FR) are a generalized description of the role fire plays in an ecosystem characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity or variability. All of the Snow Bird KW project area falls into FR 1, which is defined as a landscape ecosystem historically experiencing very frequent wildfires ranging from low to moderate-intensity surface fires to large, high-intensity, stand-replacing fires.

1.7 Decision Framework

This EA evaluates site-specific concerns and opportunities, considers alternatives, and analyzes the effects of the proposed action and alternatives for the Snow Bird KW Project. The District Ranger must decide whether or not to implement the proposed activities based on the actions and methods, location of actions, and project requirements and mitigations presented in the analysis, and whether the project will have a significant impact on the quality of the human environment, which would require the preparation of an Environmental Impact Statement (EIS).

1.8 Public Involvement

Scoping is a process for gathering comments about a site-specific proposed federal action to determine the scope of issues to be addressed and for identifying unresolved issues relating to the proposed action (40 CFR 1501.7).

An interdisciplinary team (ID team) of resource specialists gathered information from the project area to determine how to best implement Forests' Plan direction. Needs and opportunities were identified that would move the area from the existing condition to the desired future condition outlined in the appropriate Management Area in the Forests' Plan, and proposed actions were developed by the ID team.

Comments were solicited from Forest Service employees, members of the public, adjacent property owners, and public and private agencies and organizations through solicitation in the NEPA Quarterly in January 2010, publication in the Oscoda Press on February 3, 2010, and a scoping package was mailed February 3, 2010.

Public and internal comments are used to discern issues and identify potential environmental effects of the site-specific proposed activities. A copy of the scoping letter, a list of individuals and organizations contacted, and a disposition of comments received, are included in the Project File, in the Comments from Scoping Section.

One comment was received that opposed underburning red pine and suggested that chipping be used to reduce slash within stands. A subsequent review of this red pine stand determined that it was not ready for thinning at this time, therefore the proposal to thin and underburn the red pine in the project area was dropped from the proposed action.

1.9 Key Issues

Issues typically result from discussion, debate, and disagreement regarding the resource impacts directly related to the proposed activities. In order to provide concise analysis, the agency distinguishes between key issues used in the analysis for formulating alternatives, and other comments and concerns used to track effects and develop mitigation.

As determined from review by the Responsible Official and the Interdisciplinary Team, no key issues were identified for the Snow Bird KW project.

<u>Availability of the Planning Record</u>

A consideration in preparation of this environmental assessment has been the reduction of paperwork as specified in 40 CFR 1500.4. The objective is to furnish enough site-specific information to demonstrate a reasonable consideration of the environmental impacts of the alternatives and how these impacts might be mitigated. The Planning Record contains detailed information used in the analysis and is available upon request at the Huron-Shores Ranger Station.

Chapter 2: Comparison of Alternatives, Including the Proposed Action

Alternatives, developed by the interdisciplinary team in accordance with 40 CFR 1502.14, display a range of options which could be implemented to fulfill the purpose and need for action and to address any unresolved issues regarding the management of the Snow Bird KW Project area.

This chapter describes each alternative considered in this analysis. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. This comparison is based on the objectives identified in Chapter 1.

Project design criteria used to reduce adverse impacts to resources are included for each alternative.

2.1 Alternatives Considered in Detail

Two alternatives are considered in detail, Alternative 1; The No Action Alternative, and Alternative 2; The Proposed Action Alternative. Alternative 1, hereafter referred to as The No Action Alternative, analyzes the effects of deferred treatment (no management activities taking place at this time). Alternative 2, hereafter referred to as The Proposed Action, follows management direction established in the Forests' Plan and the Strategy for Kirtland's Warbler Habitat Management, as described in Section 1.4 of this document.

Alternative 1 – The No Action Alternative

Under the No Action alternative, no projects would be implemented in the project area at this time. Changes to vegetative structure and composition would occur only as the result of natural progression. No vegetation, wildlife, hazardous fuels reduction or transportation management would occur, and no timber commodities would be produced. Current uses of the area would continue until such uses are prohibited by changed environmental conditions. Minimal management such as periodic road maintenance would continue.

This alternative does not consider the regulation of Kirtland's warbler essential habitat for sustained yield of warbler nesting habitat and commercial timber production. The average annual regeneration treatment objective for the Pine River KWMA would not be met, and no progress would be made toward the Forests' Plan desired age class distribution of Kirtland's warbler essential habitat in the management area.

Because there are no prescribed natural fire areas on the Huron National Forest and all wildfires will be suppressed, wildfire is not considered (as a natural process) in the analysis of this alternative.

This alternative provides a baseline by which to compare the action alternative.

Alternative 2-The Proposed Action

Direction provided in the Forests' Plan and the *Strategy for Kirtland's Warbler Habitat Management (2001)*, and internal and public values and concerns were incorporated into the Proposed Action. The Proposed Action is designed to achieve the primary purpose of Management Area 4.2 KW, and contribute additional goods and services as described in the Forests' Plan.

NOTE:

- *An internal review of the red pine (191 acres) proposed for thinning and underburning determined that it had not grown enough since the last time it was treated to warrant another thinning. Therefore, it has been dropped from consideration in the Proposed Action.*
- *Similarly, it was determined that the submerchantable mixed bigtooth aspen and jack pine/oak (approximately 23 acres) proposed for treatment could not economically be converted to jack pine at densities required for nesting Kirtland's warbler. Therefore, site prep and regeneration of these stands was dropped from the Proposed Action.*
- *Furthermore, additional field review revealed an approximately 14 acre stand of red pine in the southwest portion of the project area was found to be of exceptional quality. Consequently, it was determined that converting this stand to jack pine for Kirtland's warbler habitat was not warranted. Management activities on this red pine stand were dropped from the Proposed Action.*

A total of 932 acres were proposed for treatment in the original scoping letter, approximately 228 acres is being dropped, so the Proposed Action now proposes treatment on a total of 704 acres.

Please refer to Appendix A to view maps of the proposed project areas and management activities associated with this alternative. Site specific information is provided in Table 1.

A summary of the proposed federal action is as follows:

- Regenerate approximately 693 acres of jack pine at densities required for KW nesting habitat through a combination of commercial timber harvest, site preparation, and tree planting. Commercial timber harvest would consist of clearcutting red pine and mixed jack pine/red pine/oak stands. Site preparation would consist of either mechanical methods, prescribed fire or a combination of methods to reduce slash and submerchantable trees and prepare the sites for tree planting.

- Site prep approximately 11 acres of non forested small openings with prescribed fire and/or mechanical methods and regenerate to jack pine at densities required for KW nesting habitat.

Table 1 below displays the vegetative management proposals for the Snow Bird project.

Table 1. The Proposed Action - Vegetative Management Proposals by Compartment, Stand, and Forest Type

Compartment	***Stand***	***Acres***	***Forest Type***	***Prescription***
304	07	6.4	Jack pine	Cut, site prep, plant
304	10	39.3	Red pine	Cut, site prep, plant
304	11	19.7	Short rotation oak	Cut, site prep, plant
304	12	5.6	Opening	Site prep, plant
304	14	50.6	Short rotation oak	Cut, site prep, plant
304	17	162.7	Short rotation oak	Cut, site prep, plant
330	10	28.3	Jack pine	Cut, site prep, plant
330	11	168.1	Jack pine	Cut, site prep, plant
330	18	92.3	Jack pine	Cut, site prep, plant
330	19	21.7	Short rotation oak	Cut, site prep, plant
330	28	3.5	Opening	Site prep, plant
330	30	1.2	Opening	Site prep, plant
330	36	1.0	Opening	Site prep, plant
330	38	103.4	Jack pine	Cut, site prep, plant

(All acreages are approximate, total treated GIS acres for Project area is approximately 704 acres)

Design Criteria applied to The Proposed Action

Management requirements, mitigation measures, Standards and Guidelines, and monitoring, as detailed in the Forest Plan, are management practices incorporated here by reference. In response to the site-specific proposal, the following additional design criteria would be applied to the Proposed Action Alternative:

Restrict harvest activities, hand-felling, bulldozing, within ¼ mile of occupied habitat from May 15 through August 15, to minimize disturbances to Kirtland's warbler during their breeding season.

Within ¼ mile of occupiable habitat planting operations should be designed to begin nearest to the occupiable habitat as early in the spring as practical and then proceed away from the occupiable habitat. The desired effect of planting in this manner is to treat the adjacent areas before Kirtland's warblers return to occupiable habitat (May 15).

In KW harvest units retain all snags and dead and downed woody debris, and retain two mast trees per five acres.

Any cultural resource sites found during implementation of project actions would be protected in accordance with standard timber sale contract clause BT6.4.

2.2 Alternatives Considered Not Studied in Detail

Alternatives that involve treating this area to produce timber instead of focusing management on producing Kirtland's warbler habitat were eliminated from detailed study. Focusing primarily on timber management would neither meet the purpose and need of this project nor the objectives of the Forests' Plan.

2.3 Summary Comparison of Alternatives

The following figure provides a summary of how the alternatives compare in terms of Chapter 1 objectives.

Table 2. Project Purpose and Need Indicators and Outputs, Summary Comparison of Alternatives (All acreages, mileages, and volumes are approximate)

Purpose and Need Indicators and Project Objectives	**Alternative 1 – No Action**	**Alternative 2 – Proposed Action**
Wildlife Habitat Indicators		
Kirtland's warbler nesting habitat created (acres)	0	704
Fuels Reduction Indicators		
Acres of project area in temporary opening	11	704

Chapter 3: Environmental Consequences

This section summarizes the physical, biological, social, and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of the alternatives.

Chapter III of the Forests' Plan EIS discusses cumulative effects of ten individual environmental elements such as soils, vegetation, wildlife, etc. Proposed project conditions are typical of those discussed in the Forests' Plan EIS. This analysis tiers to the EIS discussions. The actions proposed in the alternatives presented are consistent with the direction of the Final Environmental Impact Statement for the Forests' Plan and the Forests' Plan.

Chapter 3 is organized by resource. This section will cover the *Present Condition and Effects of the Alternatives* for each affected resource. Following is an outline of how each resource section is organized:

- *Analysis Bounds* This is a description of the geographic area used for cumulative effects analysis that is specific to the resource.

- *Affected Environment* This section briefly describes the current condition (affected environment) of the resource in the project areas, and how past activities have affected that condition.

- *Direct and Indirect Effects* This section describes the direct and indirect effects of each alternative on the present condition of the resource. Generally, direct effects are caused by the action and occur at the same time and place as the action. Indirect effects are caused by the action but occur later in time or are spatially removed from the action. Direct and indirect effects can be beneficial or detrimental. The Direct, Indirect and Cumulative effects of the No Action Alternative will all be described under the heading

- *Cumulative Effects* Cumulative effects include not only the effects of the proposed actions, but may also include the effects of past actions and reasonably foreseeable future actions on the resource. This section includes effects extending well outside project boundaries. Project boundaries include those specific areas where actions are proposed. Analysis boundaries for cumulative effects analysis is described in the *Analysis Bounds* (above) for each resource section.

Acreages used for analyses in this environmental assessment are GIS acres. All acreages are approximate.

3.1 Present Condition and Effects of the Alternatives

Biological Factors

3.2 Wildlife and Vegetation Management

Analysis Bounds

Analysis area boundaries will include Pine River KWMA essential habitat within the Kirtland's Warbler Emphasis Areas (4.2 KW) defined by the *Huron-Manistee National Forests Land and Resource Management Plan (2006).* This area covers approximately 20,542 acres or 32 square miles. The essential habitat identified is entirely National Forest System lands. This area consists primarily of red pine plantations, upland jack pine and jack pine/oak, within a pine barren ecosystem, Land Type Association 1, (LTA 1). For information on Land Type Association descriptions, please refer to the *Field Guide, Ecological Classification and Inventory System of the Huron-Manistee*, and the map in Appendix A on page 42. Other forest types, such as aspen and white pine, occur in isolated stands or as inclusions within stands and add diversity at the stand level. These forest types do not occur at a large enough scale to be considered separate community types or functioning ecosystems.

The temporal bounds will include Kirtland's warbler projects during the span of time between 1994 and 2014. These bounds were chosen because stands that were regenerated before 1994 are now mostly unsuitable habitat. It is also difficult to predict the effects that habitat management would have on the warblers past 2014. Please refer to Table 4; Pine River Habitat Management Schedule.

Affected Environment

The primary purpose of Management Prescription Area 4.2KW, Pine River KWMA, and this project, is to maintain and develop essential nesting habitat for the Kirtland's warbler in compliance with provisions of Section 7 of the Endangered Species Act and as outlined in the Kirtland's Warbler Management and Recovery Plan (USDI-Fish and Wildlife Service 1985) and Strategy for Kirtland's Warbler Habitat Management (USDA-Forest Service 2001). **Essential habitat is that land identified as biologically appropriate and necessary for the development of nesting habitat for the Kirtland's warbler.** Essential habitat is designated by the Regional Forester from the USDA Forest Service and the Director of the Michigan Department of Natural Resources. Essential habitat occurs in significant acreages on both state and federal lands. The government agencies responsible for land management are working together, sharing information to coordinate habitat development on a statewide basis. After field examination and stand data analysis, most of those stands that were believed to be manageable for nesting habitat were identified as essential habitat. At present, Kirtland's warbler habitat is managed in 24 Kirtland's Warbler Management Areas (KWMAs) - 17 on State Forests and seven on the Huron National Forest.

Essential habitat in KWMAs is regulated for sustained yield of warbler nesting habitat and commercial timber production. Forests Plan direction specifies that a minimum of 1,600 acres of suitable nesting habitat be created annually on the Huron National Forest. Where possible, 15 to 25% of each Kirtland's Warbler Management Area is developed into nesting habitat every decade. Kirtland's warbler treatment blocks in each management area are sequentially scheduled for habitat development starting with the first block and progressing to the last over the planning period (on a 40 to 70 year rotation). Treatment blocks are scheduled for regeneration close to other blocks in space and time, because larger blocks of habitat are more desirable to Kirtland's warblers, and to better mimic the effects of large scale wildfires. Some essential habitat may be managed on a shorter rotation. Nesting habitat is distributed across and within KWMAs to minimize the risk of catastrophic losses due to wildfire and other causes.

