United States
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Forest
Service

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LOWER LOOP VEGETATION MANAGEMENT PROJECT

Towns of Berlin and Randolph
Coos County, New Hampshire

Environmental Assessment

Prepared By
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Lower Loop Vegetation Management Project Environmental Analysis Summary

The Androscoggin Ranger District of the White Mountain National Forest is proposing the following management activities for the Lower Loop Project (Alternative 2):

- Timber harvest of 2.2 million board feet on approximately 455 acres of National Forest land within Habitat Management Units (HMU) 207 and 208, utilizing both even-aged and uneven-aged management techniques;
- Perform restoration maintenance on approximately 2.6 miles of existing Forest Service roads (Forest Roads 33, 2251, 178 and 2244), and re-establish 8 log landings and;
- Perform maintenance on permanent wildlife openings to maintain openings in brushy conditions.

The **Analysis Area** for the Lower Loop Project is HMUs 207 and 208 and encompasses 13,113 acres of National Forest land. Of this, approximately 10,652 acres are within Management Area 3.1 which prescribes vegetation management to achieve the goals and objectives of the White Mountain National Forest Land and Resource Management Plan (LRMP, 1986). The **Project Area** is the portion of the Analysis Area that includes stands proposed for vegetative management, as well as the area associated with connected actions (roads and landings). The 455 acres of National Forest lands proposed for harvest are located in the Towns of Berlin and Randolph, Coos County, New Hampshire, on the Androscoggin Ranger District of the White Mountain National Forest.

An Interdisciplinary Team (IDT) of Forest Service resource specialists chose the initial treatment areas as a result of an analysis of the existing habitat conditions within HMU 207 and 208 **(Purpose for the action)**. Comparing the existing conditions to the desired conditions outlined in the Forest Plan, the IDT identified a need to increase age class and habitat diversity, enhance softwood production on appropriate sites, improve stand conditions for optimum tree growth, and provide quality wood products **(Need for the action)**.

In addition to the Proposed Action (Alternative 2) described above, the IDT considered alternative proposals for addressing the Purpose and Need for this project. Two of these alternatives were developed and analyzed in detail, including Alternative 1, the "No Action" alternative and Alternative 3, an alternative that proposes a greater number of acres for even-aged regeneration harvest. The proposed activities for each of these alternatives are summarized in Table A and a more detailed description and analysis of effects for each alternative is included in Chapters 2 and 3 of this EA.

Table A. Activities Proposed for Lower Loop Project, By Alternative

Proposed Activity	Alt 1	Alt 2	Alt 3
Timber Harvest (Acres)			
Clearcut & Patchcut Total	**0**	**79**	**123**
• Regeneration Objective	0	60	104
• Permanent Wildlife Opening Objective	0	19	19
Seed Tree Cut	**0**	**8**	**8**
Individual Tree and Group Selection Cut	**0**	**345**	**301**
Overstory Removal	**0**	**23**	**23**
Transportation System (Miles)			
Miles of Road Restoration	**0**	**2.6**	**2.6**

The Proposed Action (Alternative 2) is the preferred alternative of the Forest Service. It would meet the Purpose and Need for this project while adequately addressing issues raised by the public and interdisciplinary team (IDT).

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CHAPTER ONE – INTRODUCTION

1.0 Introduction and Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and 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:

- **Purpose and Need for Action:** The section includes information on the history of the project proposal, the purpose of and need for action, 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 as well as alternative methods for achieving the stated purpose. These alternatives were developed based on issues raised by the public, the Forest Service and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

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

- **Agencies and Persons Consulted:** This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

- **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 Androscoggin Ranger District Office in Gorham, New Hampshire.

1.1 Background

The Project Area is located within the Towns of Berlin and Randolph in Coos County, New Hampshire, on the Androscoggin Ranger District of the White Mountain National Forest (Appendix A, Map 1A). It has a history of vegetation and wildlife habitat management dating back to the late 1800's and continues to be actively managed today. Aside from timber harvest,

the area offers a wide variety of recreation activities, including hiking, scenic and fall foliage viewing, camping, cross-country skiing, snowmobiling, mountain biking, swimming, snow-shoeing, wildlife watching, hunting, fishing, and cutting Christmas trees and firewood.

The Analysis Area is the larger National Forest management unit within which the Project Area is found. It consists of "Habitat Management Units" (HMU) 207 and 208, and is approximately 13,113 acres in size. A Habitat Management Unit is described in detail in Appendix B of the 1986 White Mountain National Forest Land and Resource Management Plan (hereafter referred to as the Forest Plan). A brief description of the management strategy for HMUs can be found in Section 1.1.1 of this EA.

HMU 207 encompasses 4,139 acres of National Forest land, of which 3,538 acres are allotted by the Forest Plan to Management Area 3.1, or lands considered suitable for timber harvest. HMU 208 encompasses 8,974 acres of National Forest land, of which 7,114 acres are allotted to MA 3.1. Map 1B in Appendix A shows the location of HMUs 207 and 208 in Coos County.

HMU 207 includes the Landing Camp hiking trail and the Kilkenny snowmobile trail, (Corridor 11) which runs adjacent to the Bog Dam Road. Within HMU 208, the Kilkenny snowmobile trail continues along the Pond of Safety Road. There are no hiking trails located within HMU 208.

1.1.1 White Mountain Land and Resource Management Plan – Final Environmental Impact Statement and Record of Decision, as Amended (USDA, 1986, FEIS)

Management direction for the White Mountain National Forest (WMNF) is established in the White Mountain National Forest Land and Resource Management Plan (LRMP, 1986), the Final Environmental Impact Statement (FEIS) and Record of Decision, as Amended (USDA, 1986 FEIS). The purpose of the LRMP (or Forest Plan) is to provide direction for multiple use management and sustained yield of goods and services from the National Forest lands in an environmentally sound manner.

1.2 Purpose for the Action

The Purpose for this project is to accomplish resource objectives to meet the overall management direction for the White Mountain National Forest, as established in the Forest Plan (USDA 1986a. Forest Plan, III 30-41). Within the Project Area, the Forest Plan establishes the following goals for Management Area 3.1:

The goals for MA 3.1 are to:

- Provide large volumes of high quality hardwood sawtimber on a sustained yield basis and other timber products through intensive timber management practices,
- Increase wildlife habitat diversity for the full range of wildlife species with emphasis on early-successional species,

- Grow small diameter trees for fiber production and;
- Broaden the range of recreation options, mainly offering semi-primitive motorized experience opportunities.

1.3 Need for the Action

An Interdisciplinary Team (IDT) of Forest Service resource specialists chose the initial treatment areas because an analysis of HMUs 207 and 208, comparing existing habitat conditions to desired conditions as outlined in the Forest Plan, indicated there is a Need to increase age class and habitat diversity (Forest Plan, VII-B-12/13), enhance softwood production on appropriate sites, improve stand conditions for optimum tree growth and provide quality wood products.

The Forest Plan allotted the 13,113 acres of National Forest (NF) lands within HMUs 207 and 208 to particular Management Areas, based on a series of factors, such as soils, elevation, community types, accessibility, etc. Lands allotted to MA 3.1, lands where timber harvest is permitted, comprise 10,652 acres, accounting for 81.3% of the NF lands in the Analysis Area. Lands allotted to MAs 6.1 for the two HMUs comprise 1,891 acres, or 14.4% of the NF lands. An additional 570 acres (4.3% of NF lands) are allotted to MA 9.4, a designation for NF lands in which a management prescription, and management activities, are deferred until the Forest Plan is either amended to provide specific direction for these lands, or revised to provide a new management direction for the National Forest as a whole.

1.3.1 Need for Change

The Forest Plan establishes a "Desired Future Condition" (DFC) for each Habitat Management Unit (HMU). The need for change within a particular HMU is determined by comparing the DFC with the existing ground condition (EC). For MA 3.1 lands within HMUs 207 and 208, the Interdisciplinary Team identified the existing conditions, and then compared them to the DFC to determine where change was needed. Tables 1A and 1B, which display both the existing condition and the desired condition, show only those opportunities where DFC can be achieved through vegetative management. The project planning record contains the full comparison of EC to DFC.

Table 1A. Acres by Community Type in MA 3.1 for HMU 207

Community Type	Existing	Desired Future Condition	Need
Hardwoods/mixedwoods (regeneration)	66	123	57
Spruce/Fir	450	701	251
Permanent Wildlife Openings	5	106	101

Table 1B. Acres by Community Type in MA 3.1 for HMU 208

Community Type	Existing	Desired Future Condition	Need
Hardwoods/mixedwoods (regeneration)	90	184	94
Paper Birch (regeneration)	0	52	52
Spruce/Fir	625	1539	914
Permanent Wildlife Openings	23	113	90

A look at Tables 1A and 1B shows that, in order to meet the habitat and stand structure objectives of the Forest Plan for HMUs 207 and 208, there is a need to establish regenerating stands of paper birch and northern hardwoods; and to release spruce-fir from the understory of other stands. Commercial timber harvest can be used to achieve these objectives. Even-aged harvest methods can be used to convert mature and overmature northern hardwoods and paper birch stands to a younger, regenerating age class. Uneven-aged harvest methods can be used to increase the acres of spruce-fir by removing the overstory trees where spruce-fir is in the understory.

Economically, harvesting mature and overmature trees would provide high quality sawtimber to area mills and revenue to local communities. At the same time, lower quality or damaged trees can be harvested to improve future stand quality and productivity.

1.4 Proposed Action

The Androscoggin Ranger District proposes to address the Purpose and Need for Action in HMUs 207 and 208 by applying silvicultural practices to diversify age class and wildlife habitat, improve future stand quality, enhance growing condition for softwoods and provide quality sawtimber. This Proposed Action is the original proposal, which had been presented to the public for comment in March 2004.

The Proposed Action would establish 68 acres of early-successional habitat and 19 acres of permanent wildlife openings by clearcut, patch clearcut or seed tree cut in mature and overmature stands of northern hardwoods and paper birch. It would also treat an additional 23 acres with an overstory removal to open up the established understory vegetation. It would harvest 345 acres using the uneven-aged methods of single tree and small group selection cuts to promote in-stand growth and release small patches of softwoods like spruce-fir and hemlock. The Project Area totals approximately 455 acres (Appendix A).

Five existing permanent wildlife openings (PWOs) would be expanded by 3-5 acres from their original size. These would first have the stumps removed and then seeded with winter rye to minimize soil movement as natural herbaceous plants become re-established. . Once established, they would be maintained every 3-5 years, either by tractor mowing or prescribed burning depending on accessibility.

To access the harvest areas, approximately 2.6 miles of existing roads (Forest Roads 33, 2251, 178 and 2244) and 8 landings would be restored. Roads receiving restoration maintenance are typically classified Forest Service roads that have been closed to vehicle traffic since their prior use and stabilized with erosion control devices such as water bars. Restoration maintenance is the process of rebuilding a road to the standard originally constructed. It may include removing water bars, sod and brush from the road bed; cleaning ditches; replacing culverts and stream crossings; and placing and maintaining surfacing. Restored roads would be closed and stabilized until needed again.

All roads within the analysis area will maintain their current classification and no changes will be made to the current transportation inventory. The road proposal presented in the scoping letter identified roads located within Analysis Area and possible reclassification. We have decided not to reclassify any roads at this time. The effects of the proposed action on the current road system are described in the appropriate resource section.

1.5 Decision Framework

The purpose for this environmental assessment is to provide the District Ranger, the Deciding Official, with sufficient information and analysis to make an informed decision about the Lower Loop Project given the purpose and need for the action. The deciding official would make the following decisions:

1. Which of the alternatives would best move the Lower Loop Project Area toward the DFC outlined in the Forest Plan and the Purpose and Need for Action?

2. Which of the alternatives best addresses relevant issues raised by the public and the interdisciplinary team?

3. Would the Proposed Action and its alternatives pose any significant environmental impact to warrant the need for an environmental impact statement?

4. Do the mitigation measures for the Proposed Action and its alternatives meet the Forest Plan Standards and Guidelines?

1.6 Public Involvement

On March 19, 2004, a scoping letter soliciting comment on the Proposed Action for the Lower Loop Project was sent to 230 interested people, local newspapers and various agencies and organizations. This project was also listed in the Quarterly Schedule of Proposed Actions for the White Mountain National Forest which is mailed to over 500 people interested in and/or affected by the White Mountain National Forest management. The scoping letter was also posted on our White Mountain National Forest web page (www.fs.fed.us/r9/white). An announcement of the

original Proposed Action appeared in the legal notices section of the **Manchester Union Leader** on March 31, 2004**.**

Eight (8) responses to the scoping letter were received. These responses have been used to formulate alternatives and mitigation measures.

1.7 Issues Used to Develop Alternatives

Using comments received from the public and within the agency, the interdisciplinary team (IDT) identified issues that are caused directly or indirectly by implementing the Proposed Action, or can be used to develop site-specific alternatives to meet the Purpose and Need. Appendix C, List of Scoping Comments, lists the issues, concerns and comments raised by the public and the Forest Service responses.

Measurement indicators were developed for each issue and are a means of comparing alternatives. Table 4 in Chapter 2 provides a summary of the characteristics of each alternative, including measurement indicators. One issue raised during the scoping process resulted in the development of an alternative to the Proposed Action.

1.7.1 Wildlife Issue

One respondent requested that the acreage of proposed regeneration harvests and permanent wildlife openings be increased to fully achieve the desired future condition for HMU 207 and 208 as prescribed in the Forest Plan (Appendix C). This issue is addressed in Alternative 3, which is described in Chapter 2. The measurement indicator for evaluating the effects of this issue for each alternative will be the "number of acres clearcut".

1.8 Applicable Regulatory Requirements & Required Coordination

NFMA (National Forest Management Act)

NFMA gives direction for developing, maintaining and revising plans for individual units of the National Forest System. This includes direction for maintaining multiple use and sustained yield of forest products and services, insuring consideration of economic and environmental aspects of various systems of resource management, providing for diversity of plant and animal communities, and insuring that timber will be harvested only where suitable. As an example, the wildlife strategy developed in the 1986 White Mountain National Forest Plan provides the direction for managing for wildlife habitat diversity on the Forest.

NEPA (National Environmental Policy Act)

NEPA gives direction to analyze and assess environmental conditions and consequences of planned and proposed actions. CEQ (Council on Environmental Quality) Regulations and the Forest Service Manual and Handbooks give direction and guidelines for conducting the analysis.

New Hampshire SHPO (State Historic Preservation Office) Review

Before a decision is made for a project, State Historic Preservation Office (SHPO) reviews the cultural resource report for the project. The cultural resource report has been reviewed by the Forest Archeologist and we have received concurrence from SHPO.

MBTA (Migratory Bird Treaty Act)

This project is consistent with the Migratory Bird Treaty Act. The White Mountain National Forest is actively involved with the Partners in Flight program to protect neo-tropical migrants. The Forest also recently completed a Species Viability Evaluation (SVE) process to identify species that might have a potential viability concern on the Forest. Migratory birds were considered in this review. Any species identified through this process, including migratory birds, that have a viability concern are evaluated.

USFWS (United States Fish and Wildlife Service)

The USFWS will be asked to review the biological evaluation (BE) for federally listed threatened and endangered species (TES) prior to any decision. We have received concurrence from USFWS on our biological evaluation.