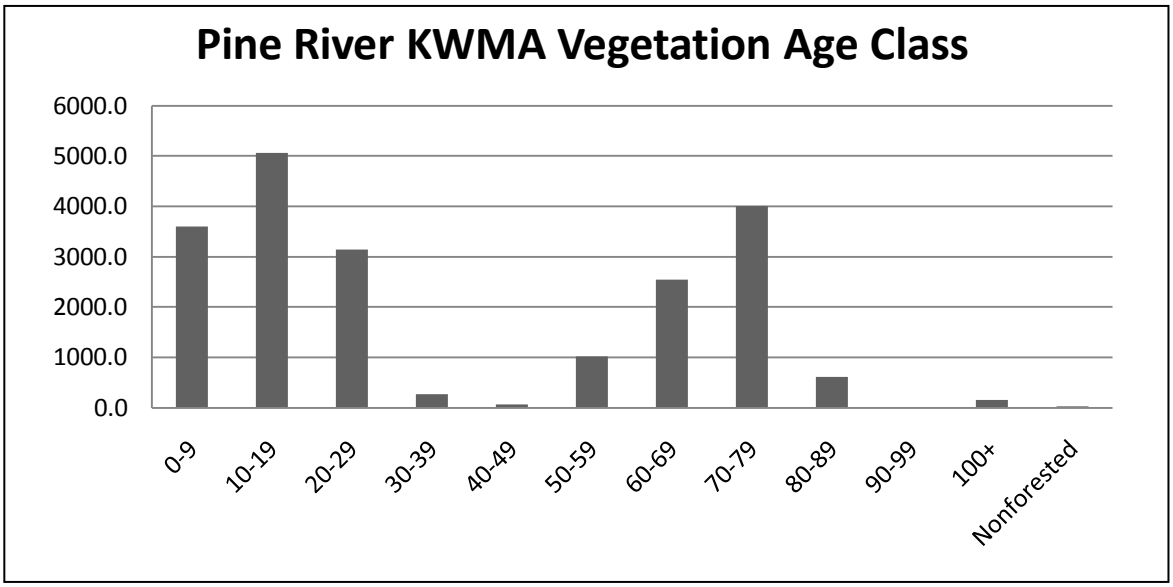
General Land Office Surveys from 1816 through 1856 indicate that the analysis area was predominantly occupied by extensive jack pine stands and pine barrens (defined in Michigan Natural Features Inventory as "a coniferous savanna of scattered and clumped trees located north of the transition zone"), commonly referred to as the "jack pine plains" of northern lower Michigan. Key elements of this ecosystem include deep, excessively drained sand soils with low nutrient holding capacity, and forest species that are well adapted to fire such as jack pine and northern pin oak. The Pine River KWMA is predominantly flat, with little relief. Fire has played a long-term and dominant role in shaping the plains landscape. The plant species associated with the jack pine plains have special adaptations for living in this environment and rely on periodic wildfires to reproduce and thrive.

In an effort to protect property and natural resources from wildfires, fire suppression has been a top priority for the Forest Service since its inception in 1905. Over this time fire suppression has had a profound effect on the habitats of the Huron National Forest. Suppression has caused a change in fire regimes. Historical pine barren ecosystems were maintained by frequent, low intensity fires with periodic, less frequent, catastrophic fire. Fire suppression has

led to stand conversions from openlands to forested communities, and from pine barrens, to oak and mixed deciduous/coniferous stands. Historically, Kirtland's warblers depended on wild fires to create the habitat conditions they needed to survive. Since now wildfire is suppressed, approximately 95% of the habitat occupied by Kirtland's warblers is the result of jack pine reforestation projects like Snow Bird KW project.

The National Forest Management Act (NFMA) requires that trees cannot be harvested before they reach maturity, which for jack pine means harvesting cannot occur until trees are between 40-70 years old. In order to comply with NFMA, Kirtland's warbler essential habitat is managed on a 50 year rotation cycle. The strategy of this management is to have approximately 20% of the total acreage of essential habitat harvested and planted to KW densities each decade. The desired age class distribution (optimal) is to have equal acreage in the 0-9, 10-19, 20-29, 30-39, and 40-49 year age classes with final harvesting occurring at approximately age 50. Kirtland's warblers prefer 5 to 15 year old jack pine for nesting and breeding, making this age class the most important (Figure 1).

Figure 1. Age Class Distribution of Essential KW Habitat in the Pine River KWMA



To make habitat more suitable for Kirtland's warbler, treatment blocks are also scheduled for regeneration close to other blocks in space and time in order to make them appear larger in the landscape level. Larger blocks of habitat (370+ acres) are more desirable to Kirtland's warblers in three ways; they are utilized earlier than other blocks, used for longer time periods and are more productive than comparable smaller sized blocks. At the ecosystem level, large habitat blocks better mimic the post-fire conditions of the large scale wildfires that Kirtland's warbler adapted with. In order to create these large blocks of habitat, it is sometimes necessary to treat immature or submerchantable stands. There are approximately 11 acres of non forested small openings proposed for treatment. These stands are proposed to be treated in the Snow Bird project now in order to provide large, contiguous blocks of even aged jack pine to improve the suitability of the project area for Kirtland's warbler habitat in the future.

Fragmentation of habitats is primarily discussed in relation to its adverse affects on bird species that are area sensitive, such as neo-tropical migrants, but it is also applicable to species that are inherently rare, such as the Kirtland's warbler. Fragmentation, which is the breaking up of continuous habitats, produces many changes in the landscape such as a reduction in mature forest, increased edge, reduced interior areas, and increased isolation in the remaining interior area. Fragmented areas tend to result in greater predation on songbird nests by blue jays, grackles, raccoons, and skunks and particularly parasitism by brown-headed cowbirds (*Molothrus ater*).

Brown-headed cowbirds evolved following herds of American bison across the prairie ecosystems of the Great Plains. Constantly moving with the buffalo, brown-headed cowbirds did not have time to stop and spend the time required for nesting and brood-rearing, so they adapted a strategy of laying their eggs in the nests of other host birds which would then raise the young cowbirds as their own. The cowbird chicks hatch first and out-compete the host chicks for resources. Over time these host bird species developed strategies to cope with parasitism from brown-headed cowbirds to the point that they now are have reached a balance in prairie ecosystems. However, agriculture

expansion and forest clearing in the Midwest and eventually, the lower peninsula of Michigan in the late 1800's, resulted in the cowbird expanding its range into Kirtland's warbler nesting areas. Kirtland's warblers, and many other eastern bird species have not adapted to parasitism from cowbirds and have no natural defenses. Before the implementation of a brown-headed cowbird control program in 1972, Dr. Larry Walkenshaw (1972) found that between 1966-1971, 69 percent of Kirtland's warbler nests he examined contained cowbird eggs.

The U.S.D.I. Fish and Wildlife Service (FWS) annually conduct a brown-headed cowbird control program, to reduce the threat of cowbird parasitism on Kirtland's warblers. In his 2003 report to the Kirtland's Warbler Recovery Team, FWS biologist Chris Mensing stated that the "Kirtland's warbler population had increased to a record level, most likely due to successful, extensive habitat management and brown-headed cowbird control." This control program removes local cowbirds from KW nesting areas, but over its 33 year history, has had virtually no effect on the populations of cowbirds throughout Michigan. Brown-headed cowbirds from agricultural areas outside of KWMAs produce a continuing supply of birds which disperse into KWMAs and threaten the future of Kirtland's warblers. Mensing's report states, "The survival and recovery of Kirtland's warbler depends on continued habitat management and annual cowbird control." (Mensing, 2003)

Direct and Indirect Effects—No Action

Under the No Action Alternative, activities would be deferred to a later time. Since there are no activities associated with this alternative there would be no associated direct effects.

The indirect effects to wildlife of this alternative would occur over time as succession takes place. Currently, there is no suitable habitat (large stands of 5-15 year old jack pine) for Kirtland's warbler within the project area. Under the No Action Alternative none would be created, no areas would be planted, and proposed treatments would be deferred.

Under the No Action Alternative, the conditions that Kirtland's warbler require for breeding and nesting, (high densities of jack pine trees and cover near the ground), would not occur and the project area would not be occupiable. Without a large scale (+200 acre) natural disturbance event like windthrow or wild fire, this age class of jack pine would not occur into the foreseeable future within the project area. This would create a deficit of nesting habitat within the Pine River KWMA and across the Huron National Forest for several years. Since the Forest Plan provides direction for the regeneration of a minimum of 1,600 acres per year, not implementing this project would represent a loss of 44% of the annual habitat creation for the Forest. It would also create a wider gap between suitably aged stands in the Pine River KWMA and reduce the suitability of this Management Area for Kirtland's warbler at the landscape level. There would be fewer birds produced within the Pine River KWMA, due to the lack of suitable habitat. This lack of action could adversely affect the future viability of Kirtland's warbler on the Forest, and would not follow direction in the Forests' Plan, the Strategy for Kirtland's Warbler Habitat Management or the Kirtland's Warbler Recovery Plan. Therefore, the No Action Alternative would not meet the objectives of the project area and would have an adverse indirect affect on habitat creation and suitability for Kirtland's warbler.

Fragmentation and the associated affects of parasitism from cowbirds, would not increase under the No Action Alternative. Fragmentation would remain the same or slightly decrease from current conditions, over the next decade, as young stands of jack pine mature and small openings fill in from woody encroachment. This alternative would not clear cut 693 acres and therefore would have much less fragmentation than the Proposed Action. Roads would likely remain and would contribute as linear fragmentation of habitats, slightly more than the Proposed Action Alternative, which would close and obliterate approximately one mile of unclassified road. Unless catastrophic natural events such as wildfire take place, landscape conditions would remain in the same proportions as they are currently. Fire suppression is likely to limit the extent of the role that wildfire would play in the fragmentation of the project area. Fragmentation would still occur under this alternative, however the associated adverse affects would be small to moderate compared to the Proposed Action Alternative.

Direct and Indirect Effects—Proposed Action

Currently, there is occupied habitat adjacent to the project area. The Chambers KW block lies immediately adjacent to both the Snow Bird and Deer Run KW Blocks. Since this occupied habitat is within 1/4 mile of the project area, proposed treatments would need to be restricted from occurring within the occupied period to prevent disturbances to nesting and brood-rearing. This is addressed by project design criteria which states:

- ***Restrict harvest activities, hand-felling, bulldozing, within ¼ mile of occupied habitat from May 1 through August 15, to minimize disturbances to Kirtland's warbler during their breeding season.***

Tree planting within the project area has the potential to disturb Kirtland's warblers (if adjacent areas within ¼ mile are occupiable) as they arrive in occupiable habitat and begin to establish territories. To minimize the potential for disturbance, the following project design criteria would be in effect:

- ***Within ¼ mile of occupiable habitat planting operations should be designed to begin nearest to the occupiable habitat as early in the spring as practical and then proceed away from the occupiable habitat. The desired effect of planting in this manner is to treat the adjacent areas before Kirtland's warblers return to occupiable habitat.***

This alternative has the potential to create long term indirect beneficial effects by creating and maintaining occupiable habitat into the foreseeable future within the Pine River KWMA.

Specifically, this alternative would indirectly benefit Kirtland's warbler by creating approximately 704 acres of occupiable Kirtland's warbler breeding and nesting habitat. Not all of this acreage is merchantable at this time (approximately 11 acres is non forested small openings), however, these areas are proposed for treatment now in order to create the large, contiguous blocks of same aged jack pine that Kirtland's warbler prefer.

Mast trees (such as oak) retained after timber harvest would be reduced from four trees/acre (as recommended in the Forests' Plan) to two trees/five acres. While this number of mast trees is less than Forests Plan guidelines, experience has shown that retention of more than two mast trees/acre adversely affects the suitability of Kirtland's warbler habitat in three ways. It results in reduced survival of jack pine seedlings (below 1,452 trees/acre on 75% of each acre) through competition. Oak seedlings can also fill in openings left to provide foraging and nesting habitat. Retention of more than two mast trees/acre has the effect of creating a two-story stand. Too many mature trees causes the area to loose its openness and reduces the suitability of the stand through fragmentation.

Creation of Kirtland's warbler habitat, through clear cutting and machine planting is considered the most dependable way to achieve the desired densities of regenerating jack pine on the Huron National Forest. The result of harvesting in this manner however is increased, although temporary, fragmentation of the forest.

As discussed previously, fragmentation of jack pine leads to potential future parasitism of Kirtland's warbler nests by brown-headed cowbirds, which seriously threatens the recovery of this species. The Fish and Wildlife Service traps cowbirds in occupied habitat to provide a measure of protection to Kirtland's warblers and associated bird species. The trapping of cowbirds in occupied habitat is a mitigation measure for the fragmentation that results from regenerating jack pine to create suitable habitat for Kirtland's warbler. The Snow Bird KW project area would receive interim protection from cowbirds from the trapping that is currently occurring at the occupied Chambers and Daylight KW Blocks which lies within one mile of the project area, well within the demonstrated coverage area of these traps. This trapping effort is paramount since without this protection, the ability of Kirtland's warblers to reproduce in the project area and the effectiveness of this project could be jeopardized.

Site preparation could also have an indirect effect on wildlife by impacts on habitat. Prescribed fire could result in reduced woody debris that provides cover, creation of new snags while reducing current snags, releasing nutrients, stimulating plant growth and nutritional value, increasing seed and fruit production, and creating seed beds. Roller chopping would reduce the height of woody debris as cover, create some seed beds, and stimulate some plant species such as blueberry. These activities would all have indirect beneficial effects on habitat suitability for Kirtland's warbler.

Kirtland's warbler habitat creation would compliment and enhance the overall suitability of the Pine River KWMA, and would compliment nearby occupied KW blocks, specifically Chambers and Daylight This creation of habitat would indirectly benefit the future viability of Kirtland's warbler on the Pine River KWMA, and on the Forest. It would implement the direction for Kirtland's warbler recovery described in the Forests' Plan, the Strategy for Kirtland's Warbler Habitat Management and the Kirtland's Warbler Recovery Plan. Therefore, the Proposed Action Alternative would meet the objectives of the project area and would have a beneficial indirect affect on habitat creation for Kirtland's warbler.

Cumulative Effects—All Alternatives

The Pine River KWMA is approximately 20,542 acres in size. The Forests' Plan, through the KW Strategy, establishes that management of KWMA's will strive to create 15-25% of each KWMA into suitable habitat, each decade. While there is suitably-aged jack pine in the Pine River KWMA, much of the area is too old to meet the nesting requirements of Kirtland's warbler. The No Action Alternative, by deferring management, would result in a larger

temporal gap between suitably aged stands and would therefore cause an even larger deficit in the amount of habitat for Kirtland's warbler recovery. The result of implementation of the No Action Alternative is a cumulative adverse affect on habitat availability in the Pine River KWMA.

Implementation of the Proposed Action Alternative would begin to move the Pine River KWMA closer to the Forests' Plan objective. When proposed treatments are combined cumulatively with past KW habitat creation (Table 4), together they would create habitat on approximately 11% of the Pine River KWMA. These projects would have a cumulatively beneficial effect on Kirtland's warblers by increasing the availability of suitable habitat within the Pine River KWMA.

Endangered, Threatened, and Regional Foresters Sensitive Species

Direct and Indirect Effects –All Alternatives

A list of Federally endangered and threatened wildlife and plant species and Region 9 Forester's sensitive wildlife and plant species (RFSS) considered and possible effects to those species as a result of implementation of the No Action and Proposed Action Alternatives is discussed in the Wildlife Biological Evaluation for Snow Bird KW Project Area (Wildlife BE- project file) and the Biological Evaluation (Plants) for the Snow Bird KW Project. The Wildlife Biological Evaluation determined that Kirtland's warbler was the only federally listed species with breeding habitat near the project area, in the Chambers and Daylight KW Blocks of the Pine River KWMA, approximately 1/4 mile away. There is currently no suitable habitat in the project area so there would be no adverse direct effects from implementation, however proposed treatments could adversely affect Kirtland's warbler in the occupied adjacent habitat. Project design criteria were established to prevent or minimize disturbance to Kirtland's warbler. Since the Proposed Action Alternative would create approximately 704 acres of suitable nesting habitat there would be beneficial indirect effects on the Kirtland's warbler. **The Wildlife Biological Evaluation (BE) determined that the activities proposed under the No Action Alternative would have no effect on Kirtland's warbler**. **The Proposed Action Alternative "may affect (beneficial), but would not adversely affect" Kirtland's warbler, and would have no effects on any other federally listed species.**

The BE also describes the impacts of the alternatives on RFSS. The BE disclosed that there were no known occurrences of RFSS wildlife species within the project area. **The Wildlife Biological Evaluation determined that** the proposals for the Snow Bird KW Project are designed to prevent or reduce direct effects to endangered, threatened, and Regional Forester's sensitive species, while providing beneficial breeding and nesting habitat for Kirtland's warblers. The proposed treatments are consistent with Forest's Plan standards and guidelines and The Strategy for Kirtland's Warbler Habitat Management. Existing habitat conditions are common and can be found throughout the Huron Shores Ranger Station and the Huron National Forest. **Implementation of the Proposed Action Alternative may affect (beneficial), but would not adversely affect Kirtland's warbler, and would have no effects on any other ET species or their habitats, and would have no impact on Regional Foresters Sensitive Species.** In the event that new ETS species are found within the project area, conservation measures would be implemented to protect them, as necessary.

Management Indicator Species

Affected Environment

Since the Forest Service's evolution from single-species management to ecosystem management, wildlife biologists have utilized a more holistic approach when addressing the needs of wildlife species (Robertson, 1992, Marita, *et. al.,* 1992). Although each wildlife species has individual habitat requirements, the sheer number (409 vertebrate species alone), renders single-species management unfeasible. Similar needs among wildlife species allows a general grouping of animals associated with common habitat types. Furthermore, the Huron-Manistee National Forests have selected 11 Management Indicator Species (four wildlife species) due to "their emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (Forest Service Manual 2120.5, Washington Office Amendment 2100-91-5). The analysis of potential effects of the proposed management activities on MIS Species would result in an analysis for wildlife species with similar essential habitat requirements. Further discussion on the status of MIS is documented in the Huron-Manistee National Forests Monitoring and Evaluation Reports (1996-2009), and FEIS, (2006) which are incorporated here by reference.

Table 3. Management Indicator Species and Associated Habitat Descriptions

Indicator Species	Principal Habitat Characteristics on the Huron-Manistee National Forests	Existing Condition Within the Project Area
Bald Eagle *Haliaeetus leucocephalus*	Associated with mature timber adjacent to large lakes and rivers	No habitat available
Karner Blue Butterfly *Lycaeides melissa samuel*	Oak savanna and openings with lupine on the Baldwin White Cloud Districts of the Manistee National Forest	No habitat available
Kirtland's warbler *Dendroica kirtlandii*	Younger aged deciduous stands (seedling/sapling size) of jack pine	Jack pine habitats too old to be occupiable
Ruffed Grouse *Bonasa umbellus*	Aspen and aspen-alder mixes, 5-25 years old, with large crowned male aspen clones	No habitat available

Population trends for MIS are found in the annual HMNF Monitoring and Evaluation Reports, 1996-2009 and in the FEIS, (2006). This information is utilized to implement and adjust the Forest program.

Direct and Indirect Effects –All Alternatives

Since there is no habitat available on the project area, implementation of the Proposed Action Alternative would have no effect on bald eagle. Karner blue butterfly does not occur on the Huron National Forest, so there would be no effect on this species as well. Effects to Kirtland's warbler were described previously. While some grouse may be found on the project area on a seasonal basis, grouse rely on several age classes of aspen in close proximity to each other to meet their yearly life requirements. Since there are no stands of aspen in the project area, there is no suitable habitat and there would be no effects to ruffed grouse.

Table 4. Pine River KWMA Habitat Management Schedule, 1994-2009 and 2007-2018

Pine River KWMA Habitat Management Schedule				
KW Block	**Year Sold**	**Year Planted**	**Years until Suitable for KW**	**Total Acres**
Past Management 1994-2009 (18% of KWMA)				
Triangle	1996	2001	Currently Suitable	199
Queen's Corner	1999	2003-2004	Currently Suitable	246
Daylight	1996	2002	Currently Suitable	271
Chambers	1994	2002	Currently Suitable	236
Conehead	2002	2004	Currently Suitable	275
Rusty Raptor	1997	2002	Currently Suitable	271
Cookie Crumb	1999	2003	Currently Suitable	83
Vandercookie	1998	2003	Currently Suitable	269
Ant Hill	1999	2004	Currently Suitable	351
Kobs	1999	2005-2006	Currently Suitable	341
Lucky 7	2003	2007	Currently Suitable	297
Kokosing	2004	Not planted	Not Planted	0
Bugs N Bears	2007	2008	1-2 years	103
Postal Britt	2004	2008	1-2 years	366
Red Trout	2005	2009	3-4 years	370
Annual Goal				**376**
Average Annual Reforestation				**459.75**
Future Management 2007-2018 (11% of KWMA)				
King WUI	2007	2010	4-5 years	369
Kobs	2010 (wildfire)	2011	6-7 years	260
Kings Corner	2010 (hydroaxe)	2012	6-7 years	270
Charlie Horse	2009	2012	6-7 years	369
Golden Gopher	2007	2013	8-9 years	369
Deer Run	2012	2015	9-10 years	420
Snow Bird	2014	2018	12-13 years	284
Annual Goal				**376**
Average Annual Reforestation				**292.6**

3.3 Fisheries and Aquatic Resources

There are no aquatic resources within the project area. Therefore there are no direct, indirect or cumulative effects from any of the alternatives on fisheries or aquatic resources.

Physical Factors

3.4 Soil and Water Resources

Analysis Bounds

There are no water resources close to or affected by project activities, therefore there are no effects to water resources to discuss. Affects to soils are discussed below. The analysis bounds for soils include the Kalkaska Sand soil type within the Pine River KWMA. Temporal bounds include the past 17 years and 7 years into the future. These bounds were chosen to coincide with the KW habitat management schedule.

Affected Environment

The analysis area is mostly forested, has good ground cover, is comprised of deep, excessively well-drained sand soils, and major precipitation events occur when soils are frost-free. All are conditions very favorable for rapid water infiltration and good sub-surface percolation. Overall, the watershed condition is satisfactory due to the deep sand soils and presence of forest canopy and litter cover over most of the area.

Soils in the proposed treatment areas are deep sands, deposited as deltas beneath glacial Pine River Bay. The terrain is characterized by poorly developed xeric sandy soils on slopes less than 11%. The soils have little or no surface organic materials and low organic matter content in the soil horizons. The soils are acid, but have a calcareous subsurface above 15 feet. Water tables are deeper than 15 feet throughout the area. Heavy vegetation and rapid infiltration of water into the soil discourages overland water flow. These characteristics contribute to very stable land and water systems. Water flows from the project area at a steady, even rate of high quality.

Localized activities such as dispersed recreation camping, use of unclassified roads and trails, and poor maintenance of roads in some areas have caused local, less than satisfactory conditions. Snow Bird project proposals consider these conditions.

Reducing the amount of forested coverage increases the water yield; more water flows out of the watershed. If the vegetation is reestablished, this is a temporary effect. Concerns about changes in timing or quantity of water flow resulting from land uses start when more than 11% of a watershed has been converted to open lands, which includes agricultural lands, development, and/or forest cover less than or equal to fifteen years of age. Thinned stands, left adequately stocked, have a proportionally lesser effect on watershed hydrology.

Increased oxidation (decomposition) of organic matter would occur on the clearcut units and on areas burned. The increase in sunlight hitting the ground warms the soils and increases microbial activities resulting in increased decomposition rates. These sites would have lower soil organic matter contents than similarly shaded areas, and would have higher fluxes of soluble nutrients. Accelerated post harvest nutrient losses are confined to a relatively short period of the first few years. Shorter rotations (30-45 years for jack pine) tend to remove more nutrients at a faster rate than long rotations (60-90 years for jack pine) due to excessive nitrogen drain impeding growth in the second rotation.

Effects of prescribed burning on soil properties are directly related to fire intensity and the resulting degree of exposure of mineral soil to heat. Soil stability is adversely affected by excessive heat. Soil properties are unaffected or may even be enhanced if the aboveground fuels are burned at sufficiently low intensity so that soil temperature is not greatly increased.

The use of equipment on unfrozen soils causes compaction. Compaction reduces the amount of large air spaces in the soil. In the sandy soils, light to moderate compaction would actually improve the water holding ability of the soils and lead to an increase in site productivity.

Direct and Indirect Effects-No Action

Implementing the No Action Alternative would have overall positive consequences for soil conditions. Not implementing vegetation treatments would, over time result in the continuation of rising biomass levels across the analysis area. Soil productivity levels would remain unchanged or increase until the levels of organic matter stabilize.

This would occur as forested stands reached old growth conditions. Barring any natural disturbance processes (i.e. insect/disease outbreak and/or wildfire), this alternative would result in the highest total biomass levels.

Leaf area indices for most stands in the analysis area have already recovered from past management activities. Impacts from the past harvesting activities on hydrologic characteristics are minimal and will continue to recover. Barring any natural disturbance processes, there would be little or no change in current watershed characteristics in the future.

This alternative would have the lowest overall soil bulk densities (least amount of area compacted). No new compacted areas would be associated with harvesting activities, as would occur in the Proposed Action Alternative. Compaction levels from previous activities would slowly recover and conditions for rapid infiltration and root growth would improve.

Consequences of poor road locations, poorly maintained roads, user-developed roads and trails, and dispersed recreation sites would continue. Without maintenance or attention, these problem areas would continue to grow. The effects include rill and gully erosion, rutting on user developed roads and trails, and soil compaction. As compared to the Proposed Action Alternative, which addresses some of these issues, this alternative would have the highest related effects.

The watershed condition would remain relatively stable. The distribution of land classification within the watershed would be unaffected by the proposal.

Direct and Indirect Effects—Proposed Action

Overall, total biomass in the project area has been increasing. Biomass and nutrient removals would be at levels that would not reduce long-term soil productivity. Harvesting of forested stands could be accomplished mechanically using methods from stem-only harvesting to whole tree harvesting. KW units harvested by the stem-only method would retain more of the aboveground biomass currently on the site than would whole tree harvested units. Whole tree harvested units would retain a smaller percentage of the aboveground biomass, represented primarily by the nonmerchantable and dead component left on the site, plus scattered, live oak and pine. In mature stands, total tree harvesting one rotation on poor sites that are not in less than natural condition due to erosion, destructive fires, and other disturbances should not adversely affect long-term productivity. Growth is always very low regardless of treatment (due to extreme droughtiness). Following implementation of the Proposed Action Alternative, total biomass levels would be less than those in the No Action Alternative.

Site preparation for machine planting, if needed, would be accomplished using prescribed fire, rollerchopping, hydro-axing, or a combination of methods to reduce residual slash in clearcut units. Use of prescribed fire would be implemented at intensities precluding changes to soil properties and soil stability. Rollerchopping concentrates the vegetation on the soil surface and this organic matter acts as a mulch, moderating soil temperature fluctuations, and reducing soil moisture losses. Chopping is a practical means of conserving soil nutrients and is particularly useful on dry sandy soils (Pritchett and Fisher, 1987). Hydro-axing chops residual material and leaves all of the biomass on site with minimal soil disturbance. Kirtland's warbler blocks would be machine planted to jack pine seedlings in furrows established by a V-plow. Displacement of surface soils would be in a band narrow enough that nutrients would remain available for seedling growth and long-term productivity and biodiversity would be minimally impacted. Superficial mixing of surface soil layers by planting or chopping operations would not result in detrimental soil displacement.

Compaction would occur to some degree on all sites harvested in frost-free conditions. Risk of compaction in sandy soils is generally low, and soil compaction levels would be maintained below levels that would preclude root penetration or adversely affect long-term site productivity. These moderately compacted areas improve the water holding ability of the soils and may, in the short term, increase site productivity. Field observations and aerial photographs of the KWMA demonstrate an increase in the amount of natural jack pine reproduction in areas of skid trails and around landings. There would be some localized areas of unsatisfactory conditions. However, these areas would be too small to treat effectively, or performing amelioration treatments would cause more adverse impacts.

Temporary roads and landings would be closed and returned to forested conditions following harvesting activities.

Cumulative Effects
The proposed levels of vegetation treatment would cause little or no measurable change in the hydrologic characteristics within the affected watershed. Proposed activities would follow Forest Plan standards and guidelines and State of Michigan Best Management Practices to minimize effects on water quality.

3.5 Air Quality

Analysis Bounds
The spatial bounds for the cumulative affects analysis is the state of Michigan. The temporal bounds include the past 10 years.

Affected Environment
The state of Michigan has been in attainment for PM_{10} since October 1996. However, a review of the state's $PM_{2.5}$ monitoring data indicates that, based on the years 2001-2003, six out of a total of 39 $PM_{2.5}$ monitors in the state measured a three-year average above the NAAQS of 15 $\mu g/m^3$ (micrograms/cubic meter). Thirteen other monitors met the standard but measured a three-year average value greater than 85% of the annual standard. Five of the six monitors with high values are located in the industrial area of Detroit, the sixth is just downwind from Toledo, Ohio. At all Michigan monitors, the 24-hour average $PM_{2.5}$ NAAQS of 115$\mu g/m^3$ is being met.

Analysis of Direct, Indirect, and Cumulative Effects
Sensitive receptor sites are usually defined as locations where human populations tend to concentrate. These may be residential concentrations in the form of towns or cities, or locations where people tend to gather in groups such as parks and schools. Travel routes such as highways may be labeled as sensitive receptor sites. Particular areas along highways or other locations may be more prone to being declared sensitive receptor sites because of topographic and microclimate features.

No areas within the Pine River Kirtland's Warbler Management Area (KWMA) are recognized as non-attainment areas in Michigan. No direct, indirect, or cumulative effects are expected when the above parameters are employed.

3.6 Visual Quality

Analysis Bounds
The cumulative effects analysis boundaries for visual quality effects will be the Pine River KWMA. This area is managed primarily for the Kirtland's warbler and incorporates large, temporary openings across the landscape. Visually, Kirtland's Warbler Management Areas are unique on and to the Forest. The temporal bounds include the past 17 years and 7 years into the future. These bounds were chosen to coincide with the KW habitat management schedule.

Affected Environment
The analysis area landscape is characterized by a forested environment dominated by extensive jack pine and jack pine/oak stands with red pine plantations and fuelbreaks interspersed. Visual contrast is evident where 200 to 300 acre warbler treatment blocks have been regenerated and display a variety of age and size classes.

A naturally appearing landscape for the analysis area would include extensive jack pine stands of varying ages, interspersed with barrens, openings, and mixed red pine/jack pine/oak stands. These ecosystems were historically maintained by wildfires.

This analysis assesses the effects of the project on the scenic integrity within the analysis area. Scenic integrity is a key concept of the Scenery Management System, which is used to determine the relative value and importance of scenery in the National Forest System. The Scenery Management System is used in the context of ecosystem management to inventory and analyze scenery; assist in developing natural resource goals and objectives; monitor scenic integrity, and ensure that attractive landscapes are sustained for the future.

Scenic Integrity is an indication of the state of naturalness or, conversely, the state of disturbance created by human activities or alteration. It measures how closely the landscape approaches the character desired over the long term. It is stated in degrees of deviation from this desired character. Where the desired character is reflective of the existing character, then Scenic Integrity measures deviation from the existing condition. Landscape character with a

high degree of scenic integrity has a sense of wholeness or being complete. In the Scenery Management System process, Scenic Integrity is managed in degrees ranging over five levels from Very High to Very Low.