CHAPTER TWO – ALTERNATIVES

2.0 Formulation of Alternatives

This chapter provides a detailed description of the Proposed Action and alternatives to the Proposed Action. Alternative 1, referred to as the "No Action" alternative, proposes that no vegetative management activities be conducted within the Lower Loop Project Area at this time. Consideration of a No Action alternative is required by regulations implementing the National Environmental Policy Act (NEPA), and is intended to contrast the effects of no action to the effects of action alternatives. Alternatives 2 and 3 are referred to as "Action Alternatives", since each of these alternatives proposes some level of vegetative management activities within the Lower Loop Project Area. Alternative 2 is the "Proposed Action". This alternative was submitted to the public for comment in March 2004. Alternative 3 is the "Maximizing Regeneration Age Class". This alternative incorporates changes resulting from public comment. Each of the Action Alternatives meets the Purpose and Need for Action, although there are differences in the degree to which each alternative moves towards the Desired Future Condition described in the Forest Plan.

The process of designing alternatives to address the Purpose and Need for Action began with a review of existing conditions for HMUs 207 and 208. Compartment vegetative data and records were reviewed to identify stands that could benefit from silvicultural treatment. This data was verified through aerial photographs and field reconnaissance. Site specific concerns related to other resources (such as soil, water, recreation, etc.) were identified and addressed either through mitigation measures or deferring silvicultural treatment where appropriate. Alternative actions were considered for silvicultural treatments, and for contributing towards the Desired Future Condition of the HMUs. From all of these considerations, the Proposed Action was developed and submitted to the public for comment (scoping) in March 2004. Alternative 3 was developed to address issues raised by the public during the scoping process.

The Forest Plan lists specific mitigation measures, called Standards and Guidelines, for controlling or alleviating the environmental effects of timber harvesting, road restoration and regular road maintenance. These Standards and Guidelines are required when conducting these activities on the White Mountain National Forest, and they are incorporated into this project by reference. Additional mitigation measures, which go above and beyond the Forest Plan Standards and Guidelines, have also been developed to address concerns specific to the Proposed Action and Alternative 3. These site-specific measures, described in Appendix D, are intended to mitigate specific resource effects. They have been developed either as a result of ongoing research or as a result of monitoring and evaluation of past similar actions on the White Mountain National Forest and elsewhere. Most information used to develop these additional mitigation measures has been accumulated over the past 15 years of implementing the Forest Plan.

2.1 Description of Alternatives

2.1.1 Alternative 1: No Action Alternative

While this alternative does not meet the Purpose and Need for Action, it does provide a basis for analyzing the effects of conducting no vegetative management activities (No Action) in the Project Area, and comparing these effects with those alternatives that propose some level of vegetative management. This alternative is required by regulations implementing the National Environmental Policy Act (NEPA). This alternative would not harvest any trees, increase permanent wildlife openings or conduct any road restoration. This alternative would not meet Forest Plan expectations for sustained timber products and diverse wildlife habitat in HMUs 207 and 208 for the foreseeable future.

There would be no change to the existing condition of the area except from natural occurrences, ongoing recreation activities, and road and trail maintenance. This alternative provides a foundation for describing and comparing the magnitude of environmental changes associated with the Action Alternatives against those that occur naturally or during routine operations. This alternative responds to those who want no timber harvesting or active wildlife habitat management to take place. Choosing this alternative would not preclude proposing timber harvest in this area at a later date.

2.1.2 Alternative 2: Proposed Action

The Proposed Action and its connected actions were developed to meet the Purpose and Need for Action with the most current information available at that time. It would involve harvesting approximately 455 acres by a combination of even-aged and uneven-aged management methods (Table 2). This alternative would provide approximately 2.2 million board feet of sawtimber and pulpwood, and improve future stand quality and productivity. Alternative 2 is displayed in Map 2 in Appendix A.

This alternative responds to the need to create uneven-aged stands in hardwoods and mixedwood community types by creating a mixture of tree ages, size classes and species composition. Using clearcutting and seed tree cuts to help accomplish the desired wildlife habitat composition (Table 5), this alternative responds to the need to create early-successional habitat within these HMUs by converting mature northern hardwoods, aspen and paper birch stands to the 1-10 year old age class, and expanding existing wildlife openings. **It is the preferred alternative of the Forest Service.**

Table 2. Alternative 2: Proposed Treatments and Acreage

Proposed Treatment	Alt 2
Clearcut & Patchcut Total	**79**
• Regeneration Objective (CC)	60
• Permanent Wildlife Opening Objective (PWO)	19
Seed Tree Cut (STC)	**8**
Individual Tree and Group Selection (ITS&GS)	**345**
Overstory Removal	**23**
Total Harvest Area	**455**

The operating season for each stand was based on field visits to evaluate roads, site moisture conditions and ecological land types (ELTs) (Tables 7 & 8). Based on these characteristics, all the stands would be harvested during the winter months (December through March) when the ground is frozen.

During harvest operations, trees would either be processed in the woods or at the landing site. Tops of trees processed in the woods would remain on the ground and the tops of trees processed at the landing would be returned to the harvest site and scattered.

Site specific mitigation measures for this alternative are found in Appendix D.

Connected Actions

Approximately 2.6 miles of existing roads (Forest Roads 33, 2251, 178 and 2244) and 8 log landings would be restored. Restoration work entails grading roadways, cleaning ditch lines and culverts, and clearing road rights-of-way of limbs and hazard trees.

Five existing permanent wildlife openings (PWO) would be expanded by 3-5 acres from their original size. Once established, these would be maintained every 3-5 years, either by tractor mowing or prescribed burning, depending on accessibility. Mowing would be prescribed for permanent openings with road access and would occur between August and November when site conditions are dry. These would first have the stumps removed and then seeded with winter rye to minimize soil movement as natural herbaceous plants become re-established. Permanent wildlife openings where motorized access is limited would be burned in late spring or early fall during appropriate weather conditions.

Alternative 2 is the preferred alternative of the Forest Service because it meets the Purpose and Need for Action by improving vigor and growth in some of stands through individual tree harvesting and group selection; helping to meet some of the wildlife habitat composition needs (Table 5) through clearcuts and seed tree cuts; releasing understory vegetation, and enhancing growth and regeneration of softwoods on naturally occurring sites.

2.1.3 Alternative 3: Maximizing Regeneration-Age Class

Alternative 3 is a modification of the Proposed Action and prescribes an increased amount of regeneration harvest as a result of public comment. Stand prescriptions for Alternative 3 are displayed on Map 3 in Appendix A. Changes (Table 6) from the Proposed Action are:

- Stand 18/4 would be divided into a 24 acre clearcut and 49 acres of individual tree selection and groups. This would increase the regeneration age class of northern hardwoods within HMU 208 and move it closer to its DFC.
- Stand 18/20 would be divided into a 10 acre clearcut and 26 acres of individual tree selection and groups. This would increase the regeneration age class of northern hardwoods for HMU 208 and move it closer to its DFC.
- Stand 14/61 would be divided into a 5 acre clearcut and 20 acres of groups. This would increase the regeneration age class of northern hardwoods for HMU 207 and move it closer to its DFC.
- Stand 14/38 would be divided into a 5 acre clearcut and 42 acres of groups. This would increase the regeneration age class of northern hardwoods for HMU 207 and move it closer to its DFC.

Timber harvesting would occur on approximately 455 acres (Table 3) and provide approximately 2.5 million board feet of sawtimber and pulpwood. Harvest operations would also occur only in winter.

Site specific mitigations are the same as Alternative 2 and can be found in Appendix D.

Table 3. Alternative 3: Proposed Treatments and Acreage

Proposed Treatment	Alt 3
Clearcut & Patchcut Total	**123**
• Regeneration Objective (CC)	104
• Permanent Wildlife Opening Objective (PWO)	19
Seed Tree Cut (STC)	**8**
Individual Tree and Group Selection (ITS&GS)	**301**
Overstory Removal	**23**
Total Harvest Area	**455**

Connected Actions

The connected actions for road restoration and maintenance of the permanent wildlife openings would be the same as Alternative 2.

2.2 Alternatives Considered but Eliminated from Detailed Study

2.2.1 Maximum Number of Permanent Wildlife Openings

We considered an alternative that would create 148 acres of permanent wildlife openings, 3 to 5 acres in size, to meet our HMU goals. This alternative was eliminated due to limited time, funds and manpower to maintain this many PWOs.

2.3 Comparison of Alternatives –Actions and Outputs

The following tables display characteristics for each of the alternatives. Table 4 is a summary of comparisons for alternatives (including the measurement indicator mentioned in Section 1.7.1).

Table 4. Summary of Comparision of Alternatives

MEASURE	Measurement Indicator	ALT 1	ALT 2	ALT 3
PROPOSED HARVEST AREA	**Acres**	**0**	**455**	**455**
• **Winter Only Harvest**	**Acres**	**0**	**455**	**455**
• **Summer/Fall Harvest**	**Acres**	**0**	**0**	**0**
• **Clearcut & Patch Clearcut Total** o Regeneration Objective (CC) o Permanent Wildlife Opening Objective (PWO)	**Acres**	**0** **0** **0**	**79** 60 19	**123** 104 19
• **Seed Tree Cut (STC)**	**Acres**	**0**	**8**	**8**
• **Individual Tree & Group Selection (ITS&GS)**	**Acres**	**0**	**345**	**301**
• **Overstory Removal**	**Acres**	**0**	**23**	**23**
• **Harvest Volume**	**MBF**	**0**	**2234**	**2530**
Estimated Stumpage Receipts	**$**	**0**	**323,930**	**366,850**
10% Yield Tax Receipts (To Towns of Berlin and Randolph)	**$**	**0**	**32,000**	**37,000**
25% Fund Payments (To Coos County)	**$**	**0**	**80,982**	**91,712**
Estimated Forest Service Costs	**$**	**55,800**	**163,852**	**171,140**
Road Restoration	**Miles**	**0**	**2.6**	**2.6**

Table 5. HMUs 207 and 208- Comparison of the Acres Needed to Achieve DFC to the Proposed Acres of Accomplishments, by Alternative (Alt.)

HABITAT TYPE	NEED acres	PROPOSED ACCOMPLISHMENT		
		Alt 1	Alt 2	Alt 3
HMU 207				
Northern Hardwood (regeneration)	**57**	0	0	10
Enhance spruce/fir component in mixed wood stands	**251**		7	7
Permanent Wildlife Opening	**101**	0	3	3
HMU 208				
Northern Hardwood (regeneration)	**94**	0	60	94
Paper Birch (regeneration)	**52**	0	8	8
Enhance spruce/fir component in mixed wood stands	**914**	0	50	50
Permanent Wildlife Opening	**109**	0	16	16

Table 6. HMU 207 and 208 - Stand Prescription & Acreage by Stand for the Action Alternatives. Rx (Stand Prescription) abbreviations are: CC (Clearcut or Patch Clearcut <10 acres), STC (Seed Tree Cut), ITS (Individual Tree Selection), GS (Group Selection), OR (Overstory Removal), and PWO (Permanent Wildlife Openings). Since Group Selection harvests only a percentage of the stand, the actual harvest acres are listed in parentheses. Season of Operation: W – December 15 through March 20

Compartment	Stand	Alternative 2		Season of Operation	Alternative 3		Season of Operation
HMU 207		**Rx**	**Acres***		**Rx**	**Acres**	
14	38	GS	47 (6)	W	GS	42 (5)	W
14	38a	CC	0	W	CC	5	W
14	61	GS	25 (3)	W	GS	20 (2)	W
14	61a	CC	0	W	CC	5	W
14	56	ITS & GS	7	W	ITS & GS	7	W
14	40	OR	12	W	OR	12	W
14	57	OR	11	W	OR	11	W
14	50	PWO	3	W	PWO	3	W
TOTAL			**105(9)**			**105(7)**	
HMU 208		**Rx**	**Acres***		**Rx**	**Acres**	
17	8	ITS & GS	50	W	ITS & GS	50	W
17	53	STC	8	W	STC	8	W
17	25	ITS & GS	70	W	ITS & GS	70	W
17	57	CC	30	W	CC	30	W
17	56	CC	30	W	CC	30	W

17	23	PWO	4	W	PWO	4	W
18	8	ITS & GS	37	W	ITS & GS	37	W
18	20	ITS & GS	36	W	ITS & GS	26	W
18	20a	CC	0	W	CC	10	W
18	4	ITS & GS	73	W	ITS & GS	49	W
18	4a	CC	0	W	CC	24	W
18	17	PWO	5	W	PWO	5	W
18	36	PWO	3	W	PWO	3	W
18	38	PWO	4	W	PWO	4	W
TOTAL			**350**			**350**	
TOTAL			**455**			**455**	

*Acres are approximate

CHAPTER 3 - AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This analysis will consider the effects of the project proposal on the following resources: Vegetation; Recreation; Visual Quality Objectives; Roadless/Wilderness Characteristics, Soils (Erosion and Calcium); Water (Quantity & Quality); Fisheries; Wildlife (Habitat, Management Indicator Species, Other Species of Concern, Habitats of Concern); Invasive Plants; Federal Threatened, Endangered, and Proposed Species (TEPS), and Regional Forester Sensitive Species (RFSS); Heritage Resources; and Socio-economics.

Specific issues regarding resources that were raised during the scoping process (see Section 1.7 and Appendix C) are addressed in this chapter. Each resource section is organized as follows:

- Issues Related to the Resource
- Description of Affected Environment (Existing Condition)
- Analysis of Direct and Indirect Effects on the Resource (By Alternative)
  - Direct Effects are caused by the action and occur at the same place and time
  - Indirect Effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.
- Analysis of Cumulative Effects on the Resource (By Alternative)
  - Cumulative Effects result from the incremental impact of the action when added to other past, present and reasonably foreseeable actions, regardless of which government agency or individual undertakes such other actions.

3.2 Vegetation

Affected Environment for Vegetation

The Analysis Area has been actively managed for wood products for over 100 years due to its natural tendency to regenerate and produce high quality trees. Logging has played an important role in the White Mountains since the 19th century and present vegetative conditions are largely the result of this past logging and recent forest management. There is no documentation or evidence that the Analysis Area was or is considered prime farm land due to the rocky nature of the soils and inadequate water supply to portions of area.

This section describes the various age classes and condition of vegetation over the landscape, ranging from newly regenerated stands to overmature forests.

The Analysis Area for direct and indirect effects on vegetation is MA 3.1 lands within HMUs 207 and 208 which permit vegetative management using various silvicultural

techniques. The analysis area encompasses 10,652 NF acres. Approximately 77.5% of these lands (8,257 NF acres) comprise a closed-canopy forest of mature and overmature even-aged and uneven-aged stands. The amount of closed and open canopy within MA 3.1 provides a picture of the structural diversity within the Analysis Area.

Many of the overstocked mature northern hardwoods or mixedwood stands within MA 3.1 in the Analysis Area have been identified for vegetative treatment because they contain trees that have low timber quality or are approaching an age where mortality is imminent. According to the *Silvicultural Guide for Northern Hardwood Types in the Northeast* (Leak et al. 1987) and *Silvicultural Guide for Paper Birch in the Northeast (revised)* (Safford 1983) commercially treating these stands would improve the quality and vigor of remaining trees. Existing stand conditions are summarized in Tables 7 and 8.

Moose activity is evident in some of the stands within Compartment 14 that have had regeneration harvests (strip and shelterwood cuts) within the past 15 years. Moose feeding seems to be concentrated near the Upper Ammonoosuc River near stands 14/38 and 14/61 and has resulted in slowed height growth in young trees due to the tops being eaten each year.