Direct and Indirect Effects—No Action
The No-Action alternative would result in minimal perceptible change in the landscape characteristic in the short term. Within the next several years, mature and over-mature jack pine would continue to die gradually, and an increase in dead trees and woody ground material would become more evident. Young jack pine plantations would put on visible growth and eventually differences in age and size classes would become less distinguishable, displaying a continuous wall of trees along travel corridors.

The no action alternative would decrease the trend of creating new age classes, which is the desired landscape character in Kirtland's warbler habitat. The consequences would ultimately be a lowered scenic integrity level within the analysis area.

Direct and Indirect Effects—Proposed Action
Forest management activities in this alternative would result in a short term drop in the scenic integrity level, as large open areas would appear quickly to create Kirtland's warbler habitat. Once the forested habitat is established and the appearance is consistent with the desired condition, the integrity level would be higher than before the activities were implemented.

Cumulative Effects
Cumulatively, the Proposed Action Alternative along with past and scheduled activities would gradually produce the Scenic Integrity desired for the area as set forth in management direction in the Forests' Plan. These activities would slowly create the desired landscape character of maintaining age class diversity in predominantly jack pine ecosystems, as were once maintained by wildfire.

3.7 Heritage Resources

Analysis Bounds
Cumulative effects boundaries for heritage resources are the project area boundaries. Proposed ground disturbances would not affect cultural resources outside these boundaries.

Affected Environment
The area of potential effect for the Snow Bird KW Project is identified as approximately 704 acres of National Forest system lands. Background research indicates that the project area cultural resources field surveys were completed on June 26, 2009 and documented September 30, 2009.

Analysis of Direct, Indirect, and Cumulative Effects
Based on the results of these surveys, a determination of "no historic properties present" was recommended by the District Archeologist. Therefore, there would be no effects to Heritage Resources.

3.8 Transportation

Analysis bounds
The cumulative effects analysis boundaries for transportation will be the Pine River KWMA. This area is managed primarily for the Kirtland's warbler and incorporates large, temporary openings across the landscape. The temporal bounds include the past 17 years and 7 years into the future. These bounds were chosen to coincide with the KW habitat management schedule.

Affected Environment
Roads within the analysis area include improved paved roads such as Bissonette, which bisects the project area and unimproved, one and two-lane sand roads on relatively flat, sand soils. McCardle Road makes up the eastern border, Chambers Road runs through the middle of the project area (north and south), Deer Road runs through the southern portion, and M-65 makes up the western border (See Appendix A -Proposed Action Map, pg 38). These roads connect the project area to Bissonette Road, the main paved road that leads to Oscoda. This road is maintained by the county all year round. The remaining Forest System roads are sand roads that are not maintained in the winter.

Table 5 shows the breakdown of the existing roads in the analysis area by road type, miles, and road densities. Some illegally developed roads (approximately one mile) will be obliterated by planting through under the proposed action. Since these roads are not on the system (classified roads), obliterating them would not reduce existing road densities.

Table 5. Road Statistics for the Snow Bird KWMA

Road Type	Miles	Miles/Square Mile
Forests Plan MPA 4.2KW maximum density	n/a	3.0
Analysis Area Classified Roads*	5.0	4.5

* Does not include private roads, trails that are not a road, illegal roads, or historic roads.

The Forests Plan provides direction (pp II-39, Section 7700-1.A) to obliterate roads not needed for administration and public use. Over the past decade, roads not needed for management within Kirtland's warbler essential habitat have been obliterated to provide essential nesting habitat for Kirtland's warbler. The Forest Plan identifies unclassified and unneeded roads dissecting KW treatment blocks as priorities for decommissioning.

Snowmobile and ATV trails run adjacent to the project area and also run throughout the analysis area. While the Strategy for Kirtland's Warbler Habitat Management states that ORV, equestrian and hiking trails will be relocated or buffered to prevent adverse effects to breeding Kirtland's warblers by trail users. Trails in existing and proposed additional essential habitat would be relocated to areas outside of essential habitat where possible. New trails would not be constructed in Kirtland's warbler essential habitat. Existing designated trails would remain in essential habitat only if they cannot be relocated outside of essential habitat without loss of recreational opportunity or experience. Kirtland's warbler nesting habitat would not be developed within 100 feet of trails that cannot be relocated. No feasible relocation routes were proposed for trails within the Snow Bird KW Project area, at this time. Proposed reforestation would not be developed within 100 feet of existing trails.

Direct and Indirect Effects—All Alternatives

The No Action Alternative and the Proposed Action Alternative represents no change to the current status of the transportation system within the analysis area. No road construction, road closures, or road decommissioning would occur. The existing classified road density of 4.5 miles per square mile would be maintained within the analysis area. These alternatives would continue the status of higher open road densities in the analysis area than the maximums recommended by the Forest Plan.

Harvest units would be accessed by existing county and forest roads. Driving surfaces of roads needed for sale activity would be improved or maintained in their current condition during sale activities. Minor adjustment to road clearing limits may be necessary.

Under the Proposed Action, vehicle access would remain the same for the public as well as administrative uses such as timber harvesting, wildfire access, and wildlife monitoring. Effects to wildlife, soils, and water resources would not change from the existing condition.

Cumulative Effects

Implementation of the Proposed Action Alternative would pose no change in cumulative effects to the transportation system in the analysis area. This alternative, when considered with past, present, and foreseeable future actions would not move analysis area road densities toward recommended Forest Plan road densities.

3.9 Fire and Fuels

Analysis Bounds

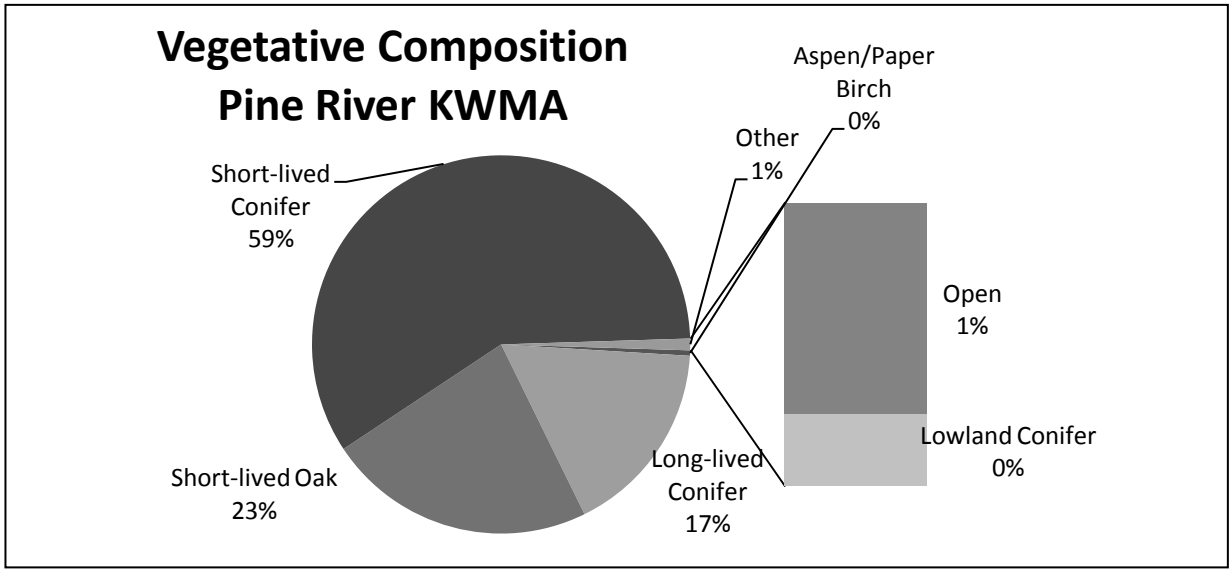
For the purposes of analyzing cumulative effects, the analysis area will be the Pine River KWMA (See *Cumulative Effects Analysis Area Map* in Appendix A, pg. 44.) The analysis area was chosen because; 1) it encompasses the project activities effecting fire and fuels, and, 2) the proposed actions would have similar effects on the hazardous fuels and fire regimes as those of past, present and reasonably foreseeable future actions within the analysis boundaries. The analysis would consider management actions and other factors, such as wildfire, on public and private lands within the analysis boundary that have reduced or are planned to reduce hazardous fuels for the past ten years and future ten years. This time frame was chosen based on the effectiveness of hazard fuels reduction treatments. The long term duration of effectiveness for the project activities would be similar to historic timeframes, with prescribed fire treatment lasting seven years and mechanical treatment remaining effective for ten years due to reduced over-story vegetation. A wildfire event in untreated fuels would result in a long-term effect for the project

area for the same ten-year duration as the thinning or clear cutting projects. This assumption is based on past wildfire experience and stand replacement fire intensities.

Affected Environment

Approximately 59% of the Pine River KWMA essential habitat is comprised of short-lived conifer types (primarily jack pine) (Figure 2). About 23% are short-lived oak forest types. Both of these forest types are early successional species historically sustained through frequent wildfires. The remainder of the area is in openings (1%), and red pine plantations (long-lived conifer, 17%).

Figure 2. Vegetative Composition within the Pine River KWMA



Red pine plantations and other long-rotation forest types such as white pine account for approximately 17% of the Pine River KWMA essential habitat. Altogether, approximately 76% of the project area is in coniferous forest types. A risk assessment for the Huron National Forest clearly identifies the project area as having high potential for extreme and high-intensity wildland fire (see *Fire Hazard Maps* in Appendix A, pg 39-40).

The coniferous forest types occur on dry, sandy soils and pose a high wildfire hazard. Most of the project area is within Fire Regime (FR) 1 (see *Fire Regime Map* in Appendix A, pg 41). This fire regime is not unique to National Forest System lands but also occur on private lands within the area. Historically, these ecosystems experienced frequent, large catastrophic stand-replacing fires. Average fire return intervals, reported in the literature ranged from 26 to 29 years, fire rotations from 50 to 179 years. These ecosystems typically occur within very dry, flat outwash plains underlain by coarse-textured sandy soils. The dominant forest types were short-lived jack pine and mixed pine forests (Cleland, *et. al.*, 2004). Cleland, *et al.,* also found that the historic fire rotation for FR 1 in Northern Lower Michigan to be about 58 years.

The project area occurs on Land Type Association (LTA) 1 (please refer to *LTA Map* in Appendix A, pg 42). The forests of LTA 1 consist primarily of species adapted to xeric conditions and frequent fire, including jack and red pines, black, and white oaks (USDA 2001). Before settlement, the flat sandy outwash plains were dominated by jack and red pines and were prone to fire. Small surface fires were undoubtedly very frequent. In an average year the expected fire hazard is very high with crown fire expected.

Cleland (2004), also notes that: "suppression of fire will eventually lead to an increased dominance of species such as red maple and beech on sites that, under a presettlement disturbance would have supported mostly pine. Fire suppression may also lead to the accumulation of high fuel loads. Some ecosystems, like the jack pine plains, may eventually burn regardless of human intervention".

Mature jack pine, red pine, slash, and ground vegetation on National Forest System lands pose a wildfire risk to people and structures on adjacent private property. The stands of jack pine and red pine found on sandy outwash plains are part of a fire-adapted ecosystem, and therefore have a long history of periodic wildfires. Left untreated, the continuous tree canopy and abundance of small and midsized vegetation (ladder fuels) within these stands allows

fire to climb into the tree canopies, which may result in an intense, fast-moving crown fire. Private properties adjacent to these untreated stands are at a higher risk of being lost during a wildfire than where trees and shrubs are removed around the property. The National Fire Protection Association (NFPA) notes in their report on the *Stephan Bridge Road Fire* (occurred on May 8, 1990) that: " Northern Lower Michigan is an area with a long history of wildfires, yet people continue to build new structures dangerously close to the vegetation and too often take little or no precaution to protect themselves against known risks".

Past Actions

Federal: The Federal Government managed lands for wildlife, recreation, fuel reduction, timber and ecological purposes, suppressed wildfires, constructed, maintained and closed roads and trails, maintained fuelbreaks and wildlife openings, and leased and authorized the development of mineral resources. The Federal Government permitted the removal of firewood from National Forest System lands. Landlines have been surveyed and maintained.

Several wildfires have occurred in the analysis area. Most of the wildfires were less than five acres and have had only a minimal effect on the area considered in this analysis. The *Exhaust Fire,* which occurred in April of 2010 burned approximately 270 acres and destroyed approximately 260 acres of occupied Kirtland's Warbler nesting habitat.

Approximately 3,678 acres were regenerated in the Pine River KWMA from 2001-2009 to create Kirtland's warbler essential habitat (see Figure 3). The Huron Shores Restoration Fuels project (2008) included landscape level treatments in a portion of the Pine River KWMA to reduce hazardous fuels. Approximately 321 acres of fuel break were prescribed burned and/or mechanically treated to reduce the risk of catastrophic property damaging wildfires and to reintroduce fire into the fire adapted ecosystem.

The Huron National Forest historically designated and managed approximately 53,500 acres of jack pine as Kirtland's warbler essential habitat on the Huron National Forest. In 1997, the Huron-Manistee National Forests amended its Land and Resources Management Plan to adjust the amount of essential habitat to approximately 68,000 acres. This adjustment was necessary to provide the flexibility to modify projects for visual or other objectives.

In April 2006, the Huron-Manistee National Forests' Land and Resources Management Plan designated approximately 88,000 acres of essential habitat, an increase of approximately 20,000 acres over the 1986 Forests' Plan. The following Kirtland's warbler management actions have occurred over the past 20 years and are illustrated in Figure 3.