The Analysis Area for cumulative effects on vegetation is all National Forest lands within HMU 207 and 208. This area is used because, though MA 3.1 lands are allocated to vegetative management to achieve the desired community and age-class types for wildlife habitat diversity, other lands within HMU 207 and 208 (MA 6.1) may also contribute to regeneration age class habitat from natural disturbance. The cumulative effects time period spans a period that considers activities ten years in the past and ten years in the future (1994 to 2014). Ten years was the time period selected because it represents the length of time after a stand is harvested when it is considered in the regeneration phase of development (i.e. the canopy is not fully closed and sunlight can penetrate the majority of the ground).

Within HMUs 207 and 208, harvesting on National Forest MA 3.1 lands has totaled approximately 1,466 acres over the past 10 years, or approximately 14% of the allowable harvest acres (10,652 acres). This included even-aged management on 275 acres that established 155 acres of regeneration (148 acres of clearcuts and 7 acres of permanent wildlife openings) and 120 acres in some other stage of development (58 acres of overstory removal, 9 acres of final shelterwood and 53 acres of prep shelterwood). The understory of the final shelterwood and overstory removals stands were already in the young age group (10+ years old) when the final stage cuts were made, while the intermediate stage prep shelterwood did not take enough basal area to be classified as regeneration. The remaining 1,191 acres were treated using uneven-aged management techniques (individual tree selection and salvage). Monitoring of these stands has shown successful regeneration of hardwood and softwood species at desired stocking levels, with a similar species mix to that found in pre-cut mature forests. Past harvest administration and observations during this analysis indicate that harvesting has not resulted in excessive residual damage to trees within the cutting areas.

There is approximately 7,500 acres of private lands within one mile of HMUs 207 and 208's boundary, consisting mostly (80%) of the Randolph Community Forest. Aerial photos as recent as 1995, show the Community Forest and other adjacent private landowners

conducting management activities similar to those on the National Forest, including timber harvest. No significant trends, such as land clearing for residential use, are evident on private ownership where it abuts HMUs 207 and 208.

Table 7. Existing Conditions for Stands Eligible for Vegetative Treatment (HMU 207)

Stand	Community Type	Species Mix	Age	Comment
14/38	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	101	Two aged stand due to previous selection cut (harvested in 1992-94)
14/61	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	101	Two aged stand due to previous selection cut (harvested in 1992-94)
14/56	Mixedwood	Sugar and Red Maple, Yellow Birch, Spruce	94	Softwood Component
14/40	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	12	Age is based on understory and not mature overstory. Harvested in 1990-92
14/57	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	97	Two aged stand due to previous selection cut (harvested in 1990-92)
14/50	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	97	Two aged stand due to previous selection cut (harvested in 1990-92)

Table 8. Existing Conditions for Stands Eligible for Vegetative Treatment (HMU 208)

Stand	Community Type	Species Mix	Age	Comment
17/8	Mixedwood	Sugar and Red Maple, Yellow Birch, Spruce, Paper Birch	104	
17/53	Northern Hardwood	Paper Birch, Red and Sugar Maple, Spruce	104	Predominately mature Paper Birch
17/25	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	154	
17/57	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	154	Portion of stand 17/25
17/56	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	94	Thinned in 1989
17/23	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	134	Permanent Wildlife Opening
18/8	Northern Hardwood	Sugar Maple, Yellow Birch, Aspen	145	
18/20	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	101	Some ice storm damage

18/4	Northern Hardwood	Sugar Maple, Yellow Birch, Beech,	144	
18/17	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	134	Permanent Wildlife Opening
18/36	Northern Hardwood	Sugar Maple, Yellow Birch, Aspen, Beech	144	Portion of stand 18/4
18/38	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	141	Permanent Wildlife Opening

3.2.1 Direct and Indirect Effects on Vegetation

Alternative 1: No Action Alternative

There would be no direct effects from timber harvest and road restoration activities, such as openings in the forest canopy, residual tree damage or soil compaction. Any openings in the forest canopy would be the result of natural mortality of standing trees or disturbance (weather event, infestation, etc.). There would be no indirect effects from timber harvest and road restoration activities, such as establishing new stands of regenerating hardwoods, soil erosion or soil calcium loss. Age class and structural (canopy) diversity would remain unchanged.

Alternative 2: Proposed Action

Stands with prescriptions for individual tree and group selection harvest (Table 6) would create small patches of ¼ to ½ acre in size to release or regenerate softwood and shade intolerant hardwood species in hardwood and mixedwood stands. Group selection would harvest approximately 16-20% of the stand. These treatments would maintain an uneven-aged stand leading to greater diversity of age classes and species. Overall, the health and vigor of stands would be improved through increased sunlight and growing space, resulting in increased growth rates on selected quality sawtimber trees.

Stands 14/40 and 14/57 are even-aged stands with a mature overstory and a younger understory. Overstory removal would remove the mature trees and release the understory, promoting growth in the more shade-intolerant species.

Clearcut harvest prescriptions (CC, Patchcuts and PWO treatments) would create opportunities for early-successional wildlife habitat by removing trees and promoting regeneration and allow natural herbaceous plants to become re-established in PWOs. Among the stands proposed for regeneration harvest (stands 17/56 and 17/57), there would be low to moderate risk of delayed regeneration due to moose browse. These stands are located upland from concentrated moose feeding areas and existing regeneration within stand 17/56 has not been affected by moose browse.

The seed tree cut prescription for stand 17/53 would regenerate paper birch by opening up the stand and retaining scattered trees as seed sources.

Alternative 2 would move HMUs 207 and 208 toward their DFC, as well as increase structural and age class diversity. A total of 68 acres of mature forest would be converted to regenerating stands (including 60 acres of northern hardwoods and 8 acres of paper birch) which would maintain and enhance this age class habitat component in each of the HMUs (see Section 2.3, Table 5). Patchcuts would enlarge five existing permanent wildlife openings to create an additional 19 acres of herbaceous vegetation.

The direct effect of clearcutting in northern hardwood stands is the promotion of stump sprouts in species such as ash, maple and birch. According to a study on four sites in New England, *Whole-tree Clearcutting in New England: Manager's Guide to Impacts on Soils, Streams, and Regeneration* (Pierce et al. 1993*)*, stump sprouting and germination of new seedlings began in the first growing season after harvest. Within five years after cutting, young, dense stands were established on all four sites. Stocking surveys conducted on the Forest three years after treatment has shown successfully regeneration in even-aged and uneven-aged harvested stands.

There should be little direct effects to many herbaceous plant species since they have adapted to surviving in clearcuts or can quickly re-colonize these areas a short time afterwards (Whitman and Hagan 2000).

Winter harvesting on frozen ground would minimize damage to understory vegetation from repeated passes of logging equipment. Damage to the understory would also be minimized by using pre-existing skid trails as much as possible and new trails would be laid out prior to operation to reduce the area affected.

Indirect effects include an increased risk of windthrow in the partially cut stands, and to trees adjacent to clearcuts and patch clearcuts. Trees exposed to the wind on wet sites are susceptible to windthrow until crowns expand to fill the canopy and the roots become windfirm. Some residual tree damage would occur from harvesting operations, but skid trails are often planned adjacent to trees marked for removal in order to provide adequate working space for logging equipment.

Prescribed burning and mowing would suppress encroaching woody vegetation and maintain PWOs in an herbaceous condition. During prescribed burning, precautions such as clearing brush away from harvest boundaries and burning during optimum weather conditions would minimize residual tree damage along the edge of the opening. There is currently a study on the Forest comparing the vegetative composition of PWOs resulting from various regimes of burning and mowing over several years.

Alternative 3: Maximizing Regeneration Age Class

Due to public comment, Alternative 3 was developed to move HMUs 207 and 208 closer to the desired future conditions for regeneration age vegetation. The effects of this alternative are nearly the same as Alternative 2 with the exception that an additional 44 acres are proposed for even-aged regeneration harvest. Within HMU 207, there would continue to be a shortage of northern hardwood regeneration habitat (47 acres), however within HMU 208, the desired future condition for northern hardwood regeneration would be achieved.

Because of potential of moose browse within the analysis area, there would be greater risk of delayed regeneration growth due to the increased amount of clearcuts under this alternative. Along with stands 17/56 and 17/57, there would be low to moderate risk of moose browse to stands 18/4a and 8/20a because of their location and distance from current moose feeding areas. However the risk of moose browse to stands 14/38a and 14/61a would be high since these stands are located adjacent to a concentrated moose feeding area.

Due to the increased amount of regeneration harvest, the residual stand damage would probably be less compared to Alternative 2 since it proposes the most acres of even-aged harvest. However, potential for windthrow would be increased since there would be more openings large enough to trap wind and damage trees along the boundary edge.

3.2.2 Cumulative Effects on Vegetation

Other than the Proposed Action and its alternatives, the Forest Service does not anticipate any timber harvest or other projects within HMUs 207 and 208 through 2014.

Alternative 3, with the most acres proposed for even-aged harvest, is still short of the DFC for all community types in HMUs 207 and meets DFC only for northern hardwood regeneration within HMU 208. As a result, even when considering timber harvest on lands outside the Analysis Area, the Proposed Action and its alternatives are well within the effects anticipated and analyzed in the Final Environmental Impact Statement for the 1986 Forest Plan that provides programmatic direction for timber harvest on the White Mountain National Forest.

Alternative 1: No Action Alternative

This alternative will not contribute incrementally to the effects of timber harvest or land clearing within the Analysis Area over the 20-year period from 1994-2014. Without timber harvest now or over the next 10 years; species, age class and structural diversity will remain static or diminish on National Forest lands within HMUs 207 and 208. Diversity may be enhanced by natural disturbance, such as a weather event, fire, disease or an infestation that can create forest openings and provide some limited opportunities for shade intolerant plant species. However, on National Forest lands, regenerating and young stands will age and grow closer to the surrounding canopy. This will have the effect of reducing sunlight to the forest floor and reducing early-successional habitat for wildlife. Mature stands of the short-lived (50-60 years) paper birch and aspen community types will continue to age towards mortality, many to be replaced by shade tolerant species now growing in the understory of these stands.

Action Alternatives 2 and 3

The two Action Alternatives will contribute incrementally to the effects of timber harvest or land clearing within the Analysis Area over the 20-year period from 1994-2014; however, these effects are well within the effects anticipated and analyzed in the Final Environmental Impact Statement for the 1986 Forest Plan.

The Forest Plan permits 80% to 90% of the lands within MA 3.1 to be managed using even-aged silvicultural techniques. The remaining 10% to 20% of MA 3.1 lands are managed using predominantly uneven-aged treatments. Even-aged harvest has the effect of reducing the acres in closed canopy forest and contributing to age-class variation within the forested landscape. Table 9 compares the cumulative timber harvesting and other stand regenerating activities on MA 3.1 lands, for all of the alternatives.

Table 9. Cumulative Harvest on NF Lands in HMUs 207 & 208, in acres
Even-aged regeneration harvest and PWOs are noted in parentheses

Harvest Time Frame	Alt 1	Alt 2	Alt 3
Harvesting on NF acres in the past 10 years	**1,466** (155)	**1,466** (155)	**1,466** (155)
Proposed NF acres for harvest	0	**455** (87)	**455** (131)
Foreseeable NF harvest acres in the next 10 years	0	0 (0)	0(0)
Cumulative NF acres harvested from 1994-2014	**1,466**	**1,921**	**1,921**
% of all MA 3.1	14%	18%	18%
% of MA 3.1 in 0-10 age class	.5%	2.3%	2.7%
Acres below DFC (540 total -392 acres for NH regen and 148 acres for PWOs) for Regeneration Habitat in MA 3.1	**385**	**298**	**254**

Within the time period of 1994 through 2014, Alternative 2 proposes to harvest approximately 1,921 acres, or 18% of the MA 3.1 lands in HMUs 207 and 208. Regeneration resulting from even-aged harvest during this time period would reduce the closed forest canopy (mature and overmature) by 242 acres, including new permanent wildlife openings, maintaining 75.2% of MA 3.1 in closed canopy for HMU 207 and 208. This alternative would fall 298 acres short of the DFC for early-successional habitat and PWOs in HMUs 207 and 208.

Over the 20-year period from 1994 to 2014, Alternative 3 proposes to harvest the same amount of acres as Alternative 2. Regeneration resulting from even-aged harvest and natural disturbance during this time period would reduce the closed forest canopy by 286 acres, maintaining 74.8% of MA 3.1of HMU 207 and 208 in closed canopy. This alternative would fall 254 acres short of the DFC for early-successional habitat and PWOs in HMUs 207 and 208.

3.3 Recreation

Affected Environment for Recreation

Recreation resources within HMU 207 include the Landing Camp trail and a portion of the Killkenny Snowmobile Trail (Corridor 11) which runs adjacent to the Bog Dam road (FR 15). Within HMU 208, there are no hiking trails and the Corridor 11 snowmobile trails continues along the Pond of Safety road (FR 236)

The Analysis Area for direct and indirect effects on recreation is MA 3.1 lands within HMUs 207 and 208 since any effects to recreation are a direct result of activities associated with the proposed vegetation management. All the proposed harvest units are associated with a ROS (Recreation Opportunity Spectrum) classification of "Semi-Primitive Motorized" (predominately natural appearing environment with evidence of human users). The recreation experiences associated with this classifications allows evidence of motorized use, human activity and resource utilization associated with timber harvest (Forest Plan, pages III-34 & III-40). Timber harvest has occurred in the Project Area in the past and therefore the recreation experience is not expected to change.

The Analysis Area for cumulative effects on recreation includes all public lands within HMUs 207 and 208. The cumulative effects time period would span a period of ten years in the past to ten years into the future, which is the same as for vegetation, since any effects to recreation are a result of activities associated with the proposed vegetation management.

3.3.1 Direct and Indirect Effects on Recreation

Alternative 1: No Action Alternative

Alternative 1 would not alter current recreation opportunities. The vegetative landscape along Forest roads within the Project Area would remain unaltered by logging activity. Road and trail maintenance would occur at regularly scheduled intervals. Existing early successional habitat would mature over time and move into the young age class which would reduce hunting opportunities for certain game species.

Action Alternatives 2 and 3

There is one trail located within the analysis area, the Landing Camp trail which is approximately 1,700 feet from the closest proposed stand (14/40). This trail receives very little year round use and winter harvesting is not expected to impact hikers. Other recreationists, such as mountain bikers, swimmers, campers, hunters and sightseers who visit the area would not be disturbed by noise or dust created by hauling since harvest is limited to the winter months. By harvesting outside the peak recreational period (summer and fall), impacts to recreational users should be minimal.

To provide safety to recreationists who use the Bog Dam Road during the winter operating season, (snowshoeing and/or cross country-skiing), safety hazard signs and speed limit signs would be posted informing the public of ongoing logging activities.

Short-term effects from noise and traffic generated by harvest operations would not persist once operations were completed.

The action alternatives would establish early successional forest stands and expanded wildlife openings that would provide habitat and browse for certain bird and game species. Bird dog enthusiasts who use these areas would benefit by having greater opportunities to flush ruffed grouse from newly established forest openings. Game hunters and nature viewers would also benefit by the additional early successional habitat which attract wildlife such as moose and certain bird species.

3.3.2 Cumulative Effects on Recreation

None of the alternatives considered in detail in this document would change the recreation opportunities identified in the Forest Plan for the Project Area. When normal mitigation measures are employed, recreation activities and timber harvesting have co-existed, and can continue to co-exist without effects on recreation opportunities and public safety. Over the next 10 years, no additional timber harvest or other projects are anticipated on public lands within these HMUs, so no cumulative impacts are expected.