Figure 3. Acres Sold to Create Habitat for Kirtland's warbler on the Huron National Forest

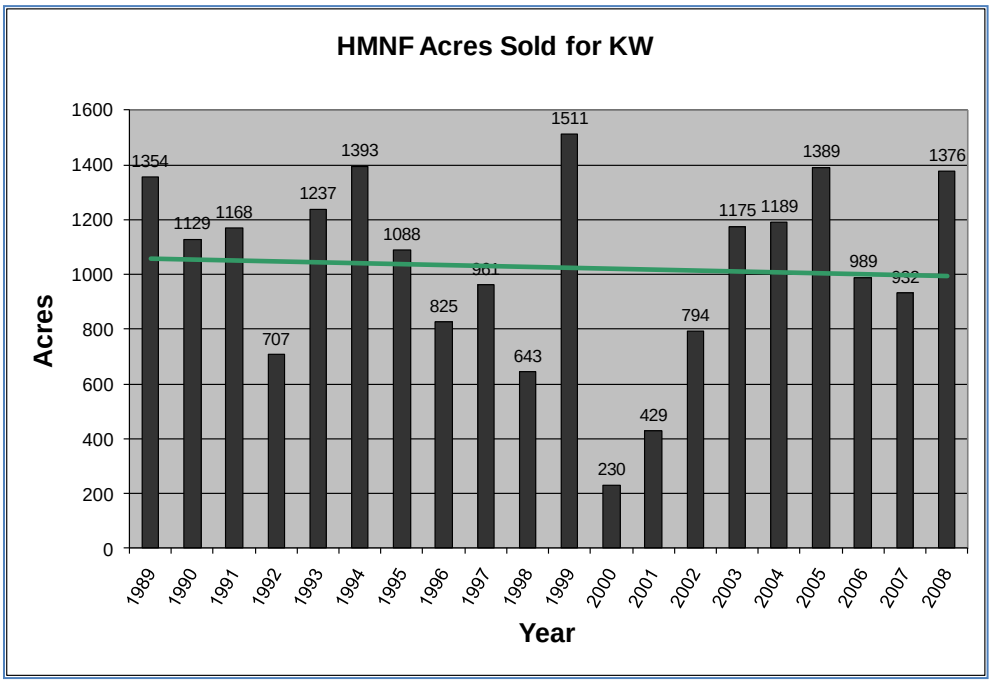
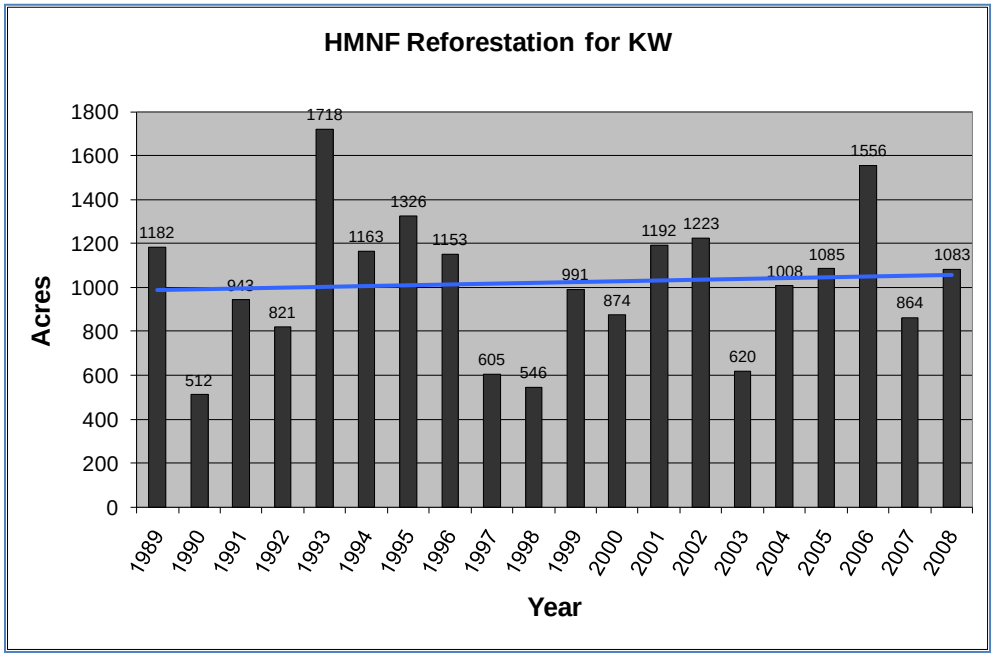


Figure 4. Acres Reforested to Provide Habitat for Kirtland's warbler on the Huron National Forest



Non-Federal: The Iosco County Road Commission constructed, maintained, and improved roads. Private individuals have used the cumulative effects analysis area for recreational purposes – hunting, snowmobiling, ATV riding, etc. Non-federal entities likely started wildfires in the cumulative effects analysis area. Timber has been harvested on private lands. The public has cut firewood off of National Forest System lands.

Energy, telephone and cable companies constructed and maintained service lines and cleared rights-of-way within the cumulative effects analysis area.

Present Actions

Federal: The Federal Government continues to manage lands for wildlife, recreation, fuel reduction, timber and ecological purposes, suppress wildfires, construct, maintain and close roads and trails, maintain fuel breaks and wildlife openings, and to lease and authorize the development of mineral resources. The Exhaust wildfire (April 24, 2010) burned approximately 270 acres of occupied KW habitat in the Pine River KWMA.

There are several timber sales that are ongoing (FY 2010) including the Pine River 8A, Pine 11, the Huron Jack Pine Fuels Project (a 253 acre portion occurs in Pine River KWMA) and the Pine 12 Timber Sale are currently active within the cumulative effects analysis boundaries. The Federal Government permits the removal of firewood from National Forest System lands, but not within active timber sale areas or occupied Kirtland's warbler blocks.

Several planting projects for the Kirtland's warbler are ongoing on the Huron National Forest. In FY 2009, approximately 370 acres were reforested in the Pine River KWMA to create Kirtland's warbler breeding habitat. In FY 2010 approximately 369 acres were reforested.

Non-Federal: The Iosco County Road Commission continues to maintain and improve roads in the areas. Private individuals continue to use the cumulative effects analysis areas for recreational purposes – hunting, snowmobiling, ATV riding, etc. There is no oil and gas well development currently on going within the analysis area. Utility companies are maintaining service lines and rights-of-way.

Future Actions

Federal: The Federal Government will likely continue to manage for wildlife, recreation, fuel reduction, timber and ecological purposes, suppress wildfires, construct, maintain and close roads and trails, maintain fuel breaks and wildlife openings, and lease and authorize the development of mineral resources. The Exhaust Fire KW Project, whose decision notice was signed in 2010, will site prep and plant approximately 260 acres to replace the KW habitat that was lost in the Exhaust Fire of 2010.

Non-Federal: The Iosco County Road Commission is likely to continue to maintain and improve roads in the analysis area. Private individuals are likely to continue to use the analysis areas for recreational purposes – hunting, snowmobiling, ATV riding, etc. Non-federal entities are likely to start wildfires in the analysis areas. Private companies are likely to maintain utility corridors within the area. Private landowners are likely to continue to harvest timber or do fuels reduction activities (brush cutting, prescribed burning, etc.) on their lands. The public is likely to continue to cut firewood off of National Forest System lands. A summary of past, present, and reasonably foreseeable action is found below in Table 6.

Table 6. Federal and Non-Federal Actions Within the Snow Bird Project Area Analysis Bounds

Federal actions within project area	**Past**	**Present**	**Future**
Fuelbreak maintenance	•	•	•
Trail maintenance: snowmobile, ORV, motorcycle trails	•	•	•
Road maintenance	•	•	•
Wildlife opening maintenance	•	•	•
Firewood removal	•	•	•
Landline survey and maintenance	•	•	•
Timber harvest/reforestation	•	•	•
Wildfire suppression activities	•	•	•
Prescribed burn activities	•	•	•
Special Use permits	•	•	•
Mineral development activities			•
Non-federal actions within project area	**Past**	**Present**	**Future**
Private utility company construction and maintenance of service lines/ROW	•	•	•
Private timber harvest activities	•	•	•
Iosco County road maintenance	•	•	•
Recreational activities i.e. hunting, snowmobiling, ATV riding, etc	•	•	•
Wildfires	•	•	•

Direct and Indirect Effects—No Action

The proposed actions would be deferred and no fuel reduction would occur. The short-term effect of no action would be no immediate decrease in fuel loading. There would be no change in fire hazard or occurrence from the present. Wildfire risk would continue to be high to extreme. In the long term, fuel loading and the threat of a catastrophic wildfire would continue to increase in the mature and overmature jack pine stands. In the event of catastrophic wildfire, containment would likely be dependent on a change in fuel type and/or weather conditions.

Direct and Indirect Effects—Proposed Action

The Proposed Action Alternative (see *Proposed Action Map* in Appendix A, pg 38) would reduce hazardous fuels through proposed timber harvesting and treatment of submerchantable trees by mechanical means or by prescribed burning. Timber harvesting would decrease biomass (fuel) by removing over-story vegetation through clear-cutting conifer stands. Under the Proposed Action Alternative approximately 693 acres of red pine, jack pine and pine/oak mix would be clearcut. Approximately eleven acres of non forested small openings would be site prepped prior to planting. A comparison of fuel reduction activities and acres treated for The No Action and Proposed Action are shown in Table 7.

Table 7. Hazardous Fuel Reduction Activities and Acres Treated for No Action and the Proposed Action

Hazardous Fuel Reduction Activities	No Action (Acres)	Proposed Action (Acres)
Clearcut Jack Pine	0	693
Site prep – Non forested and open areas	0	11
Total	**0**	**704**

The Proposed Action Alternative would produce a shift in the fuels in the project area since approximately 3.4% of the Pine River KWMA would become a temporary opening until planted with jack pine for Kirtland's warbler nesting habitat. In the short term, fuel loading would be reduced within the project area. In the long term, as these young jack pine plantations mature, fuels and fire hazard within these stands would increase as a nearly continuous overstory of flammable foliage develops.

As the jack pine planted for Kirtland's warbler nesting habitat grows, there is a transition of fuel type from open grass to standing closed canopy timber. Shortly after they begin to support Kirtland's warblers, young stands of jack pine trees have fuel characteristics such as continuous crown contact and ladder fuels, which increase the likelihood of a wildfire rapidly transitioning from a surface fire to a crown fire with a high probability of becoming large property damaging wildfire.

In order to provide defensible space around private property, subdivisions, and within Kirtland's warbler essential habitat, multiple fuelbreaks have been created throughout the Pine River KWMA. Fuelbreaks are a natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled. In addition to the fuelbreaks, several other Kirtland's warbler timber sales have occurred throughout the Pine River KWMA, clearcutting timber and resulting in temporary openings that function as fuelbreaks on the landscape (See Appendix A Pine River KWMA Recent Openings Map, pg 43). Red pine thinning northwest of the Pine River KWMA also reduces crown to crown contact between residual trees, and reduces the overall fuel loading within the stands. Furthermore, throughout the Pine River KWMA there are forest community types such as aspen, mixed hardwood, and wetland areas that would not sustain a crown fire and would serve to reduce the intensity of a wildfire and make it more easily controlled.

Without crown-to-crown contact the chances of a crown fire developing and the subsequent destruction of the trees on site would be greatly reduced. Brown and Davis (1973) state that hazard reduction may take the form of "breaking the vertical continuity of fuels and horizontal continuity of tree crowns in coniferous stands by cultural measures such as pruning and thinning and removal of undergrowth". The California Department of Forestry and Fire Protection (2000) states that: "dense stands of brush or timber must be thinned to reduce the volume of fuel and reduce the opportunity for fire to spread from tree crown to tree crown". Timber harvesting may cause a minor short-term increase in fuel loading due to residual slash. As the slash begins to decompose or is treated by prescribed burning, fuel loading would also decrease. In the long term, fuel loading would increase as trees grow larger and the canopies expand. However, if whole tree harvesting were employed there would be little, if any, additional slash accumulation within the treated stands. This would substantially reduce the fuel loading and the chance of a wildfire carrying through the area. Continued growth on trees planted to reforest the site would have the effect of increasing fuel loading in the project area over the long-term.

If tops and limbs remain on site following harvesting operations, fuel loading on the ground could carry a wildfire that would make fire control and containment difficult. In the short term, rollerchopping the residual slash would compact fuels and enhance decomposition although the fuel loading would remain the same. In the long-term, fuel loading from residual slash would decrease as the slash decomposed. However, fuel loading over the long-term would increase due to the growth of trees planted to reforest the site.

Prescribed burning for site preparation would reduce fuel by consuming the more flammable components of the slash. First Order Fire Effects Model indicates that fuel loading would change from approximately 58 tons per acre to about 28 to 33 tons per acre (about 25 to 29 tons per acres of fuel consumed). The short-term and long-term effects would be similar to that of whole-tree harvesting but with slightly larger diameter material remaining on site than with whole-tree harvesting

The site preparation of approximately 11 acres of non forested small openings by prescribed burning or non-commercial mechanical methods would decrease biomass (fuel). Prescribed burning would reduce fuel by consuming

the more flammable components of the standing trees. Some of the larger size material would remain but would decrease over time as decomposition occurred. The short-term and long-term effects would be similar to those of prescribed burning of residual slash.

Cumulative Effects
The past, present, and future action for the analysis area are describe above in the *Past, Present, and Future Actions* section and are summarized in Table 6.

Cumulatively, by continuing to harvest and plant jack pine at densities desired for Kirtland's warbler habitat, a consistent age-class distribution within the Pine River KWMA essential habitat would ideally be maintained. This would maintain the mix of fuels within the analysis area over the long term. Location of those fuels and fuel breaks (temporary openings) would shift over time.

When combined with past, present, and reasonably foreseeable future actions, Proposed Action would continue the trend of reducing hazardous fuels and thus reducing the probability of damage to adjacent private and public improvements from a wildfire.

Proposed Action would have a beneficial cumulative effect on hazardous fuels reduction. The short-term effect would be the removal and consumption of biomass and the immediate reduction of hazardous fuels. Similar activities have taken place over the past ten years, are currently in progress or are planned to take place in the next several years (Table 6). Timber harvesting, site preparation activities, and prescribed burning would provide an overall positive contribution within the analysis boundary by reducing fuels.

Temporary openings, including approximately 369 acres of KW habitat planted in fiscal year 2010, the proposed project, site preparation and replanting of 260 acres burned in the Exhaust Fire and, approximately 413 additional acres planned to be sold in fiscal year 2010 or later, would increase to about 8.5% of the analysis area. Ideally, the shift in temporary openings would be maintained as KW habitat continues to be established, thus maintaining a fuel barrier component within the KWMA essential habitat. Should a catastrophic wildfire occur, it is likely that only major changes in fuel type (forest type) would allow for containment (See Appendix A Pine River KWMA Recent Openings Map).

The effectiveness of all activities, however, decreases as biomass increases. The treatments would become less effective over time, with mechanical treatments declining over a ten-year period and prescribed fire declining over seven years.

The Huron-Manistee Monitoring and Evaluation Report for 2008 notes: "already wildfires have burned up to or into areas that have had hazardous fuel reduction treatments, and in all cases the fire behavior has lessened. This has allowed safer and more effective fire suppression."

Social and Economic Factors

3.10 Recreation and Social Values

Analysis Bounds
The analysis bounds for cumulative effects of the alternatives on the recreation resources is the Pine River KWMA. Kirtland's Warbler Management Areas present a situation unique to the Forests' management. Recreational use guidelines are established in the Forests' Plan for MA 4.2. The temporal bounds include the past 17 years and 7 years into the future. These bounds were chosen to coincide with the KW habitat management schedule.

Affected Environment
Opportunities for developed and dispersed recreational experiences on the forest are classified and defined by the *Recreation Opportunity Spectrum* [ROS (Forest Plan EIS, Chapter III, pages 271-275)]. The Snow Bird KW Project falls within the Roaded Natural ROS Class. Forest Plan direction for management of the analysis area is to provide a mixture of recreational opportunities to meet identified needs and demands, and within the KWMA, dispersed recreational opportunities consistent with essential habitat management for Kirtland's warbler.
The most common use of Kirtland's warbler essential habitat is recreation, primarily hunting for white-tailed deer, snowshoe hares, and to a lesser extent for bear, bobcat, wild turkey, ruffed grouse, and squirrels. Other uses are guided Kirtland's warbler tours, blueberry picking, trapping, and general wildlife viewing. These uses are generally

compatible with management for Kirtland's warbler habitat and will be encouraged on these lands with some restrictions. Other recreational uses subject to greater restrictions include off-road vehicle (ORV) use, horse back riding, and hiking. Non-recreational uses such as timber harvest, mineral development, and military exercises are also permitted with limitations. Since Kirtland's warbler nesting habitat is the highest priority for these lands, measures must be taken to protect the warbler and its habitat from potentially harmful agents, events or human uses.

Recreation use in the project area is considered low throughout most of the year. The area provides opportunities for dispersed camping, hunting, wildlife viewing, and berry picking. The area receives slightly higher use during the spring turkey hunting season, the summer blueberry picking season, and the fall deer hunting season.

There are no developed campgrounds within the project area. Dispersed camping exists in the project area but is not a high use.

Recreation opportunities within Kirtland's warbler essential habitat are somewhat restricted and mainly seasonal, as *occupied* habitat is closed to public entry during the breeding and nesting season. Primary roads remain open through the nesting and breeding season, and birders frequent the area for a chance to hear and view the endangered Kirtland's warbler.

The Huron ATV trail and the snowmobile trail cross through a part of the analysis area. Other than the ATV/snowmobile trail, off-road vehicle use is minimal. Many of the roads are not plowed in the winter and are used moderately by snowmobiles during the season. Illegal ATV use in the area is low, being higher in areas around private property and areas with greater terrain.

Socially, most of the recreational use on the Huron National Forest revolves around motorized activities, or the ability for motorized access. Recreational users attachments to specific areas are strong. Hunters and berry pickers have traditional areas that they frequent and campsites have become established by repeated use. A strong sense of place exists in the analysis area that is a value in itself to some users.

No Action Alternative—Direct and Indirect Effects

The No Action Alternative would have little effect on the recreational setting or uses, or opportunities available in the short term. There would be no interruption to existing activities, current access levels would be unchanged, and results of recreational pursuits would remain fairly constant for several years.

Recreation and tourism pressures are expected to continue to increase with greater numbers of people looking to use public lands for a variety of leisure activities. Lack of management activities within the analysis area would have little impact on recreation use and social values of the area.

Nature viewing, and hunting and berry picking success, dependent on natural processes or vegetation management, could be affected as a consequence of no management action. Numbers and types of wildlife species traditionally viewed or hunted, and composition of understory plant species (such as blueberries) would decrease as age class diversity declined.

Opportunities for other recreational uses would remain relatively unchanged over the long term. Uses not necessarily connected to vegetation management, such as camping, would not be affected.

Proposed Action—Direct and Indirect Effects

There would be little direct change in recreation opportunities or experiences as a result of implementing the proposed actions. The Proposed Action Alternative would maintain the present Recreation Opportunity Spectrum within the analysis area. Proposed activities are consistent with past management and compatible with the current recreation uses and character of the area.

Timber harvest and related activities have the potential to temporarily reduce the feeling of remoteness in the area. Hunters and berry-pickers could be displaced from areas traditionally used while timber harvesting and planting take place, and during the period of Kirtland's warbler occupation (primarily jack pine stands between the ages of five and fifteen). This effect could last up to twelve to sixteen years for any given treatment block. During this time, other jack pine stands within the area would be open to hunting and blueberry harvest. Harvested stands would remain open in appearance for several years before newly established trees grow to an enclosed forested condition.

Harvested stands would stimulate berry-producing plants through ground disturbance and increased sunlight, favoring blueberry production, and potentially increasing the number of berry pickers in the project areas in the short term. Within several years, reforested jack pine stands would attract breeding and nesting Kirtland's warblers, thus increasing opportunities for birders to view the endangered warbler.

Total road densities within the project area would remain the same, so access within the project area and analysis area would remain the same, maintaining the value of the area for those who prefer access and interaction with motorized vehicles.

Cumulative Effects
Future KW treatment blocks in the KWMA, along with past KW harvesting would continue to change the vegetative structure and age-class distribution within the analysis area. Large clearcuts and jack pine stands have less recreational value for camping and hunting, and as occupied Kirtland's warbler habitat is closed to the public during the nesting season, some recreation users from the area would be displaced. This number would not be considerable because recreation use is already low throughout the analysis area. Bird watching would likely become more prevalent in the analysis area as a more stable population of Kirtland's warblers inhabit the area with continued habitat development.

The pursuit of recreational experiences is expected to continue to expand nationwide. Under the Proposed Action Alternative, no adverse cumulative effects are expected from past, proposed, or reasonably foreseeable future management activities, as the existing array of recreation opportunities may move around within the analysis area but would not change. Recreation users would continue to find suitable opportunities to meet expectations.

3.11 Civil Rights Impact Analysis and Environmental Justice

Analysis Bounds
The bounds of analysis for determining effects on civil rights and environmental justice will be defined as Iosco County, Michigan.

Affected Environment
The 2010 U.S. Census shows 17.1% of the population of Iosco County being below the poverty level, while that of the State of Michigan is 14.7%.

Based on the 2010 census results, the minority population in Iosco County is 4.9%, while that of the state of Michigan is 22.1%.

Analysis of Direct, Indirect, and Cumulative Effects
None of the alternatives is expected to disproportionately impact human populations. There are no human health or safety factors associated with, or physical or biological factors influenced by the alternatives that would affect low-income or minority populations in or around the project area. There are also no biological or physical factors influenced by the alternatives that would disproportionately affect low-income or minority populations in or around the project area. The laws, rules, and regulations governing nondiscrimination conduct in government employers and by government contractors and subcontractors would be employed in all actions associated with the alternatives. No environmental justice issues were raised during scoping of the proposed action. None of the alternatives would disproportionately affect low-income populations.

Based on 2010 U.S. Census demographic information, the percent of low-income and minority population in Iosco County is less than twice that of the state of Michigan. This demographic indicates Iosco County does not qualify as an environmental justice community.

3.12 Economics and Community Well-being

Analysis Bounds
The base of the bounds of the analysis for determining effects on economics and community well-being is the Iosco County, Michigan.

Affected Environment
Economic sustainability of local communities is measured by representative values indicated by employment, income, industry sectors and the portion of economic cumulative impacts within a defined economic impact area. The

impacts of economic change were measured for the Forests' Plan using an economic impact assessment modeling tool called IMPLAN. The consideration of potential effects to market-related goods and services and some non-market values is presented in the Huron-Manistee Final Environmental Impact Statement (FEIS). The following alternatives display various costs of preparing environmental documents, field surveys and preparation, and administration associated with the establishment of Kirtland's warbler breeding and nesting habitat on National Forest system lands. No analysis of discounted future benefits and costs for vegetative management in this project area is documented. It is possible, however, to derive general information regarding dollar costs and benefits of vegetation management alternatives from the FEIS.

The following costs for each alternative are displayed below in table form. The costs are best estimates based on past experience. Anticipated stumpage values for the Proposed Action Alternative is based on recent Warbler sales sold at the Huron Shores Ranger Station. Estimated volumes are based on past sales, experience and professional judgment.

Table 8. Estimated Dollar Costs and Returns of Alternatives

Economic Indicators	No Action	Proposed Action
Projects Outputs		
Acres Treated (approximate)	0	704
Anticipated Stumpage Value	$0	$629,362
Project Costs		
Environmental Assessment Preparation [1]	$56,250	$56,250
Field Preparation & Administration [2]	$0	$16,880
Site Preparation for Jack Pine Regeneration [3]	$0	$71,104
KW Planting [4]	$0	$211,200
Stocking Surveys [5]	$0	$10,560
Total Costs Associated with Project	**$56,250**	**$366,826**

**Costs are direct costs and do not include overhead*

1. EA Preparation includes survey work, compartment exam, writing document 225 days @ $250/day (pay scale averaged at GS-9 rate)
2. Field Prep and Administration 30 days field prep @ $216/day; 20 days administration @ $250/day, 25 days contract prep @ $216/day.
3. Site Prep for JP Regeneration; Roller-chop 704 acres @ $101/ac.
4. KW planting 704 acres @ $300/ac.
5. Stocking Surveys; 1st and 3rd year stocking survey and planting certification 704 acres @ $15/ac.

Iosco County is dependent on agriculture, forestry, and manufacturing for its economic livelihood, and is approximately 60% or more public ownership in U.S. Forest Service and State of Michigan forest lands. According to the Census that was conducted in the year of 2010, Iosco County had a population of 25,581. The county experiences a large influx of seasonal residents and weekend tourists. Many local businesses serve tourists and seasonal resident's needs.

No Action Alternative—Direct and Indirect Effects

The base of the bounds of the analysis for determining effects on economics and community well-being is Iosco County, Michigan.

No revenue would be generated if the No Action Alternative was selected. Project planning costs remain the same across all alternatives analyzed. There would be no jobs created and no economic returns to the community. Recreation use would remain fairly constant and would have no evident effect on the local economy. This alternative would represent a change in the trend of providing timber volume and jobs for the local economy.

Proposed Action Alternative—Direct and Indirect Effects

The Proposed Action Alternative would generate approximately 17,179 centum (hundred) cubic feet (CCF) of timber products. Although it would not have a considerable impact, this alternative would provide important materials for local mills. Harvest related activities would provide employment opportunities for local logging contractors, wood products industries, and local contractors for site preparation and reforestation projects.

Dollar costs associated with the Proposed Action Alternative are estimated at approximately $366,826 (Table 8). These costs are based on the amount per board foot the Forest Service receives for timber sale planning, preparation, and administration, and are the current cost for contracting site preparation, reforestation, etc. Using

the average of values from 2005-2010 sales on the Forest, this project should yield a value of approximately $629,362. This alternative would result in either a profit made or in even amount of funding made from the timber sale and the funding that required for management to the area after the sale and timber removed. Other planned projects with higher quality products and values could be blended with this project in order to cover the costs needed for site preparation and reforestation.

Cumulative Effects
Implementation of the Proposed Action Alternative would result in positive effects to local economics by continuing current trends of providing timber products and jobs related to timber harvesting, site preparation, and planting on the Huron National Forest. Based on past experience, cumulatively, this project, combined with timber sales sold on the Huron National Forest in the past years and in the reasonably foreseeable future should show a return to the treasury.

3.13 Irreversible and Irretrievable Commitment of Resources

Irretrievable commitment of resources are decisions to use, modify or otherwise affect nonrenewable resources such as minerals and cultural resources, or resources that have deteriorated to the point that renewal can occur only over a long period of time or at a great expense. None of the alternatives for the proposed Snow Bird KW Project would result in irreversible commitments.

Irretrievable commitments represent opportunities forgone for the period of the proposed actions, during which other resource utilization cannot be realized. These decisions are reversible, but the utilization opportunities are irretrievable. Under multiple-use management, some irretrievable commitments of resources are unavoidable, due to the mutually exclusive relationship between some resources.

Chapter 4: List of Preparers

Interdisciplinary Team Members

Susan Kocis – District Ranger/Responsible Official
Paul Thompson – Team Leader, District Wildlife Biologist
Kari Vanderheuel – NEPA/Recreation Planner
Greg Schmidt – Huron Zone Botanist
Kristy O'Neil – Huron Zone Archeological Assistant
Mara Jones-Branch – Forester
Paul Lyden – Assistant Fire Management Officer
Gordon Haase – Natural Resource Manager
Liz McNichols – GIS Specialist
Karlis Lazda – Silviculturist

Consultants to the Analysis

Cari VerPlanck – Huron Zone Archeologist
Phil Huber – Wildlife Biologist/ Kirtland's warbler Specialist
Chris Williams –Wildlife Technician

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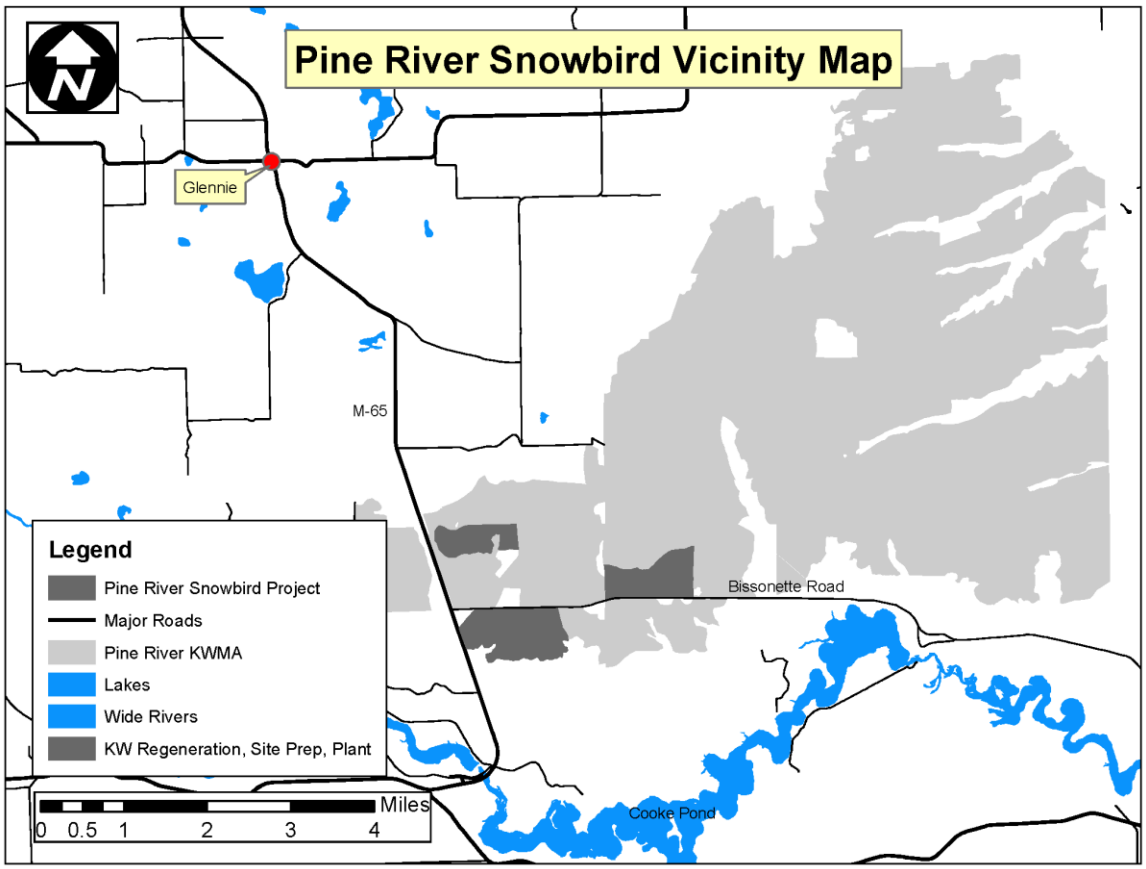
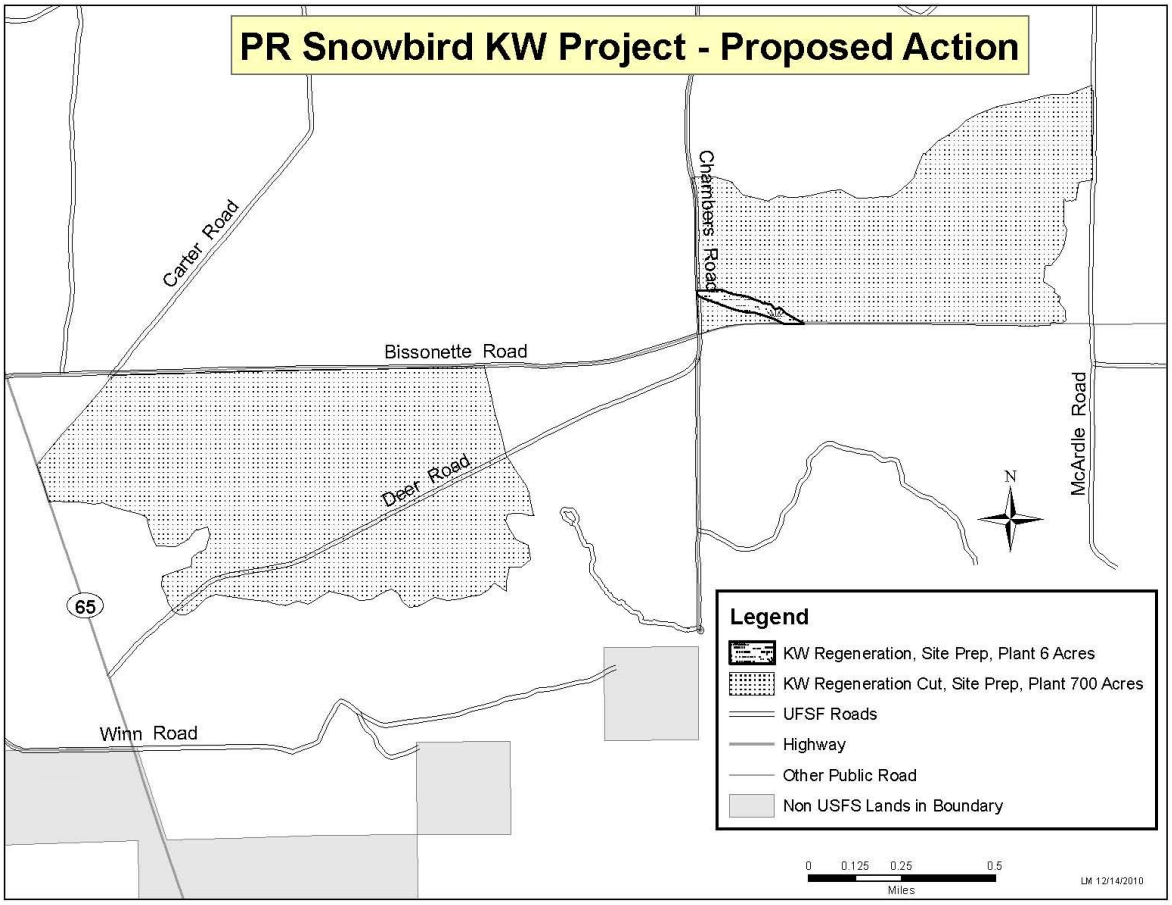
Appendix A – Maps