3.4 Visual Quality Objectives

Affected Environment for Visual Quality Objectives

The Project Area lies within the lower- to mid-mountain slopes ranging in elevation from 1,600 ft. to 2,400 ft. The landscape is characterized by a large expanse of hardwoods with lesser amounts of softwoods situated along streams and upper-mountain slopes. There are a variety of textures visible on the hardwood-dominated slopes resulting largely from past harvest and land clearing activities.

All areas within the Forest have been inventoried and assigned Visual Quality Objectives (VQO) (Forest Plan VII-I-2) based on guidelines established by the Forest Plan to evaluate planned changes to scenery. As vegetation over the landscape changes and our analysis becomes better defined due to advanced computer modeling, we can better evaluate the visual quality objectives for a specific area. The majority of the Project Area was originally classified as Variety Class B (Common, features with no outstanding visual quality) with a Sensitivity Level Rating of 1 (based on the high number of viewers to the view corridor/viewshed). This classification was based on topographic maps using a viewpoint taken from Route 110. Today, using a three dimensional terrain and vegetation model and taking into account the height of current vegetation along Route 110, the majority of the stands can not be seen from this viewpoint. The best viewpoint to see into the analysis area is atop Mount Crescent. Based on this viewpoint, the stands are classified as either Variety Class B (Common, features with no outstanding by visual quality) or Variety Class C

(features contain little variety by themselves or in combination) with a Sensitivity Level Rating of 3 (based on low use).

Seven viewpoints were used to analyze visual effects for HMUs 207 and 208; six were located on the Bog Dam Road and the other was atop Mt. Crescent. The views from these viewpoints comprise the **Analysis Area for direct and indirect effects on visual quality.** From these vantage points, there is evidence of past management practices on the Forest in the form of smaller openings from patch cuts and structural diversity from uneven-aged management.

The Analysis Area for cumulative effects on visual quality is the Upper Ammonoosuc Watershed seen from Mt Crescent within HMU 207 and 208. Mount Crescent, though three miles away, is the only accessible spot that provides a panorama view of the project area. Cumulative effects analysis will encompass past, present and future activities spanning the 20-year period from 1994 to 2014.

3.4.1 Direct and Indirect Effects on Visual Quality Objectives

Alternative 1: No Action Alternative

Alternative 1 would not make any immediate changes to the existing landscape, nor would it have any direct effects on visual quality on National Forest land. Over time, the landscape will change through natural mortality and disturbance (i.e. ice or wind storms).

Action Alternatives 2 and 3

The direct impacts of even-aged and uneven-aged management would result in short-term textural changes in the existing tree canopy as seen from the viewpoints. Even-aged management offers more textural change than uneven-aged management. The size, position, and design of clearcuts may possibly have some short-term direct effects on visual aesthetics, but these can be minimized by scattering the openings across the landscape, creating irregular shaped units and feathering the edges, and leaving groups of reserve and wildlife trees throughout the area. Some of the proposed clearcuts and permanent wildlife openings would be visible from Mt. Crescent and along the Bog Dam Road. Since there are existing clearcuts already visible, they would not represent a dramatic change to the landscape.

Single tree and small group selection treatments in uneven-aged stands would result in removal of 1/4 to 1/3 of the basal area. The stands would continue to appear natural, and would regain foliar density within a few years as forest floor vegetation grows back and tree canopies increase in size due to the added sunlight. In some instances, uneven-aged management may enhance visual quality by extending the view into the stand.

Based on the Forest Plan Visual Quality Guidelines, Table 10 displays the maximum number of acres that may be observed from a viewpoint for any one opening, either from a stationary observation or a vehicle oriented observation.

Table 10. Allowable Observed Acres of Individual Openings (Forest Plan Visual Quality Guidelines, observed from designated viewpoint)

VQO	Distance Zone	Stationary Observation (Acres)	Vehicle Observation (Acres)
Modification(PR)	Background	25	30
Partial Retention (PR)	Foreground	3	5
Modification (M)	Foreground	5	10

Table 11 compares for each of the action alternatives the number of clearcuts and PWOs acres visible from the seven view points with the most encompassing vistas of the Project Area. The acres seen from each viewpoint listed in the table are generated from a computerized visual analysis model and confirmed with on-site visits and photos. By designing irregularly shaped units and conforming to the topography, the Forest Service is able to minimize visual impacts while still optimizing wildlife habitat needs.

Table 11. Visibility of Clearcuts and Acres of Permanent Wildlife Openings (PWO) from Certain Viewpoints, Compared for Action Alternatives 2 and 3

View Point	Distance Zone	Visible From View Point (acres)	Alt 2	Alt 3
Crescent Mt.	**Background (PR)**	**Clearcuts** (17/57) (17/56) (18/4a)		
			17.4	17.4
			0	0
			NA	16.6
		Acres of PWO (18/23)	2.5	2.5
Bog Dam Road View 1	**Foreground (PR)**	**Clearcuts**	0	0
		Acres of PWO (18/38)	3	3
Bog Dam Road View 2	**Foreground (Modification)**	**Clearcuts**	0	0
		Acres of PWO (18/7)	5	5
Bog Dam Road View 3	**Foreground (M)**	**Clearcuts**	0	0
		Acres of PWO (14/50)	0	0
Bog Dam Road View 4	**Foreground (PR)**	**Clearcuts** (17/56) (14/61a) (14/38a)		
			0	0
			NA	5
			NA	5
		Acres of PWO	0	0
Bog Dam Road	**Foreground**	**Clearcuts**	0	0

View 5	**(M)**	**Acres of PWO** (17/23)	0	0
Bog Dam Road View 6	**Foreground (PR)**	**Clearcuts** (17/56) (17/57)		
			0	0
			0	0
		Acres of PWO	0	0

All of the proposed stands proposed for even-aged management would meet the Visual Quality Objectives for all analyzed viewpoints as outlined in the Forest Plan. Harvesting activities within stands 18/17, 18/38, 14/61 and 14/38 would be visible in the foreground from the Bog Dam Road.

Comparing the amount of acres visible for the two action alternatives, there would be an additional 16.6 acres of visible openings seen from Mount Crescent (stand 18/4a) and an additional 10 acres of openings (14/61a and 14/38a) seen from the Bog Dam Road under Alternative 3.

To minimize visual impacts, slash would be removed 50 feet from the road and reserve trees in clearcut units would be strategically placed to reduce the amount of opening visible. Within uneven-aged managed stands, any noticeably damaged small trees would be removed to minimize the visible evidence of the harvest.

3.4.2 Cumulative Effects on Visual Quality Objectives

Evidence of previous harvesting is visible across the landscape, both on the National Forest and on lands in other ownership. Past actions most likely resulted from natural disturbances and timber management. Within the Analysis Area, approximately 275 acres have been harvested within the last ten years. This includes 155 acres in clearcuts and permanent wildlife openings intended to establish early-successional habitat and 120 acres of shelterwood and overstory removal cuts that are not openings, but will appear as a difference in texture on the landscape. Along with the action alternatives, the cumulative visual effects would be a blend of new openings and areas of differing height and coloration, producing a mosaic effect of textures upon the landscape. Because these textures are seen from Mount Crescent, a distance of 3 miles, they tend to blend in and the various silvicultural treatments are less visually apparent.

Both of the action alternatives propose some level of clearcutting and would meet the Forest Plan standards and guidelines for visual quality for all viewpoints. Alternative 3 produces the greatest amount of visible openings upon the landscape as seen from Mount Crescent (54.5 acres) compared to Alternative 2 (27.9 acres). These additional openings create a greater diversity of textures and visual impact across the analysis area. No additional harvesting or other projects are planned in this area for the next ten years, so cumulative impacts to visual resources are expected to be well within the scope of those described in the Forest Plan.

3.5 Roadless/Wilderness Character

Affected Environment for Roadless/Wilderness Character

As part of the Forest Planning process, the White Mountain National Forest is required by law to conduct an inventory of lands within the National Forest that qualify as "roadless", and then to evaluate and consider these lands for recommendation as potential Wilderness areas. No stands fall within the 1986 and 2000 Roadless Area Inventory

Forest Plan Revision – New Roadless Area Inventory

For the ongoing Forest Plan Revision, the White Mountain National Forest has completed a new 2004 Roadless Area Inventory. This inventory reconsiders all lands on the National Forest for their Roadless Area potential, accounting for new land acquisitions, changes to the landscape since the last Forest Plan, and improved computer technology for evaluating areas. The new inventory includes 17 Roadless Areas totaling nearly 383,000 acres (excluding 114,000 acres of Wilderness). The new inventory expands the Kilkenny Roadless Area and a portion of the Lower Loop Project Area falls within the boundaries of the new Roadless Area, including stands 17/8, 17/53 and a portion of stand 18/20 (6 acres). A map of the new Roadless Area Inventory, including the Kilkenny Roadless Area, is available in the Project Planning Record.

The nearest congressionally-designated Wilderness Area to the Lower Loop Project Area is the Great Gulf Wilderness which is located about 7.2 miles from the nearest proposed harvest unit (17/8).

Roadless Characteristics

Roadless characteristics are quantitative and objective, and they determine whether an area may be considered for recommendation as Wilderness. The Forest Plan Revision Roadless Area Inventory applied roadless criteria to the White Mountain National Forest to determine which areas qualified for consideration for recommendation as Wilderness. Since a portion of the Lower Loop Project Area falls within the boundaries of the new Kilkenny Roadless Area, the effects of the project proposal on the roadless characteristics of this area will be analyzed. Not all of the roadless characteristics will be evaluated, since only some of these characteristics are affected by the Lower Loop project proposal.

The following roadless characteristics will be analyzed:

- To be roadless, an area must have less than a 0.50 mile (½-mile) of improved roads per 1,000 acres of National Forest.
- To be roadless, the percentage of an area that has had a regeneration timber harvest (clear cuts, seed tree cuts and shelterwood cuts) within the past 10 years must be less than 20%.
- To be roadless, the percentage of an area that has non-native tree plantations or permanent wildlife openings must be less than 15%.

- To be roadless, an area should have a core of solitude of at least 2,500 contiguous NF acres that is not impacted by motorized influences (and meets primitive or semi-primitive non-motorized recreation opportunity guidelines).

The 2004 Forest Plan Revision Roadless Area Inventory has determined that the Kilkenny Roadless Area includes 37,093 NF acres, with 3.7 miles of improved roads (a density of 0.10 mile per 1,000 NF acres). **The Analysis Area for direct, indirect and cumulative effects on roadless characteristics** is the Forest Plan Revision Kilkenny Roadless Area. The analysis considers the existing characteristics of the Kilkenny Roadless Area and how the proposed project, and any projects in the foreseeable future, may effect these characteristics. Since the Forest Plan Revision will make a determination on future management of the Kilkenny Roadless Area, the foreseeable future will include any potential activities between now and the implementation of the revised Forest Plan, anticipated to be early in 2005.

Wilderness Characteristics

Once an area has qualified as Roadless, it is evaluated in the Forest Plan Revision process to determine whether it should be recommended to Congress for Wilderness designation. Wilderness characteristics describe those attributes of an area that may or may not make it as a strong physical candidate for Wilderness. Each area is evaluated based on its physical characteristics, the resource trade-offs if it was to become a Wilderness, and demand for additional Wilderness for a particular area. The effects of the project proposal on the Wilderness characteristics of the Kilkenny Roadless Area will be analyzed. Not all of the Wilderness characteristics will be evaluated, since only some are affected by the Lower Loop project proposal.

The following Wilderness characteristics will be analyzed:

- Solitude or the degree to which an area provides visitors with a Wilderness experience. Analysis will consider short-term effects and any reduction in the core area of solitude as a result of the project proposal.
- Degree of Disturbance or the degree to which an area's natural appearance may be altered. Analysis will consider the effects of timber harvest and road restoration or construction.

Analysis of Wilderness characteristics may involve some of the same criteria as the roadless characteristics. However, a proposed project may not affect an area's designation as Roadless (because it would not change the quantitative criteria to a point the area would no longer qualify as Roadless), but it may still affect an area's Wilderness characteristics (because it may affect some change in solitude or degree of disturbance).

Consideration for Wilderness

The Forest Plan Revision process will determine the availability of a Roadless Area for consideration as a potential Wilderness. While the Lower Loop project may affect Roadless and/or Wilderness characteristics of the Roadless Area, it does not propose any activities that would make the Kilkenny Roadless Area unavailable for consideration as potential Wilderness in the Forest Plan Revision.

The Analysis Area for direct, indirect and cumulative effects on Wilderness characteristics is the same as for roadless characteristics. The time frame for cumulative effects will be the same, as well.

3.5.1 Direct and Indirect Effects on Roadless/Wilderness Character

Alternative 1: No Action Alternative

Alternative 1 proposes no timber harvest or road restoration or construction, and it would have no effect on the Roadless or Wilderness characteristics of the Analysis Area.

Action Alternatives 2 and 3

The 1986 Forest Plan permits up to 1,211 acres of regeneration harvest and 393 acres of wildlife openings on MA 3.1 lands within the Analysis Area. To qualify as a Roadless Area, the criteria permit up to 7,419 acres of regeneration harvest and 5,564 acres of wildlife openings within the Analysis Area, well beyond the scope of what is permitted by the existing Forest Plan. Within the Analysis Area, Alternative 2 proposes 60 acres of regeneration harvest and 19 acres of new wildlife openings and Alternative 3 proposes 104 acres of regeneration harvest and 19 acres of new wildlife openings. When added to the existing acres of regeneration harvest and wildlife openings identified in the Roadless Area Inventory for the Kilkenny Roadless Area, the acres proposed in each of the Action Alternatives fall well short of what is permitted by the roadless criteria (Table 12).

The roadless criteria would permit up to 18.5 miles of improved roads in the 37,092-acre Kilkenny Roadless Area. The inventory identifies 3.7 miles of existing improved roads. Alternative 2 does not propose any additional improved road and will remain well below the amount permitted by the roadless criteria (Table 12). Alternative 3 does not propose any additional improved roads in the Analysis Area.

The Action Alternatives would have limited effect on the roadless characteristics of the Analysis Area, and no effect on its eligibility as a Roadless Area. The Action Alternatives will add to the degree of disturbance in the Analysis Area, but they will not result in an irreversible or irretrievable change in the condition of the land or its capability as potential Wilderness.

3.5.2 Cumulative Effects on Roadless/Wilderness Character

There are no foreseeable projects that would have an effect on the eligibility of the Analysis Area as a Roadless Area nor result in an irreversible or irretrievable change in the condition of the land or its capability as potential Wilderness.

Table 12. Summary of Cumulative Effects on Draft Kilkenny Roadless Area

Roadless Characteristics	Draft Kilkenny Roadless Area		
Total Acres	**37, 093**		
Regeneration Acres			
Acres Allowed toRemain Roadless (20%)	7,419		
Acres Allowed by Current Forest Plan [1]	1,211		
Inventoried Regeneration Acres (0-10 yrs)	177		
Acres Added by Lower Loop Proposal	**Alt 1**	**Alt 2**	**Alt 3**
	0	8	8
Acres Added by Foreseeable Future Actions	0		
Improved Roads			
Miles Allowed to Remain Roadless	18.5		
Inventoried Miles	3.7		
Miles Added by Lower Loop Proposal	**Alt 1**	**Alt 2**	**Alt 3**
	0	0	0
Miles Added by Foreseeable Future Actions	0		
Permanent Wildlife Openings			
Acres Allowed toRemain Roadless (15%)	5,564		
Acres Allowed by Current Forest Plan [2]	393		
Inventoried Permanent Wildlife Opening Acres	10		
Acres Added by Lower Loop Proposal	**Alt 1**	**Alt 2**	**Alt 3**
	0	0	0
Acres Added by Foreseeable Future Actions	0		
Solitude			
Acres Allowed to Remain Roadless	2,500		
Inventoried Core Acres of Solitude	31,618		
Core Acres after Lower Loop Proposal (All Alternatives)	31,618		
Core Acres after Foreseeable Future Actions	31,618		

[1] Equals maximum allowed under current Forest Plan (10% of MA 3.1).
[2] Equals maximum allowed under current Forest Plan (3% of MA 3.1).