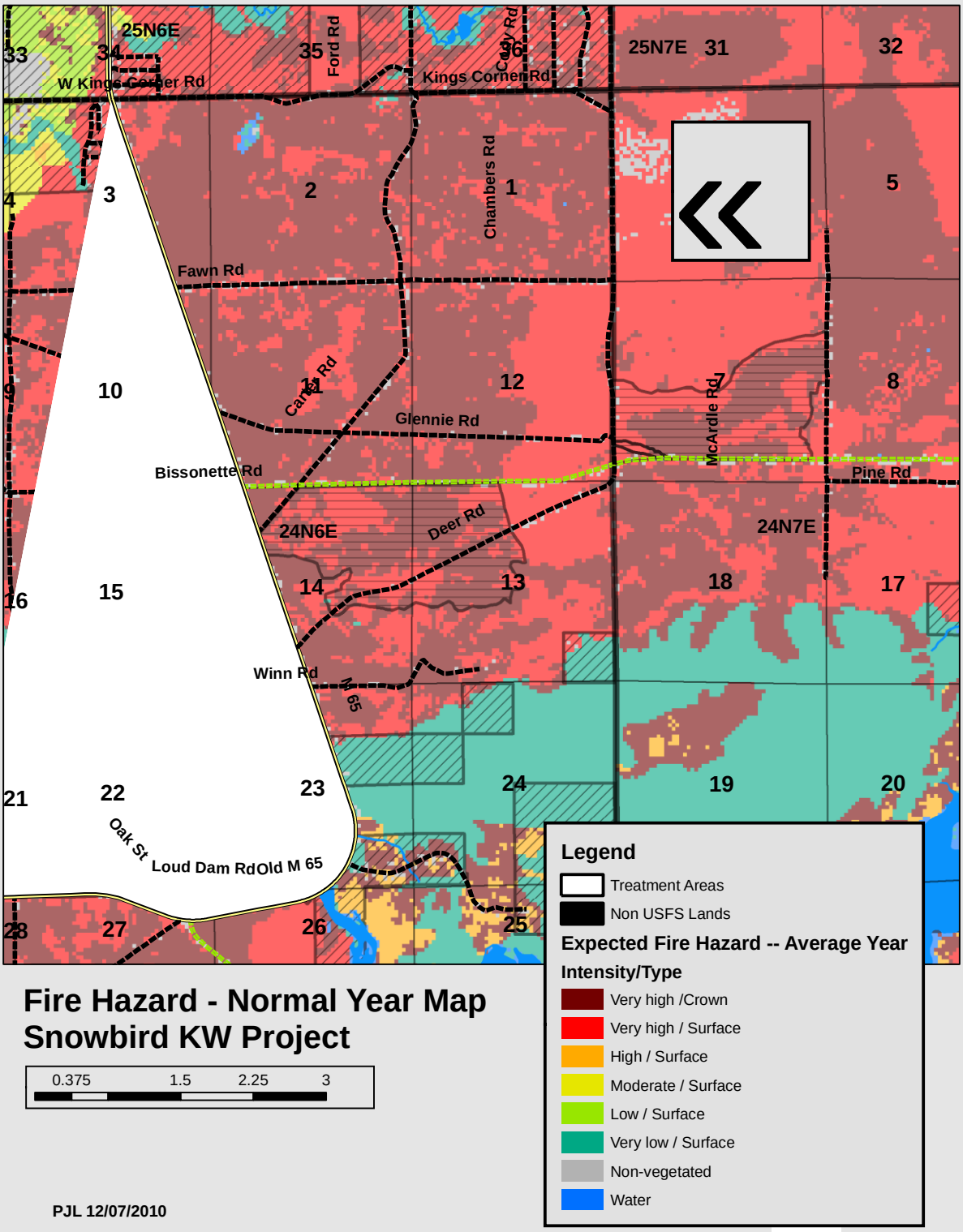


Snow Bird KW Project – Vicinity Map

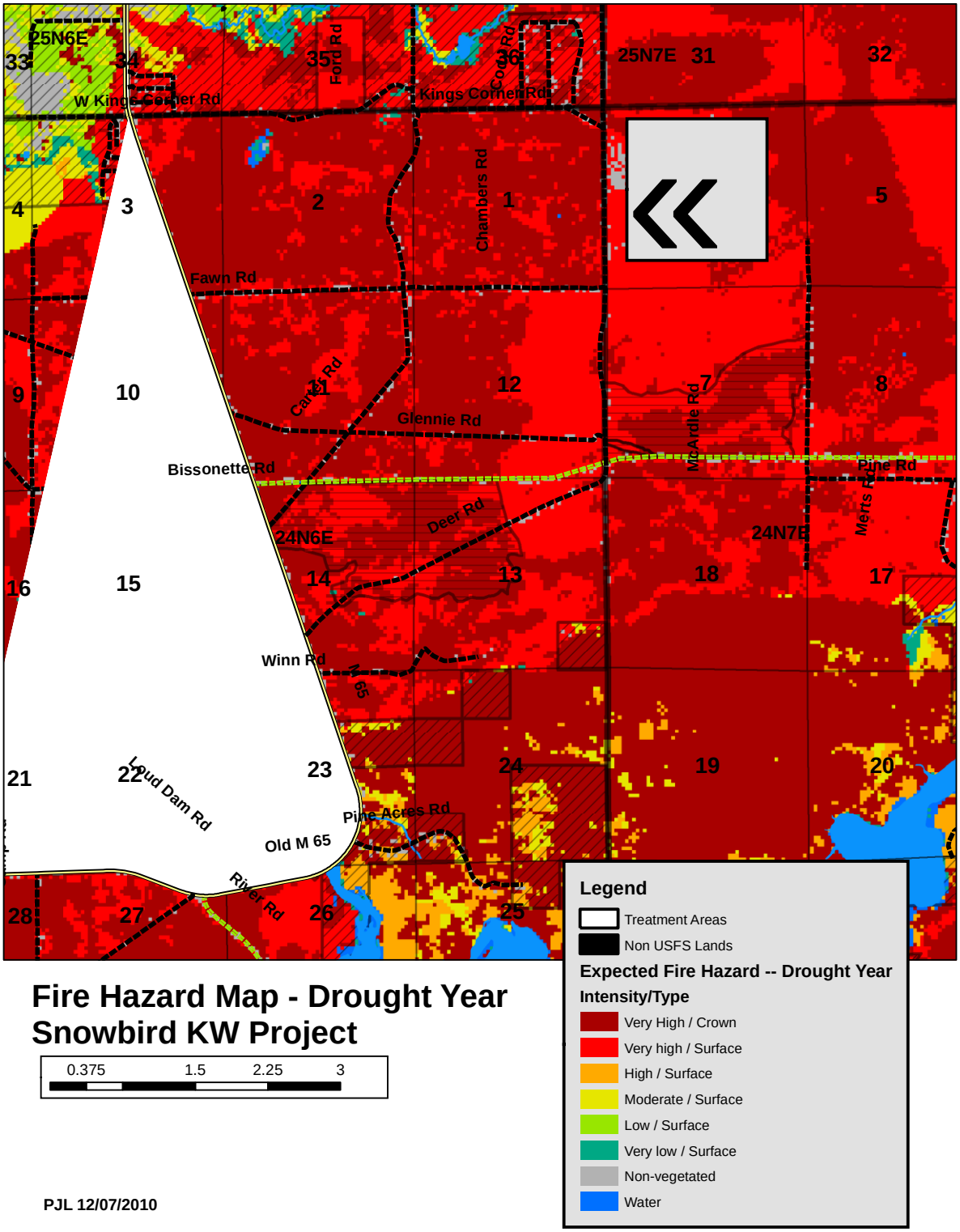


Snow Bird KW Proposed Action Map

Fire Hazard Maps



Fire Hazard Map



Fire Hazard Map - Drought Year
Snowbird KW Project

0.375 1.5 2.25 3

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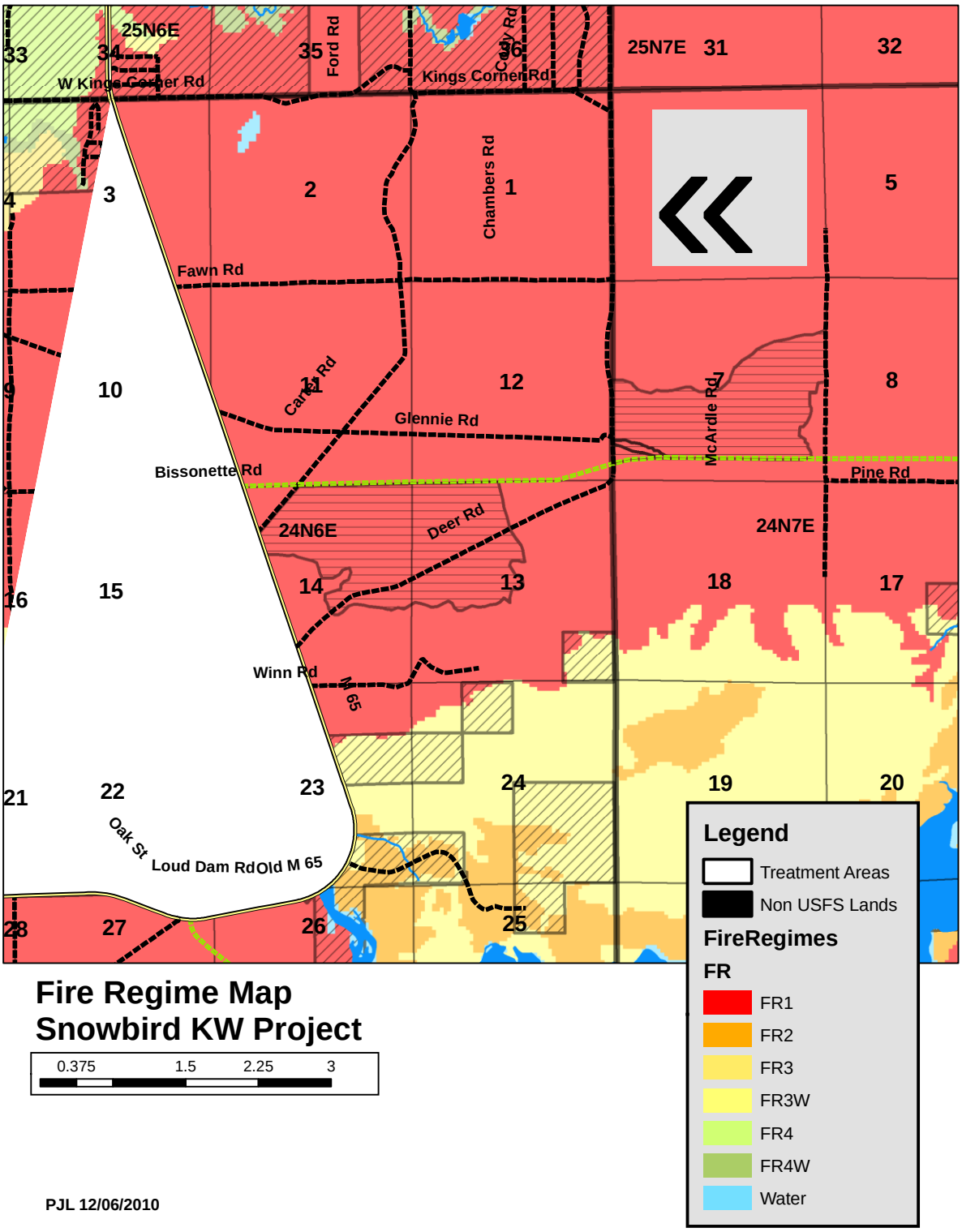
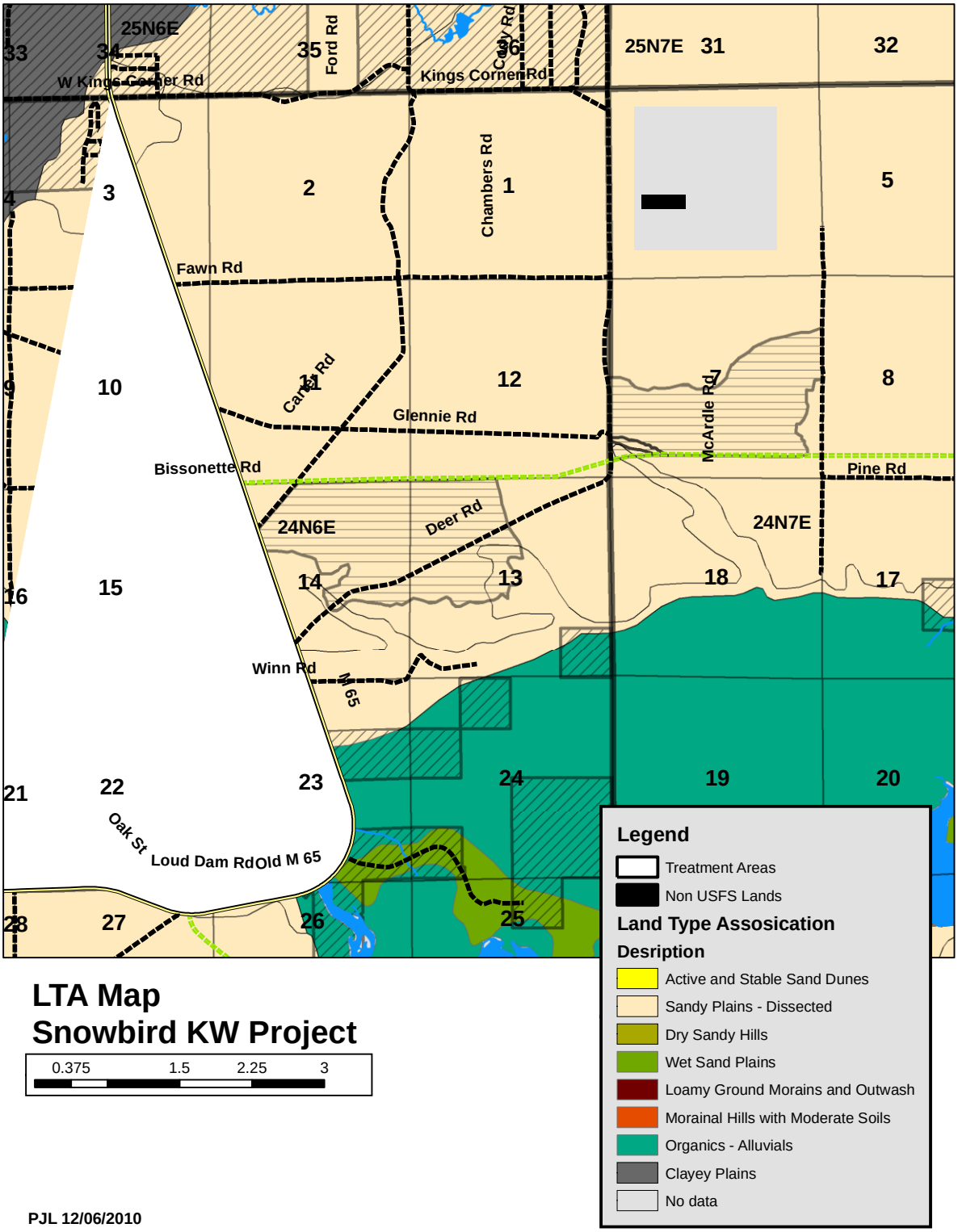
Fire Regime Map