3.6 Soils

3.6.1 Soil Erosion

Affected Environment for Soil Erosion

The Lower Loop Analysis Area has soils common to the White Mountain National Forest. At elevations below 2,500 feet, which is the case in this proposed sale, the soils are deep, well and moderately well drained, fine sandy loam tills on 10-25% slopes. This location is too low on the landscape to have dry debris slides, which lead to mass movement of shallow, gravelly soils. It is low enough on the landscape to have deep soil slumps however, field and photo review indicate this soil hazard does not exist here. There are no harvest areas where the soil is shallow to ledge. Surface soil erosion is the only soil physical hazard for the Lower Loop timber sale.

The proposed sale area is a mix of northern hardwood and softwood ecological land types (ELTs). Ecological land typing is most useful for making decisions about what type of harvest system to use (even or uneven-aged management) and in what seasons harvesting can occur. On rich or semi-rich soils such as ELT 115G, sugar maple is the most desirable tree species to grow for high quality sawtimber. The preferred harvest system to emphasize sugar maple is uneven-aged management (individual tree and group selection cuts). Using even-aged management on these sites tends to replace some of the sugar maple with yellow birch and beech. Stands considered for even-aged regeneration harvests on these soils are stands 14/38, 14/61, 17/57, and 18/4. While our soil inventory also shows stand 17/56 and a portion of stand 18/20 as ELT 115G, field observations indicated that they were closer to an ELT 115C, and vice versa with stand 18/4. Ecological Type (ELT) 115C is a good site for growing northern hardwoods (sugar maple, yellow birch and american beech) but is not as rich as ELT 115G.

Surface soil erosion is always a concern, especially related to skid trails. Overall, soil erosion in eastern forests is not considered a problem when Best Management Practices (BMPs) are applied in a timely way (Martin and Martin 1994). Field monitoring on the White Mountain National Forest supports this conclusion (2000 Monitoring Report). All soils within the analysis area have a high surface soil erosion hazard relative to other soils on the White Mountain National Forest (Forest Plan, VII-F-3) and are suitable for frozen ground harvest.

Within the analysis area, roads and skid trails are the main concern for soil erosion because they may expose mineral soil (Patric 1976). The act of cutting trees is not a source of soil erosion because it does not expose mineral soil (Stone et al 1978). Permanent, all season roads in the Project Area are maintained to Forest Plan standards that help prevent concentration of water on the road surface. The Kilkenny Loop Road (FR 15) is an all season gravel road that is graded, ditched and the culverts maintained to safely disperse surface water. Forest Roads 2251, 178, 2244, 33, and 241 are frozen soil roads designed for winter use. Previously used haul roads and skid trails in the project area have re-vegetated or are becoming thick with saplings and have water-bars in place. There is no evidence of accelerated soil erosion on these skid trails or truck roads.

Existing log landings from previous sale activity are well located and stabilized, and do not show signs of soil erosion based on field inspection. They are not considered a significant source of soil erosion (Stone et al 1978), but may sometimes present concerns about soil compaction. However, research reveals that soil bulk density of landings returns to pre-harvest densities two to three years following harvest (Donnelly et al 1991).

The Analysis Area for direct and indirect effects on soil erosion is the National Forest lands within the project area designated as MA 3.1 in the Keenan Brook and Pond of Safety watersheds since all the proposed activities are located within this area.

3.6.1.1 Direct & Indirect Effects on Soil Erosion

Alternative 1: No Action Alternative

The direct effects for Alternative 1 may be localized soil erosion related to on-going maintenance of permanent, all season Forest roads. In the absence of activities such as timber harvesting, no surface soil erosion is expected with this alternative because there is no road construction, or re-opening, and no re-use of skid trails.

No indirect effects are expected from this Alternative. See water quality discussion for indirect effects.

Alternatives 2: Proposed Alternative

No accelerated soil erosion is expected on FR 15 because it is constructed to a standard that properly manages surface water, ditches and culverts are adequate, cut-banks are stabilized, and maintenance of all such facilities will occur before and during the life of sale activity.
Forest Roads Forest Roads 2251, 178, 2244, 33, and 241 will be restored. . These existing roads will be used for winter harvest and is not expected to lead to soil erosion. Proper closeout at sale completion would prevent soil erosion as has been the case to date. Winter use of the log landings will also not lead to soil erosion. When cleared of snow, and frozen, they are very durable. Also, the flat terrain where they are located helps prevent post-sale soil erosion, especially after they are waterbarred, and stabilized, as necessary, when harvest activity is complete.

Uneven-aged harvest cuts would be used on rich or semi-rich sites except for stand 17/57. This stand has a relatively sparse overstory and an established open understory. Opportunities to favor sugar maple using an uneven-aged harvest method are not feasible at this time because a mix of northern hardwood species is already established.

Indirect effects such as sedimentation of streams are the most likely indirect effect from road construction, use or skidding. See Water Quality (Section 3.7) for discussion.

Prescribed burning of the PWOs would occur either in late spring when the snow cover has melted or in late summer/early fall when temperatures have cooled. While some surface soil organic matter may be lost, actual experience does not indicate that prescribed burning affects rainfall infiltration rates. This is because most of the site continues to remain covered by organic matter and mineral soil aggregation is not changed. Soil nitrogen would be lost when organic matter burns, however, little of the organic matter is actually lost due to the low intensity of the fire and atmospheric deposition is contributing nitrogen to the soil.

Alternatives 3: Maximizing Regeneration Age Class

Direct and indirect effects for Alternative 3 would be similar to Alternative 2 with the exception that some rich or semi-rich sites would be clear cut in order to meet wildlife objectives. In addition to stand 17/57, this would include stands 14/38a, 14/61a and 18/4a. By using even-aged management within these stands, sugar maple would not be the favored species, but a combination of species such as sugar maple, yellow birch and beech would become established.

3.6.1.2 Cumulative Effects on Soil Erosion

The Analysis Area for cumulative effects of soil erosion is the Keenan Brook and Pond of Safety watersheds (Water Quality Section 3.7) which represents 11,600 acres of land. This area was chosen because it encompasses past and proposed activities. Three previous timber sales have occurred in these watersheds in recent times, and included even and uneven-aged harvesting on hardwood and softwood sites, and truck road and skidder use. No future timber harvests or other projects are planned in the foreseeable future. The time period for soil erosion cumulative effects is the last 10 years and 10 years beyond this proposed action. These periods were chosen to incorporate known past activities, and time for the proposed activities to occur and be completed.

Within the past 10 years, the Forest Service has harvested approximately 1,466 acres of timber, including 155 acres of clearcuts, 9 acres of final-stage shelterwood cuts, 53 acres of prep shelterwood cuts and 58 acres of overstory removal. Upon the completion of this project, no other projects are anticipated within this area that would utilize the roadways or skid trails in the foreseeable future.

Cumulative soil erosion impacts within the Analysis Area are generated primarily from past timber harvesting on public lands and road maintenance. Past harvest activities in the Analysis Area have contributed little to soil erosion due to the well and moderately well drained nature of the soils, natural re-vegetation of the road surfaces and use of Forest Plan Standards and Guidelines and Best Management Practices such as installation of water bars and road maintenance.

The cumulative effects for Alternative 2 would be the same as Alternative 3. There would be some cumulative soil erosion impacts from the proposed project, but overall the cumulative impacts are likely to be site specific, limited in magnitude and duration, and well within the scope of the effects anticipated and analyzed in the FEIS for the 1986 Forest Plan.

3.6.2 Soil Calcium

Affected Environment for Soil Calcium

Research at the Hubbard Brook Experimental Forest on the White Mountain National Forest indicates there is a concern about soil calcium loss from atmospheric deposition and timber harvest (Federer et al 1989). This may affect long-term forest productivity, health and

composition. Unlike the proposed action in this analysis, this study focused on intense (clear-cut, whole tree harvest) harvest applied at short intervals (40 years), not longer rotation forestry using bole-only harvest. Therefore, the magnitude of concern here is smaller. The 1998 National Acid Precipitation Assessment Program Report (NAPAP 1998) indicates that eastern hardwood ecosystems are not considered sensitive ecosystems, and that soil sensitivity is variable (NAPAP 1998).

In the past, soil erosion was the principal concern affecting forest soil productivity. The issue was loss of organic matter that harbors nutrients and helps maintain soil aeration. However, it has been found that soil organic matter is not lost from harvest sites, even those clear-cut, or those where all the tree boles, tops and limbs are removed (Johnson et al 1991; Johnson et al 1997). Instead, it is re-distributed in the upper mineral soil layers during harvesting. Also, it is re-supplied more quickly by root decay than it is lost by erosion or respiration.

Soils within the Project Area are deep and moderately or well drained fine sandy loam tills. There are no soils shallow to ledge, where soil productivity might be an issue due to limited soil volume. In general, soil calcium concentrations are at the highest amounts in this northern portion of the Forest. This is due to the mineralogy of the bedrock that contributed to the formation of these soils. In contrast, soils in Bartlett Experimental Forest in the southeastern part of the White Mountain National Forest have low calcium concentrations. Despite low concentrations, however, forest measurements since 1931 at Bartlett do not indicate a change in forest biomass accumulation trends (growth) over this long period of time (Nuengsigkapian, 1998). The same result was found when the study was expanded forestwide (Smith et al 2002). There is also no evidence of change in forest composition over time at Bartlett (Leak 1992), the idea being that changes in soil nutrition would lead to different mixes in forest composition. Forest health assessment on the White Mountain National Forest was part of a regional study, and it showed only limited dieback (Hallett et al. 2000). Dieback means some twigs or foliage has died or is discolored, which is not atypical in a maturing forest. A study is currently underway to assess forest health in northern hardwoods across a range of calcium concentrations on the White Mountain National Forest.

Past harvest (or other land uses) may be a cumulative factor in soil calcium nutrition. Early land use records indicate timber harvest in this vicinity was relatively light in the early 1900's (Goodale 1999). The actual harvest history, while known on large parts of the Forest, is not exactly known here, so we have to rely on what happened in the nearby vicinity. No agricultural uses were made of this land. Since the early 1900's, there has been conventional, bole-only forest harvesting in this area. This means the tops and limbs were left in the woods. Tree tops and limbs account for about 50% of the calcium that resides in a northern hardwood forest. As noted, whole-tree harvest is not proposed in the Lower Loop Sale. Where clear-cutting previously occurred, regenerated timber stands now show adequate stocking. This means there was sufficient nutrients (and other resources) to support a new stand. In fact, some believe calcium oxalate resides in the soil, and that it is released after clear-cutting because it becomes soluble when soil conditions are slightly more acid.

Soil calcium in the Project Area may have been affected by atmospheric deposition and early timber harvest practices. Based on research at Hubbard Brook, it is estimated that 5% of the total soil calcium may have been lost since 1950 when acid rain began in earnest (Federer et

al 1989). Using updated information that includes mineral weathering, this number can be reduced to about 2% (Fay 2003; Likens et al 1998). Land use records and timber stand age and composition suggest Lower Loop area was probably harvested in the early part of the 1900s, and that the stands were "lightly culled" (Goodale 1999). This would translate into about a 1% loss of soil calcium (Fay 1993). It is estimated, therefore, that about 3% of the total soil calcium may have been lost due to atmospheric deposition and timber harvest during approximately the past 50 years.

Finally, Lower Loop is part of a timber sale program for the entire Forest that has been in the range of 20-24 MMBF per year. This is about 1/3 of the biological potential of the current suitable timberland, meaning that current growth far exceeds harvest, and that overall, harvest interruption of the calcium cycle is relatively infrequent and widely spread. Second, our rotation lengths where clear-cutting is involved in northern hardwoods is approximately 120-years, which is not only consistent with silvicultural guides, but also, does not raise us to the level of concern sometimes expressed when rotation lengths are short, such as 40-years (Federer et al., 1989). And finally, there is no proposal, in this case, to practice whole-tree harvest; therefore, from the outset, approximately 1/3 of the calcium that might be removed during a timber sale remains on site for re-cycling into the ecosystem.

The Analysis area for direct, indirect and cumulative effects to soil calcium is the location of the actual harvest activities since site specific impacts related to soil or forest productivity are not likely to extend further.

3.6.2.1 Direct and Indirect Impacts to Soil Calcium

Alternative 1: No Action Alternative

Because timber harvest would not occur in Alternative 1, there would be no direct impact on soil calcium from harvest activity. Other than the ongoing cumulative effects of atmospheric deposition, the current supply of soil calcium would remain available to buffer the impacts of acid deposition. Research findings based on detailed modeling at Hubbard Brook indicate that soil calcium recovery from past harvest and acid deposition is possible (Likens and Bormann 1995).

Indirectly, retaining soil calcium may help to minimize possible impacts to forest productivity, species composition, or health that might result from future timber harvest or acid deposition. The consequence, based on current research, is that these forest qualities will likely remain unchanged (USDA Forest Service White Mountain Monitoring Report 2000, pp. 43-50). The only evidence of negative indirect effects in northern hardwoods is limited dieback of branches on trees within the sugar maple decline study sites located on the Forest (Hallett et al. 2000). This may not be directly linked to acid deposition, but the result of other factors, including the maturation of the forest. Some dieback is commonly found in many northern hardwood stands. Until the mechanisms are well known, it is very difficult to attribute changes in forest health to any single factor. In fact, changes in forest health are due to multiple factors, including not only soil calcium, but also, either drought or repeated insect infestations.

Alternatives 2 and 3

The harvest and removal of forest products takes away calcium that would otherwise be recycled to the forest floor. Clear-cut harvest by conventional bole-only harvest removes approximately 187 Kg/ha of calcium that equates to approximately 2% of the total soil calcium supply. Thinnings, single tree selection and group cuts removes 44 Kg/ha that equates to less than 1% of the total calcium supply in the soil. Estimated losses from softwood harvesting are somewhat less than from hardwoods The acres of clear-cut and single tree, thinning or group cuts at the Lower Loop Sale is shown below in Table 13.

Table 13. Acres of Clearcuts or Other Harvest Activity by Alt.

Method	Alternative 1 (Acres)	Alternative 2 (Acres)	Alternative 3 (Acres)
Clear-cut	0	87	131
Other	0	368	324

As a practical matter, indirect impacts are the same as the No Action Alternative. This is because soil acidification is driven largely by the impacts of acid deposition, not the harvesting of trees (Soloman et al 2003). Therefore, while there may be a subtle change in forest productivity, health or forest species composition, it is probably indistinguishable given the intensity and frequency of harvest for the Lower Loop area.

3.6.2.2 Cumulative Effects on Soil Calcium

The time span for this analysis is from early harvesting at the beginning of the 20th century to 10 years into the future, which is the reasonable planning horizon for public and private entities. Early harvesting is considered because land use history affects soil nutrients, including calcium. Future harvesting and atmospheric deposition are considered for the same reason. The Project Area is composed of second-growth hardwood forest, regenerated from around 1900.