LTA Map


25N6E
33
34
35
36
Ford Rd
Cady Rd
W Kings Corner Rd
Kings Corner Rd
25N7E
31
32
3
2
Chambers Rd
1
5
4
Fawn Rd
10
9
11
Carl Rd
12
7
McArdle Rd
8
Glennie Rd
Bissonette Rd
Pine Rd
24N6E
Deer Rd
24N7E
16
15
14
13
18
17
Winn Rd
M 65
21
22
23
24
19
20
Oak St
Loud Dam Rd
Old M 65
28
27
26
25
Legend
Treatment Areas
Non USFS Lands
Land Type Assosication
Desription
Active and Stable Sand Dunes
Sandy Plains - Dissected
Dry Sandy Hills
Wet Sand Plains
Loamy Ground Morains and Outwash
Morainal Hills with Moderate Soils
Organics - Alluvials
Clayey Plains
No data
LTA Map
Snowbird KW Project
0.375
1.5
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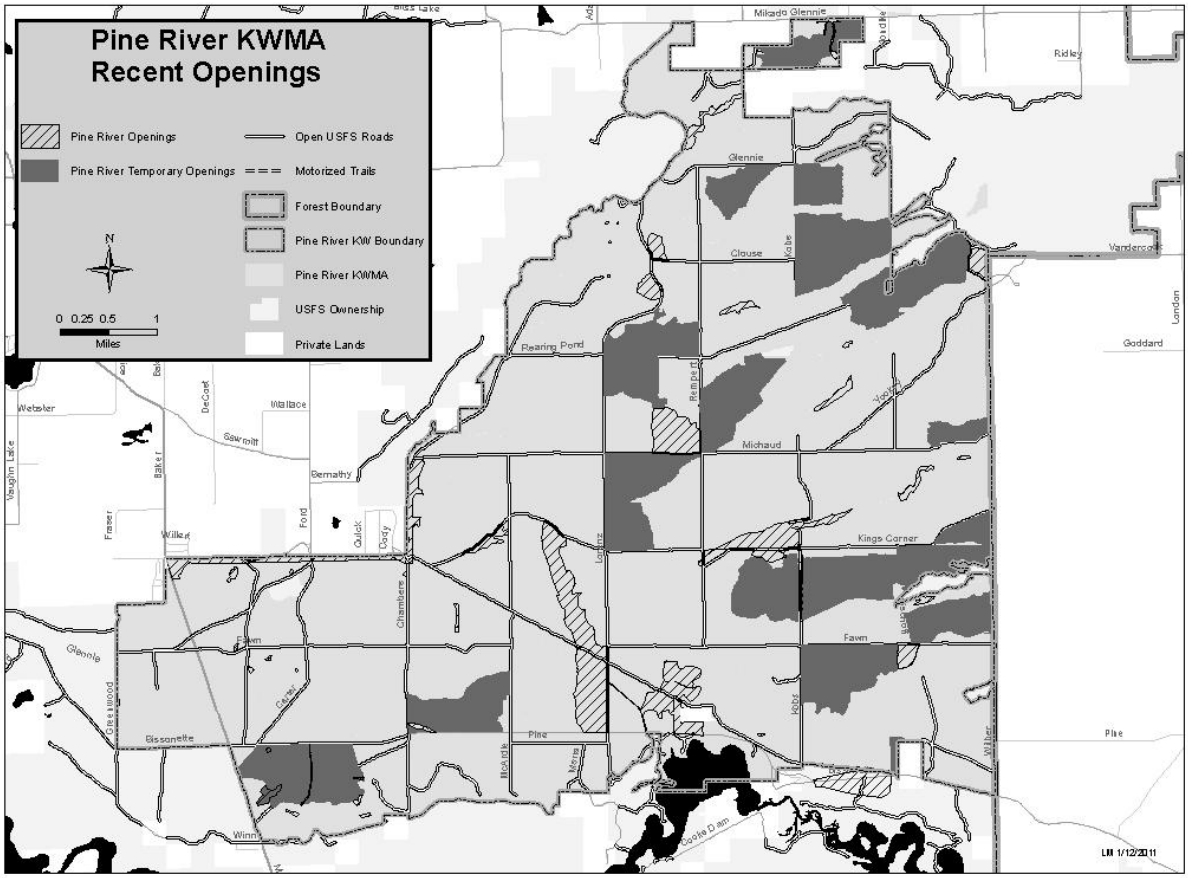
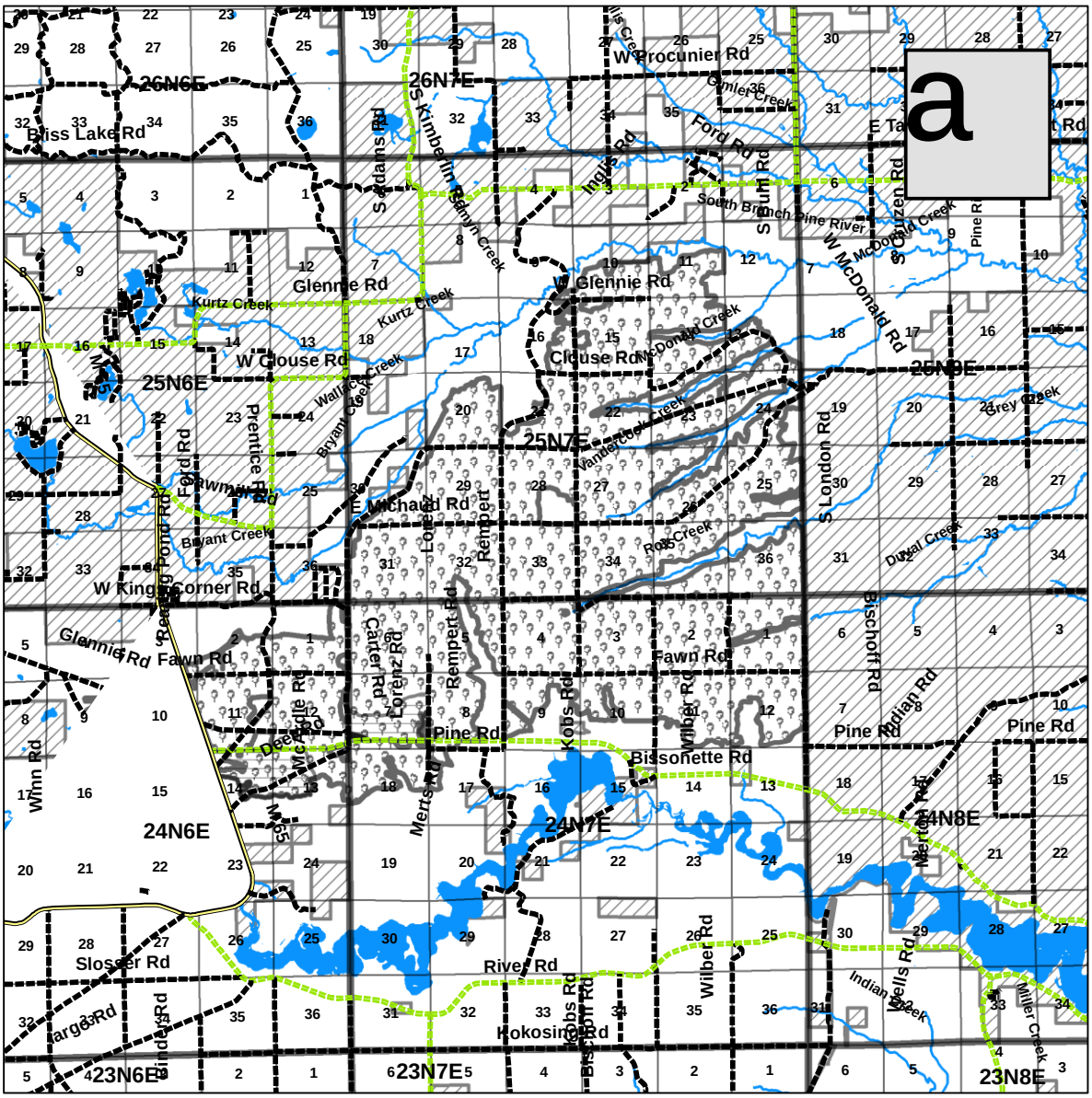
3
PJL 12/06/2010

Pine River KWMA Recent Openings Map



Fire Cumulative Effects Map



Cumulative Effects Map
Snowbird KW Project

0.375 1.5 2.25 3

PJL 12/07/2010

Legend

- Treatment Areas
- Cumulative Effects Area
- Non USFS Lands

Appendix B – Glossary of Terms

Glossary: Abbreviations, Acronyms, and Terms

Alternative	One of several projects (plan, option, choice) proposed for the decision-making process.
Biomass	The total mass of living matter within a given unit of environmental area.
Clearcutting	A regeneration method used to establish even-aged stands whereby all trees are removed in one harvest.
Crown Fire	A fire that advances across the tops of trees or shrubs more or less independently of the surface fire (Helms, ed., 1998).
Cumulative Effects	Past, present, and reasonably foreseeable effects (regardless of who or what has caused, is causing, and might cause these effects) analyzed together with the effects from the management actions.
Desired Condition	Description of land and resource conditions if all long-term goals are achieved.
DFC	Desired Future Condition (a.k.a. Desired Condition)
EA	Environmental Assessment
Ecosystem	A spatially explicit, relatively homogeneous unit of the earth that includes all interacting organisms and components of the abiotic environment within its boundaries – *note* an ecosystem can be of any size, e.g. a log, pond field, forest, or the earth's biosphere (Helms, ed., 1998).
Effective Treatment	An activity resulting in a full benefit at year 1, then declining linearly over time until there are minimal benefits. Varies depending on activity.
Fire Behavior	The manner in which a fire reacts to the influences of fuel, weather, and topography (Helms, ed., 1998).
Fire Interval	Time in years between two successive fires in a designated area; i.e. the interval between two successive fires (Dickman and Cleland, in press)
Fire Regimes	The general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning. The characteristic frequency, extent, intensity, severity, and seasonality of fires within an ecosystem (Helms, ed., 1998).
Fire Regime Condition Classes	**Condition Class 1**: Within the natural (historic) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances. **Condition Class 2**: Moderate departure from the natural (historic) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances. **Condition Class 3**: High departure from the natural (historic) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.
Fire Rotation	Length of time necessary for an area equal to the entire area of interest (i.e. the study area) to burn (Dickman and Cleland, in press)
FOFEM	First Order Fire Effects Model: a modeling program.
Forest Plan	Short for the Huron-Manistee National Forests' *Land and Resource Management Plan* (USDA Forest Service 2006).
Fuelbreak	A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled. A generally wide (60 to 1,000 ft. or 18 to 305 m) strip of land on which native vegetation has been permanently modified so that a fire burning into it can

	be more readily controlled (Helms, ed., 1998)
Fuels	Plants and woody vegetation, both alive and dead, that is capable of burning.
Hazard (Fire)	Fuels and topography of an area.
Hazard Fuel Reduction	Any treatment of living or dead fuels that reduces the threat of ignition and spread of fire
Ladder Fuels	Combustible material that provides vertical continuity between vegetation strata and allows fire to climb into the crowns of trees or shrubs with relative ease – note ladder fuels help initiate and ensure the continuation of a crown fire.
Long term (fire)	Two to ten years following implementation.
LTA	Land Type Association
Model (Fuel)	An abstract representation of objects and events from the real world for the purpose of simulating a process, predicting an outcome, or characterizing a phenomenon. (Helms, ed., 1998)
No-Action Alternative	The most likely condition expected to exist in the future if current management direction continues unchanged; used as the baseline in evaluating possible effects of implementing the action alternatives.
Objectives	Concise, time-specific statement of measurable and planned results that respond to identified desired conditions; forms the basis for further planning; and are action items oriented and specifically describe measurable results.
Plantation	An area planted to trees, typically with a planting machine or by hand planting
Prescribed burn	To deliberately burn wildland fuels in either their natural or their modified state and under specified environmental conditions, which allows the fire to be confined to a predetermined area and produces the fireline intensity and rate of spread required to attain planned resource management objectives – *synonym* controlled burn, prescribed fire (Helms, ed., 1998).
Prescribed fire	Deliberately ignited fire for the purpose of forest management, often to remove a heavy fuel buildup or simulate natural cycles of fire in an ecosystem.
Risk (Fire)	Those uses or human activities which have the potential to result in a wildland fire ignition.
Short and long term	Generally, short term means the duration of the activity plus a few months. Long term means after the short term, extending out to a specified number of years. The definition of long term (and in some cases, short term) will differ for each resource (e.g. fire, heritage, wildlife, etc): for example, long term for Kirtland's warbler habitat creation is about 50 years, the normal rotation cycle for jack pine on the Huron-Manistee National Forests. Definitions of short term and long term for each resource can be found in their respective specialist reports located in the Project File.
Short term (fire)	One to two years following implementation.
Long term (fire)	Two to ten years following implementation.
Slash	Limbs, branches and tops of trees left after timber harvest.
Surface fire	A fire that burns only surface fuels such as litter, loose debris, and small vegetation (Helms, ed., 1998).
Treatment	Any activities undertaken to modify or maintain the existing condition of the vegetation.
USDA	United States Department of Agriculture