Alternative 1: No Action Alternative

Past harvest and acid deposition up to the time of the proposed sale was estimated to lead to approximately a 3% loss of soil calcium over a 50 year period. Presuming a similar rate of acid deposition over the next 10 years, which actually may become lower due the impacts of the Clean Air Act, there would be an additional estimated loss of 1.6%. Therefore, the total cumulative loss over the period of this cumulative effects analysis is 4.6%.

Action Alternatives 2 and 3

The cumulative effect of calcium depletion on the stands proposed for harvest includes an estimated 1% (land use history) + 2% (acid deposition up to 2004) + 1-2% (proposed harvest) + 1.6% (future acid deposition) = 5.6-6.6% on those acres prescribed for clearcuts or seed tree cuts. In those cases when other methods are applied (e.g. single-tree, thinning,

small groups), the proposed harvest value would change from 2% to <1%, reducing the cumulative calcium depletion to <4.6-5.6%.

When contemplating these estimated cumulative impacts, it is significant to bear in mind that direct measurement of exchangeable soil calcium at Hubbard Brook Experimental Forest (Johnson et al 1997) has shown no change eight years after a whole-tree clearcut. In addition, a personal communication with the principal investigator indicates the same is true after 15 years, based on unpublished data (Johnson, 2004). It is believed by some that small watershed studies generally overestimate losses of base cations (Adams et al 2000). Furthermore, continuing studies may well diminish these estimates. In particular, current research on calcium oxalate, a previously un-quantified source of calcium, will likely further reduce the estimated impacts. Also, studies of feldspar appetite may have a similar impact. It appears, therefore, that these estimates will prove to be overestimates, and that they are not supported by direct measurement of the soil.

The cumulative effect on forest productivity, forest health and forest species composition is the same as those disclosed under indirect effects for Alternative 2. That is to say, no change is expected in the trend of biomass accumulation based on related studies at the Bartlett Experimental Forest (Nuengsigkapian, 1998), and forest-wide (Smith et al 2002). No change in species composition is expected based on long-term studies at the Bartlett Experimental Forest (Leak 1992). Forest health plots as part of a regional study indicate only limited dieback at the few plots on the White Mountain National Forest (Hallett et al 2000). This is supported by ongoing study of forest health plots across a range of calcium concentrations on the Forest (Fay 2003). This same study is also not revealing any changes in forest composition on northern hardwood sites; namely, sugar maple and beech are the most common species on these 80-120 year old stands, which is what would be expected on rich hardwood soils with stands of this age.

3.7 Water

3.7.1 Wild and Scenic Rivers

The proposed action and connected action would not change the potential "Scenic" classification eligibility of the Upper Ammonoosuc River. Forest Policy regarding eligible rivers is to manage the quarter mile corridor in a manner that does not threaten the eligibility, outstanding values, or potential classification of the river segment (USDA Forest Service 1986a, Forest Plan FEIS IX-D-2). Timber harvesting and transportation systems are allowed in areas considered eligible for scenic classification (Wild and Scenic River Act section 2(b)) as long as the forest appears natural from the riverbank. The visual appearance of the river corridor observed from the river would be unaffected from the action alternatives and connected actions due to existing vegetation acting as a visual buffer from the proposed harvest units.

3.7.2 Watershed

Affected Environment for Watershed

Lower Loop Timber Sale is located in the Keenan Brook and Pond of Safety watersheds (see Figure 1). Both watersheds are located in the headwaters of the Upper Ammonoosuc River. Their total acreage is approximately 11,600, and they comprise the analysis area for direct, indirect, and cumulative effects on water resources.

The watershed of Keenan Brook contains approximately 4,500 acres. It is aligned north to south with the outlet to the north. Stony Brook and two unnamed perennial channels enter Keenan Brook from the west. Four unnamed intermittent channels also enter Keenan Brook from the west. One unnamed perennial channel enters Keenan Brook from the east. The northern border of the watershed is located where Keenan Brook flows into the Upper Ammonoosuc River. To the south, the watershed is bordered by Pond Hill. The Keenan Brook watershed is a subwatershed of the Headwater Branches of the Upper Ammonoosuc River watershed.

The Pond of Safety watershed contains approximately 7,100 acres. It is aligned north to south with the outlet to the north. The headwaters of the Upper Ammonoosuc River begin at the Pond of Safety. One unnamed perennial channel enters the Upper Ammonoosuc River from the west. Six unnamed perennial and seven unnamed intermittent streams enter the Upper Ammonoosuc River from the east. The northern border of the watershed is located where Keenan Brook enters the Upper Ammonoosuc River. To the southeast, the watershed is bordered by Mount Crescent. The Pond of Safety watershed is a subwatershed of the Headwater Branches of the Upper Ammonoosuc River watershed.

Historic logging occurred within the Keenan Brook and Pond of Safety watersheds. Trees were logged from riparian areas and woody material was removed from streams. Subsequent flooding and scour added to these effects and resulted in portions of the watersheds with less than potential levels of woody material and loss of diverse channel and floodplain characteristics. There is no knowledge of fires occurring in these watersheds. Today, increased woody material contributes to the protection of stream banks, and creation of habitat for aquatic species.

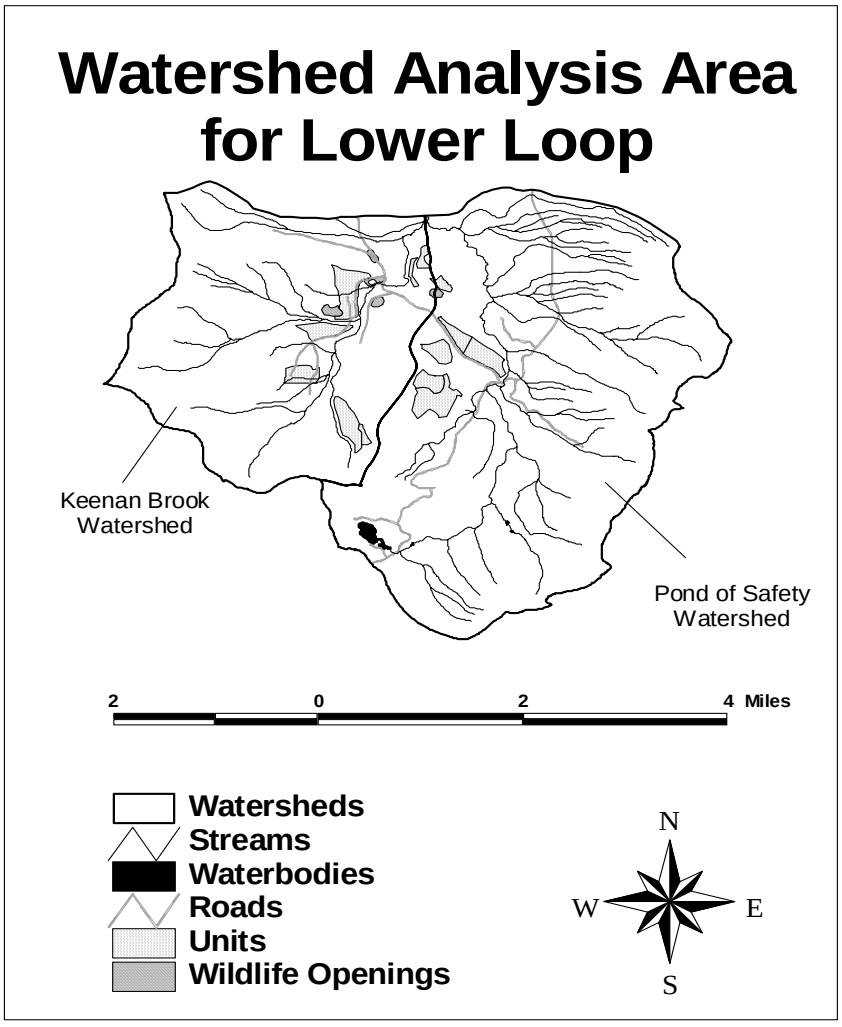


Figure 1. Watershed Analysis Areas for Direct, Indirect, and Cumulative Effects.

3.7.3 Water Quantity

Affected Environment for Water Quantity

Water quantity in streams in the proposed project area is largely related to the amount of precipitation that occurs throughout the year. Even though each summer evapotranspiration largely leaves the soil in variable stages of water content, the rains in the fall usually completely replenish this water. At Hubbard Brook, 62% of the precipitation becomes streamflow (Likens and Bormann, 1995) and most of the rest is lost to evapotranspiration. Some water probably makes its way to deep cracks.

Changes to vegetation can alter evapotranspiration rates which can lead to changes in streamflow. Hornbeck, et al (1993) summarize that reductions in basal area must approach 25% to obtain measurable responses in annual water yield. These increases became greatly

reduced 3-4 years after timber harvest, and became undetectable 7-9 years after harvest. Peak flows are often increased during the growing season immediately after cutting, but not of an extent to cause flooding. Most of the increase in water yield occurs during periods of low flow.

Potential existing changes to water quantity can be determined by looking at timber sales which have occurred in the watersheds within the past 10 years. The Bear Corner Timber Sale (1994), Pond of Safety Sale (1992) and Nuthatch Timber Sale (active) are located in the Pond of Safety watershed. Basal area reductions from these two timber sales do not approach 25% removal. Based on the research described above, it is unlikely that localized water yield increases are currently present within the Pond of Safety watershed as the result of previous timber sale activity. The Pond Hill Timber Sale (1996) is located in the Keenan Brook watershed. Basal area reductions from this sale do not approach 25% removal. It is therefore unlikely that localized water yield increases are currently present within the Keenan Brook watershed.

3.7.3.1 Direct and Indirect Effects on Water Quantity

Alternative 1: No Action Alternative

There would be no new direct or indirect effects of water quantity on channel stability from implementation of Alternative 1 (No Action). Streams and riparian areas would continue to function much in the same way as present. Forest Plan direction, Standards & Guidelines, and Best Management Practices would continue throughout the project area. Current and on-going management activities would continue, but no new federal management activities would be initiated. Changes, such as road maintenance, might occur through current management direction, natural processes, or other management decisions in the future.

Action Alternatives 2 and 3

The measure for changes in water quantity is the percentage (%) of the basal area removed in each delineated subwatershed of Keenan Brook and the Pond of Safety watersheds. These percentages are based on each unit's current basal areas and their predicted post-harvest basal areas. Timber sales which occurred within the last 10 years are analyzed along with the proposed alternatives. Where less than a 25% reduction in basal area is determined, no measurable increase in discharge is expected in the channel associated with those watersheds.

The basal area reductions in the Keenan Brook and Pond of Safety watersheds did not exceed the 25% threshold for any of the Action Alternatives (Table 14), even when combined with past harvesting. Riparian types in these tributaries are generally higher gradient and stable. The main stem of the Upper Ammonoosuc is a low gradient riparian type which is more susceptible to changes in water quantity. No measurable increase in discharge is expected in the channels associated with either watershed. Therefore, no channel adjustment related to an increase in discharge from the proposed timber harvest is expected at this scale, regardless of the channel riparian classification and type.

Table 14. Basal Area Removed in Smaller Subwatersheds, by Alternative

Watershed	Subwatershed	Stream Type	Percent of Basal Area Removed by Proposed Alternative			Percent of Basal Area Removed in Past 10 Years
			1	2	3	
Keenan Brook	Tributary 1	Perennial	0	5	5	1
	Tributary 2	Perennial	0	0	0	0
	Tributary 3	Intermittent	0	2	3	0
	Tributary 4	Intermittent	0	1	2	0
	Tributary 5	Perennial	0	1	1	0
	Tributary 6	Intermittent	0	10	16	0
	Tributary 7 – Stony Brook	Perennial	0	0	0	0
	Tributary 8	Intermittent	0	0	0	0
	Sideslope draining to main stem Keenan Brook	Perennial	0	2	3	1
Pond of Safety	Tributary 1	Intermittent	0	6	6	0
	Sideslope draining to main stem Upper Ammonoosuc	Perennial	0	2	2	2

In the Keenan Brook watershed, Tributary 4 appears to have been impacted in the past by road crossings. At the stream crossing of FR33, FR33A, and the intermittent stream, the roads have caused the stream to leave its channel, and form a new channel. Approximately 100-feet downstream of the roads, the tributary flows back into its original channel. For both Action Alternatives, this tributary would be moved back into its original channel in order to mitigate road impacts on channel stability.

Cutting near the stream channel has a larger impact on water yield than scattering the cutting throughout the watershed (Hornbeck, et al, 1993). As a result, buffer strips play a large role in preventing changes in water yield. Buffers around streams and riparian areas also protect the channels from indirect impacts by retaining large woody material adjacent to these areas. The buffers become a source for future recruitment of this wood to the streams, providing for intact structural elements on the stream banks of watercourses, and allowing riparian areas to be intact for more effective filtering of runoff. For Alternatives 2 and 3, a minimum 25 foot no-cut buffer and 75 feet- 70% crown closure would be placed around all perennial channels. Around intermittent streams, trees which provide stability to the stream banks would be retained as well.

In addition to the use of riparian buffers, keeping logging debris out of channels and riparian areas and felling trees away from streams also mitigate for impacts on channel stability. These mitigations would prevent the formation of unstable debris dams in the stream and

subsequent flooding. They also prevent trees from being dragged through a channel at a non-crossing site. Because the mitigations are expected to be implemented and effective regardless of the Action Alternative selected, direct and indirect effects to water quantity and channel stability are not expected to occur for either of the Action Alternatives.

Fire also has the potential to increase water quantity. As described above in regards to timber harvest, vegetation removal reduces interception and evapotranspiration, leaving more water in the soil than if vegetation had been undisturbed. If more water is supplied than can infiltrate and be stored in the soil, the excess water becomes overland flow. Overland flow not only has erosive potential, but could increase water quantities in nearby streams. However, the amount of increase in water quantity is dependent upon the intensity and severity of burning and the proportion of the watershed burned (Baker, 1990). Prescribed fires generally have lower intensities and severities than wildland fires. In addition, only 19 acres of wildlife opening are proposed in a 11,600 acre watershed. It is therefore unlikely that the prescribed burning proposed to maintain the wildlife openings would increase water quantity in the watershed.

3.7.4 Water Quality

Affected Environment for Water Quality

The State of New Hampshire designates surface waters in the Keenan Brook and Pond of Safety watersheds as Class A. There is no discharge of any sewage or wastes allowed into waters of this classification. In addition, Class A waters are considered potentially acceptable for water supply uses after adequate treatment. Surface waters in the Keenan Brook and Pond of Safety watersheds flow into Godfrey Dam and are used for municipal purposes. Recreationists who camp in the area may use the streams as a water source following treatment. At present, there are no surface waters listed as not meeting water quality standards in the Keenan Brook or Pond of Safety watersheds by the state of New Hampshire.

Under New Hampshire antidegradation provisions, waters of the National Forest are designated as "Outstanding Resource Waters" (ORW) and shall be maintained and protected (NHDES, 1996). These antidegradation provisions apply to all new and increased point and non-point source discharges of substances, including all hydrologic modifications and all other activities that would lower water quality or affect the existing surface waters of the State. This designation has higher water quality standards than Class A waters. Some limited point and nonpoint source discharges may be allowed, provided that they are of limited activity that results in no more than temporary and short-term changes in water quality. "Temporary and short term" means that degradation is limited to the shortest possible time. Such activities shall not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORWs. Such temporary and short-term degradation shall only be allowed after *all practical means* of minimizing such degradation are implemented. Best Management Practices (BMPs) as described in this report and other mitigations elsewhere in the EA represent 'all practical means' and would be used should an Action Alternative be selected.

Studies have shown that sediment from logging roads is evident during runoff events, even where BMPs are used (Patric, 1980; Likens, et al, 1970; Hornbeck et al, 1987). This indicates the importance of augmenting BMPs with Forest Plan Standards and Guidelines and site-specific mitigation measures to further reduce effects of sedimentation from roads and skid trails associated with timber harvest.

The EIS for the Forest Plan states, and experience with National Forest timber sale mitigations has shown, that sedimentation from roads, skid trails, and landings can be reduced to a negligible amount with the use of mitigations such as careful layout and construction, caution in wet and muddy conditions, and road closure. Minimizing the area of disturbed forest floor is a big step in controlling erosion and sediment movement into streams. This is accomplished by careful consideration of skid trail location, minimizing the number of skid trails, and avoiding steep slopes and wet areas. Other mitigations include the use of waterbars, avoiding operations during saturated and muddy periods, avoiding disturbance to stream channels, and winter harvest.

3.7.4.1 Direct and Indirect Effects on Water Quality

Alternative 1: No Action Alternative

There would be no increased direct or indirect effects on water chemistry, temperature, or sediment from implementation of Alternative 1 (No Action). The current condition would remain. Chemical water quality and temperatures would remain high quality and cold and would not violate water quality standards.

Action Alternatives 2 and 3

One measure of the magnitude of effects caused by sedimentation is related to amount of disturbance, which is an indicator of the area across which increased sediment transport could occur. This area can be measured by acres of ground disturbance resulting from skid trails and landings, and miles of pre-haul maintenance on existing roads. Table 15 summarizes these measures for comparison by alternative. Since Alternatives 2 and 3 vary only in the amount of clearcuts, ground disturbance due to landings, skid trails, and road maintenance does not vary between the two Action Alternatives.

Based on field observations by timber sale administrators on the White Mountain National Forest, the maximum ground disturbance by skid trails for units harvested in summer or fall is approximately 10% of the unit. For units harvested in winter only, it is 1% of the unit. All units proposed for harvest in the Lower Loop Timber Sale would be harvested in winter, minimizing ground disturbance in the watersheds.

Table 15. Summary of Water Quality Measures: Acres of Ground Disturbance from Landings, Skid Trails, and Pre-Haul Maintenance

Alt	Landings	Skid Trails	Road Restoration		Total Disturbance
	acres	acres	miles	acres	acres
1	0	0	0	0	0
2	3.5	5	2.6	4.4	12.9
3	3.5	5	2.6	4.4	12.9
NOTE: 1 mile of road at an average width of 14' = 1.4 acres of disturbance/mile					

Culverts would be installed along the haul roads for Alternatives 2 and 3. Although placement of the culverts in the stream channel would initially cause some disturbance, properly sized culverts that are capable of passing bankfull flows can minimize future stream crossing impacts. These culverts would be removed following sale closure.

Old wooden bridge abutments were left at the stream crossings along FR 33. These abutments are currently constricting the stream channels. When culverts are installed at these locations, all the old abutments would be removed and stream banks will be stabilized.

Skidder bridges would be constructed across Keenan Brook and the intermittent tributary which enters Keenan Brook from the east in order to move timber from compartment 17, stands 8 and 53 to a landing on FR 33. These panel bridges would span the banks of the channels and would be removed before spring runoff. Crossing locations were chosen jointly by a hydrologist and a forester. Keenan Brook is the only perennial channel to be crossed by skidders. One mapped intermittent stream would also be crossed by a skidder bridge.

The most effective factor for preventing sediment and nutrients from reaching a watercourse is a buffer strip (Gilliam, 1994). Trees adjacent to perennial streams would be retained, and trees would be felled directionally away from streambeds, where possible. Skid trails, including stream crossings would be laid out prior to harvesting, and Forest Plan Standards and Guidelines stipulate that skidding within 100 feet of a flowing stream would be limited to dry or frozen conditions, except on designated skid trails. In both of the Action Alternatives, harvesting would occur only in winter. Winter harvest is effective at reducing disturbance at smaller stream crossings because activities occur when the channel is frozen or snow-covered. Designated crossings are the only sites which may require restoration after the proposed activities are done. Most studies show that BMPs are effective at reducing or eliminating transport of sediments into watercourses (summarized by Stafford, et al, 1996).

Most effects related to roads reopening and skid trails are short term in duration through the use of the mitigation measures. However, the effect of elevated turbidity during storm events would probably remain. Skid road contributions would decrease to near zero as the skid trails revegetated and stabilized after use. Turbidity increases during storms related to permanent roads would probably continue to occur as long as the roads are in place. However, this effect would be mostly the same as what is occurring presently since no new road construction is proposed for Alternatives 2 and 3.

Maintenance of roads in relation to the proposed action would probably contribute to this effect since disturbance and use of the roadbed allows sediment to mobilize and be removed in subsequent rainfall events. This would be minimal since the roads would only be used under frozen conditions. In addition, since the increases in turbidity occur only during storm events when turbidities are naturally elevated, it is not likely these increases would have an effect on aquatic life, stream morphologies, or overall water quality in the watershed. This effect of sediment transported from the forest road system is currently being monitored through the forest wide water quality monitoring plan that takes annual samples across the forest to track numerous water quality parameters, including turbidity.

Prescribed burning is proposed to maintain the permanent wildlife openings. Potential effects of fire on water quality include increased sediment and turbidity, water temperature, and increased nutrients in streamflow. However, the magnitude of these potential effects after prescribed fire is less than those of wildfires since the prescribed fire is typically of low severity (Landsburg and Tiedemann, 2000).

Increased stream water temperature is a potential result of fire. This can occur if vegetation shading stream channels is removed. However, the wildlife openings proposed for burning would maintain buffers between the burns and stream channels. It is therefore unlikely that stream water temperatures would increase as a result of the proposed prescribed fire.

Nitrate and nitrite are the primary nutrients of concern from forest burning (Landsburg and Tiedemann, 2000). Research has shown that stream nitrate responses for prescribed fire are lower than stream nitrate responses in wildfire. In addition, research shows that unburned buffer strips between the streams and riparian areas and the area proposed for burning could minimize effects of fire on stream chemistry (Landsburg and Tiedemann, 2000). A vegetated buffer strip between all wildlife openings and stream channels should effectively filter nutrients before they reach a waterbody.

The most significant water quality response to fire is increased sediment and turbidity (Landsburg and Tiedemann, 2000). Both surface and rill erosion has the potential to increase following fire. This is due to the reduction of vegetative and litter cover that intercepts rainfall. Reduced cover causes the soil surface to become subject to raindrop impact. The increased erosion is related to the amount of vegetation removed. However, prescribed burns, by design, do not consume extensive areas of organic matter (Baker, 1990). Therefore, cool-burning prescribed fires have been shown to have little impact on erosion and sedimentation, whereas intense wildfires may have substantial impacts. Research has also shown that riparian vegetation traps sediment from side slopes that would otherwise enter the channel if riparian vegetation is not present (Brooks, et al., 1997). Since the wildlife openings proposed for prescribed fire have a vegetative buffer strip, it is unlikely that any increased erosion from the prescribed fire would reach flowing water.

The direct and indirect effects on water quality from the proposed Action Alternatives are anticipated to be small and temporary. The existing roads, landings, and skid trails within the project area provide an example of the condition that these facilities would be in several years following the sale if all the same standards and guidelines are followed as before. Skid trails and landings were visited by a hydrologist and were found to be vegetated and stable, showing little evidence of sheet or rill erosion. Water quality remains high in the watersheds.

In the project area, the proposed Action Alternatives would not violate the Outstanding Resource Waters standards, or the standards of Class A waters, as mitigations outlined in Appendix E would be implemented.

3.7.5 Cumulative Effects on Water Quantity and Water Quality

The cumulative effects area (CEA) for water resources is the Keenan Brook and Pond of Safety watersheds. This scale watershed was selected because it includes all the headwaters of the streams which flow through the proposed units, and at this scale the effects of multiple uses within the watershed could become additive and result in cumulative effects. As water flows downstream, pollutants are mobilized into the watershed, and changes in water yield and chemistry related to the project merge with other waters within the watershed. The outlet of the cumulative watershed boundary is the Upper Ammonoosuc River. This scale is large enough to integrate processes within the watersheds and gather the result to a single point at the outlet of each watershed.

Past and present activities (1994-2004) that occur in the cumulative effects area watersheds include timber sales, recreation including trails, road maintenance and use, and activities on private land such as developments and roads. Future activities (ten years forward) include the proposed action, additional activity in the private lands, continued recreation use, and ongoing road maintenance and use. Atmospheric deposition also occurs throughout the country, including the cumulative effects watersheds.

Water Quantity

The Bear Corner Timber Sale (1994) and Nuthatch Timber Sale (active) are located in the Pond of Safety watershed. The Pond Hill Timber Sale (1996) is located in the Keenan Brook watershed. In general, due to the limited nature of timber treatment practices, time between timber sales, and the use of BMPs, no measurable increases in water quantity are expected to be currently present in the watershed. Additions to water yield as a result of the Lower Loop Vegetation Management Project would not be visible in the CEA. This is because less than 25% of the basal area in the CEA watershed is proposed for removal in both Action Alternatives. The White Mountain National Forest has no timber sales planned in the CEA in the next ten years. Five permanent wildlife openings would be maintained through prescribed burning in this watershed. No additional prescribed burns in the CEA watershed are anticipated in the next 10 years. Therefore, no water quantity increases related to prescribed burns is anticipated to occur.

In addition, to protect against cumulative effects on water quantity from generation of additional runoff by timber harvest, the Forest Plan includes a standard and guideline that limits the amount of clearcutting in a 1,000-acre or larger watershed to 25% within a ten year period (LRMP p. III-17). None of the Action Alternatives would approach the 25% limit for clearcuts in either the Keenan Brook or Pond of Safety watersheds, even when combined with previous sales. Alternative 3 proposes the largest amount of clearcutting. Selection of this alternative would result in only 1% of the Keenan Brook watershed and 1% of the Pond of Safety watershed being harvested by clearcutting. The extent of clearcutting on private land in the Keenan Brook and Pond of Safety watersheds is unknown. However, if all of the

private lands within the watersheds were clearcut, the standard and guideline still would not be exceeded.

Since no changes in water quantity are anticipated in the CEA, it is also unlikely that changes in channel stability as an effect of increased water quantity would occur.

Water Quality

As discussed in the water quantity discussion, the Lower Loop Timber Sale does not propose to harvest large portions of watersheds. Research shows that watersheds treated with methods similar to those proposed in the alternatives did not exceed water quality standards for nitrate (Hornbeck, et al., 1973). Because of this, the removal of vegetation proposed in this sale through timber harvesting and prescribed fire is not expected to worsen the impacts of acid deposition on water quality.

Private lands constitute 2% of the cumulative effects area. At present, water quality and changes to runoff as a result of activities on private land are not causing the streams to exceed water quality standards. However, it is possible that future activities on this ownership could contribute to localized pollution effects if managed improperly.

As discussed previously, the Lower Loop road is likely contributing to some changes in the routing of water and sediment transport processes where present. Past, present, and future road activities on the forest are expected to continue in much the same way as present. Road density in the watersheds is generally low since the roads are spaced throughout an 11,600-acre cumulative effects area, for an average of 6.5 feet of road per acre. This road density would be reduced with the decommissioning of Forest Service roads. Future road activity on private land is unknown.

Cumulative effects related to past, present, and future recreational activities in the cumulative effects area have not been observed or detected. Recreation use in this watershed is largely limited to roads, hiking trails, and streams. About 18.9 miles of hiking and snowmobile trails are located within the cumulative effects watersheds, with an average density of 8.6 feet of trail per acre. The trails in the riparian area may be contributing to increased sediment loads into streams at localized areas despite mitigations such as water bars.

There is a low risk of cumulative effects on water quality, water quantity, or the condition of streams, riparian areas, or floodplains, in the cumulative effects area from the Action Alternatives, as these alternatives would create a small amount of new disturbance that would be mitigated. The mitigations are expected to be effective based on previous experience on the White Mountain National Forest, but no mitigation is 100% effective. By using multiple mitigations, impacts are reduced to negligible or easily recoverable.

3.8 Air Resources

Affected Environment for Air Resources

The proposed Lower Loop Vegetative Management Project is located within the White Mountains airshed, which is the body of air which lies over the forest. The project area is located in the valleys of Keenan Brook and the Pond of Safety. Regional winds move from west to east. Local winds are dominated by mountain valley dynamics interacting with large-scale atmospheric movements.

Emissions in the air or air pollution that occurs in the airshed are mostly related to regional sources as well as local sources of vehicle emissions and dust from roads. Fire contributes particulates and carbon monoxide to the air. Dust from roads contributes particulates. Automobile emissions are associated with carbon monoxide, hydrocarbons, nitrogen dioxide, and lead. While in the presence of sunlight, some of these pollutants combine to form ozone.

None of these air pollutants currently exceed New Hampshire or federal ambient air quality standards except for short time periods from wood stoves, wildland fires, and prescribed fires. On occasion, ground-level ozone in the area exceeds air quality standards. This occurs mostly in summer months due to weather and air flow, and is not frequent enough for the area to be categorized as a nonattainment area. Wildland and prescribed fire do not occur in the area at a large scale. Most fires in the White Mountain National Forest are less than 5 acres in size. However, on occasion wild fires have exceeded 100 acres in size.

The Analysis Area for direct and indirect effects is the Keenan Brook and Pond of Safety Airsheds which is approximately 11,600 acres of private and public lands. This area was chosen because the potential effects to air quality generated by any of the proposed activities are likely limited to those areas of operation within the airshed are not expected to extend any further. These airshed boundaries are the same as the watershed boundaries described in the water resources report. The ridges within this airshed form a boundary to local air pollution effects by blocking movement of pollutants, while the pollutants are transported in the valleys.

3.8.1 Direct and Indirect Effects on Air Resources

Five existing wildlife openings in the airshed total approximately 13 acres in size and are currently being maintained by prescribed burning. The primary source of concern for air quality from the proposed project is the expansion of these wildlife openings to a total of 32 acres. These 32 acres would be maintained in the future by prescribed burning. This is considered a permissible open burning activity by the state of New Hampshire (NHDES, 2004a). The major pollutant of concern in smoke from fire is fine particulate matter, both PM10 (particulate matter less than 10 microns in diameter) and PM2.5 (particulate matter less than 2.5 microns in diameter); (USFS, 2002). Carbon monoxide (CO) concentrations also increase as a result of smoke emissions.

An additional concern to air quality is the use of heavy equipment and gas-operated tools during timber harvest and road maintenance operations. Emissions from motor vehicles, heavy equipment, and gas-operated chainsaws could directly affect air quality in the project area. The most significant emissions from diesel motors used to operate heavy equipment and some motor vehicles are nitrogen oxides (NO_x) and particulate matter (PM), both of which contribute to public health problems in the United States. NO_x emissions from diesel vehicles play a major role in ground-level ozone formation that is most problematic in summer months.

Alternative 1: No Action Alternative

No activities are proposed and no additional emissions are expected to take place in the project area, beyond what occurs now. Thirteen acres of permanent wildlife openings would continue to be maintained through prescribed fire. Forest Service classified roads would continue to receive their scheduled level of maintenance. Vehicle use would continue in the project area. These existing emissions are currently contributing to the air quality condition described in the affected environment as well as the larger scale air quality issues discussed in the cumulative effects section of this report.

Alternatives 2 and 3

Prescribed fire causes increased emissions of CO, PM2.5, and PM10. All of these air pollutants are regulated under NAAQS. However, increases in these emissions are short term and localized. As of 2002, prescribed fires were not considered to be a significant cause of nonattainment of NAAQS (USFS, 2002). In addition, the current wildlife openings are maintained by prescribed fire and this has not caused nonattainment of NAAQS. It is therefore unlikely that increasing the prescribed fire in the airshed by 19 acres would cause nonattainment of NAAQS for these parameters.

The direct effect of timber harvest and road maintenance activities proposed in the Action Alternatives is the emission of NO_x and particulate matter resulting from the use of heavy equipment, diesel-operated motors, and gas-operated chainsaws and other tools, as well as dust from roads. However, because of the limited duration of operation of this emission-generating equipment, it is unlikely that the proposed operations would exceed the NAAQS. Ground level ozone is worst during summer months, so fall or winter harvest would minimize this effect so that ozone is unlikely to form at elevated levels as a result of the proposed activities. The Lower Loop Vegetative Management Project proposes only winter harvest, further minimizing air quality impacts.

3.8.2 Cumulative Effects on Air Resources

The cumulative effects area (CEA) for air quality includes the Keenan Brook and Pond of Safety airsheds because the potential effects to air quality generated by any of the proposed activities are likely limited to those areas of operation within the airshed, and they are not expected to extend any further. These airshed boundaries are the same as was described in the direct/indirect effects section of this report.

Timber harvesting has occurred within the Project Area in the past ten years. The White Mountain National Forest currently has no timber sales planned in the CEA within the next ten years. Permanent wildlife openings would be maintained through prescribed fire.

No recreation projects, other than routine maintenance, have occurred throughout the CEA. No additional Forest Service recreation projects beyond routine maintenance are expected to occur in the cumulative effects area in the next decade.

Private lands constitute 2% of the cumulative effects area. No mapped roads exist on these small patches of private land, and activities on this land are unknown.

Many of the cumulative effects to air quality occurring in the White Mountain National Forest come from upwind, thousands of miles away in the Midwest. Large coal burning plants and other industrial emission sources contribute oxides of sulfur and nitrogen that have resulted in acid rain. Some large sources within the state and region also contribute to these effects.

The New Hampshire Department of Environmental Services has reported that there are no stationary sources of air pollution within the cumulative effects area (NHDES, 2004b).

Alternative 1: No Action Alternative

No local emissions related to the proposed action would occur. The existing condition and trends as described in the affected environment would remain much the same. The same activities that currently are occurring on the CEA would continue to occur. Future vehicle emissions may increase if more visitors come to the White Mountain National Forest. This would contribute to ground level ozone when conditions are suitable. Thirteen acres of permanent wildlife openings would continue to be maintained through prescribed fire. Cumulative effects would continue to occur with the same trends.

Alternatives 2 and 3

The Action Alternatives would result in the same emission-producing activities as was discussed in the direct and indirect effects section of this report. None of these emissions are expected to contribute to existing cumulative effects already present in the cumulative effects area. This conclusion is reached because, as discussed in the direct and indirect section of this report, the emissions related to the Action Alternatives are expected to be local to the project area and of limited extent. These limitations are due to the limited duration of these emissions. Effects of activities both on and off Forest Service lands are not expected to cause NAAQS to be exceeded within the time frame analyzed.

3.9 Fisheries

Affected Environment for Fisheries

Historic logging practices likely had an adverse effect on instream habitat conditions in New Hampshire (Taylor et al. 1996). Over time, instream habitat has improved and stream inventories conducted across the White Mountain National Forest indicate that most streams have suitable instream habitat required by eastern brook trout (*Salvelinus fontinalis*). However, there continues to be a lack of habitat diversity, with the percentage of pools far lower than recommended guidelines (USDA Forest Service 1996).

The Analysis Area for direct and indirect effects on fisheries includes the Project Watersheds described in Section 3.7, Water. Most of the perennial streams in the Analysis Area are first and second order and are located on moderate to moderately-steep slopes. **The Analysis Area for cumulative effects on fisheries**, as well as the temporal scale of 1994 to 2014, is the same as the CEA described in Section 3.7, Water. For the Proposed Action and its alternatives, effects to fisheries are similar to those for water quality and quantity.

Eastern brook trout have been monitored at nine sites across the Forest since 1992. Young of the year were present at all sites in all years, indicating that trout are well distributed across the Forest and producing young. None of the sites showed increasing or decreasing densities over the sampling years. Data was collected on the National Forest from 1992-1999 and a report generated that concluded the data "did not show any evidence that land use activities are influencing fish populations perhaps due to the larger influence of other environmental factors such as floods or mild winters" (USDA Forest Service 1999). This data suggest wild brook trout populations are viable in all the major watersheds of the White Mountain National Forest (USDA Forest Service, 2001).

Past stream inventories recorded presence of brook trout in all first and second order streams in the Analysis Area. Young of the year were observed in some of the streams in the Analysis Area, indicating spawning habitat is present. State of New Hampshire records show that brook trout are stocked in the Upper Ammonoosuc River on an annual basis. Brook trout are the Management Indicator Species for lakes, ponds, and stream habitat on the White Mountain National Forest. Based on this information, it is assumed that brook trout and a variety of other fish species and aquatic invertebrates inhabit the perennial brooks in the Analysis Area.

Important factors for maintaining quality brook trout habitat include cool continuous flowing water, unimpeded travel upstream and downstream, clean gravels for spawning and egg incubation, clear waters during the growing season, instream cover, adequate food supply, high quality headwater streams, and suitable riparian habitat. The desired condition for fisheries resources for all of these streams is to meet Forest Plan Standards and Guidelines for water quality, riparian, fisheries, and aquatic habitat management (Forest Plan III-15 a-d, -16, -19, -20).

3.9.1 Direct, Indirect and Cumulative Effects on Fisheries

Direct and indirect effects to fish habitat result from sedimentation related to temporary road construction, road restoration, stream crossings, skid trails, culvert and bridge replacement, tree felling and landings. Increased turbidity in streams during any of these activities is a direct effect that could cause fish and other aquatic life to move temporarily from the area, where possible. Sedimentation is an indirect effect that is described in detail in Section 3.7.2. The mitigation measures (Appendix C) and Forest Plan Standards and Guidelines that would be employed to diminish or eliminate the impacts of sedimentation on water quantity and water quality are the same that would be employed for fisheries. In particular, maintaining 70% crown closure in a 100-foot riparian strip adjacent to perennial streams (as recommended by the Society for the Protection of New Hampshire Forests, 1997), should prevent increased sedimentation to the streams, protect the soils infiltration capacity, maintain shading to minimize any increases in water temperature, and provide for large woody debris recruitment.

Cumulative effects to fisheries are the same as for water quantity and quality (Section 3.7.3). Maintaining large trees adjacent to streams may improve future instream habitat diversity in these streams by promoting recruitment of large woody debris necessary for pool formation (Likens and Bilby 1982). More habitat diversity provides more refuge during floods, helping to stabilize brook trout populations (USDA Forest Service 2001).

3.10 Wildlife

Issues Related to Wildlife:

- Increasing the acreage of clearcuts in the Project Area to achieve DFC for early successional species for HMU 207 and 208

3.10.1 Wildlife Habitat

Affected Environment for Wildlife Habitat

When comparing the DFC for both even and uneven-aged acres by community type in HMU 207, the overall acres of northern hardwoods are close to desired levels, aspen exceeds desired levels, and paper birch, spruce-fir, and permanent wildlife openings fall well short. When comparing the DFC for both even and uneven-aged acres by community type in HMU 208, the overall acres of northern hardwoods are above the desired level; but paper birch, aspen, spruce/fir, and permanent wildlife openings fall well short. With regard to DFC for age class, there is a lack of regenerating stands for all habitat types in both HMUs. Within HMU 207, there is an abundance of overmature northern hardwoods, aspen, and spruce/fir and a lack of overmature age class for paper birch. Within HMU 208, there is an abundance

of overmature northern hardwoods and aspen, and a lack of overmature age class for all other community types. (Tables 16 and 17)

In the higher elevations (above 2,500 feet) of both HMUs, no vegetative management is permitted. Within HMU 207, these higher elevation lands comprise nearly 601 acres and contain mature and overmature northern hardwood, mixedwood, paper birch, and spruce/fir. Within HMU 208, these higher elevation lands comprise nearly 1,860 acres and contain young, mature, and overmature northern hardwood, mixedwood, paper birch, and spruce/fir.

The Analysis Area for direct and indirect effects on wildlife habitat is the managed portion (MA 3.1) of HMUs 207 and 208, since this is the portion of these HMUs in which habitat objectives have been established in the Forest Plan. **The Analysis Area for cumulative effects to wildlife habitat** will include all lands in HMUs 207 and 208. An HMU is a building block for the larger wildlife habitat management goals of the 1986 Forest Plan. When vegetative management activities fall within the DFC for a given HMU, the effect cumulatively is that the given HMU contributes to the larger wildlife habitat goals for the National Forest. Non-managed National Forest lands within the HMU boundaries are considered when analyzing cumulative effects to determine if there are activities taking place elsewhere in the HMU that may affect wildlife habitat. The temporal scope for considering cumulative effects on wildlife habitat is ten years in the past and 10 years in the future. This 20-year time period was chosen because the benefits of regenerating stands diminish after 10 years for some wildlife species.

3.10.1.1 Direct and Indirect Effects on Wildlife Habitat

Alternative 1: No Action Alternative

There would be no direct or indirect effects from timber harvest and road restoration activities, such as openings in the forest canopy, residual tree damage, snow or soil compaction, or noise from logging or road equipment. Openings in the forest canopy would result from mortality of individual trees or disturbance from some other natural event (storm, fire, infestation, etc.).
Existing permanent wildlife openings would continue to be maintained through mowing or prescribed burning every 3 to 5 years. Direct effects of fire, mowing, or stumping permanent wildlife openings on wildlife may vary for different species and conditions (Anderson 1994). In general, while some evidence of vertebrate mortality has been reported, the most common opinion is that vertebrates are rarely killed in fires. (Lyon et al. 1978). Mowing or stumping may eliminate soft mast, such as raspberries, or other herbaceous vegetation for one season.

Alternative 2: Proposed Action

Active timber harvest operations and connected actions, such as road restoration increases short-term human access to the Project Area. When operations are active, negative effects could include displacing wildlife, including nesting birds, or altering travel corridors or mobility of some species, including amphibians, small and large mammals. Beneficial effects of harvesting could include increased mobility for some species on snow compacted by skidder traffic, and additional browse for wildlife from residual treetops scattered on the ground.

In units with a clearcut and seed tree cut prescription, site conditions on the forest floor would be hotter and drier for about 2 to 5 years after cutting with increased decomposition of leaf litter (Fay et al. 1994). This could adversely affect some species of amphibians, such as red-backed salamander (DeMaynadier and Hunter 1998). Individual salamanders in large unshaded openings would not likely survive. Amphibians and small mammals in clearcuts also might be more vulnerable to predation. This would be partially mitigated by leaving reserve patches of trees throughout these units.

The season in which a unit is harvested may directly affect wildlife, especially during critical times of a species' life cycle. Certain species could be affected by winter harvest (December through March). Some species, including owls, breed in winter. White-tailed deer gather, or "yard", in areas of lowland conifers in the winter, where cover and warmer temperatures provide protection from the elements, and where they would also be vulnerable to disturbance during this time of year. Species, which utilize cavities in winter, such as chickadees and nuthatches; or species which den, such as squirrels and raccoons, could be affected if roost or cavity trees were harvested. Raptors start to breed in February, with young fledging in June and July (Society for the Protection of New Hampshire Forests 1997), so they could be affected by both winter and summer harvest.

In proposed clearcut and seed tree cuts, there would be a lack of larger dead and down wood (>11" DBH) between 10 and 60 years. Residual trees in all other harvest units would continue to supply a component of standing and down woody material as trees die, branches break, and annual litter buildups on the ground. Forest Plan Standards and Guidelines, as well as mitigation measures described in Appendix D, would retain wildlife trees in harvest units for future large cavity trees and dead/down wood. This, in conjunction with the abundance of mature habitat within the managed and unmanaged portions of these HMUs, should ensure that an adequate amount of cavity trees and dead and down wood is available for wildlife associated with these habitat features.

No whole tree harvesting would be allowed in any units. Whole trees would be dragged to the landing, limbed, and the tops dragged back in the woods. This practice would provide a one time input of treetops and branches. Some species such as moose and white-tailed deer could make use of this browse during the winter months.

Northern hardwoods and paper birch regeneration age class

The proposed clearcut and seed tree prescriptions for these stands would benefit species associated with shrub layers, herbaceous ground vegetation, soft mast, and minimal overstory components. Up to 150 species will use northern hardwood regeneration habitat for all or part of their life cycle (DeGraaf et al. 1992, DeGraaf and Yamasaki 2001). Early successional paper birch is used by approximately 150 species of wildlife (DeGraaf et al. 1992).

Northern hardwoods or softwoods rapidly replace the paper birch and aspen component in a forest unless there is frequent disturbance. Clearcutting has been shown to be the best method to regenerate and establish paper birch and aspen (DeGraaf et al. 1992, Perala and Russell. 1983, Safford 1983).

Mature Northern Hardwoods, Mixedwoods, and Spruce/Fir

The individual tree and group selection harvests proposed in the Project Area would maintain the mature character of the existing stands. These treatments would remove some mature trees and release the understory to create more vertical structure and layers.
All of these treatments would create disturbance and open the canopy to partial sunlight. There would be minor changes to shading of the forest floor. The result would be to diversify stand structure and increase understory vegetation and browse availability for wildlife. Mast trees such as beech would be able to develop larger crowns. Over time the existing softwood component within some of these stands might be increased.

Permanent wildlife openings

The initial effects of expanding the permanent wildlife openings would be similar to those described for creating regeneration northern hardwoods habitat. Over time, these wildlife openings would be stumped and then maintained every three to five years through prescribed burning or mowing. Prescribed burning would occur during April and early May prior to breeding season for most birds. Burning would occur only during certain weather conditions described in an approved prescribed burn plan. This should minimize the potential of displacing nesting birds, as most birds don't start to nest this early in the spring. Mowing would occur during dry site conditions between late August and November. This also would minimize disturbance to nesting birds as most birds finish nesting in July. It is expected that these treatments would increase the percentage of grass and forb in these openings providing a source of browse, hiding cover, and nesting habitat for some species of wildlife. Newly created permanent wildlife openings would be seeded with winter rye until revegetated by native plants.

Alternative 2 has 44 fewer acres of even-aged regeneration harvest than Alternative 3. This reduced even-aged means Alternative 2 would have less impact on amphibians and small mammals vulnerable to increased sunlight and predation in temporary openings than Alternative 3. Alternative 2 would meet less of the Forest Plan wildlife habitat DFC for HMUs 207 and 208 than Alternative 3, proposing 10 fewer acres of northern hardwoods regeneration in HMU 207 and 34 fewer acres of northern hardwood regeneration in HMU 208.

Alternative 3: Maximizing Regeneration Age Class

Alternative 3 would have the greatest impact on amphibians and small mammals vulnerable to increased sunlight and predation in temporary openings, since it proposes the most even-aged regeneration harvest (112 acres) in addition to expansion of five wildlife openings (19 acres). Alternative 3 best meets the objectives of the Forest Plan for wildlife habitat within HMUs 207 and 208 (Tables 16 and 17).

Table 16. Summary of Wildlife Habitat Objectives for HMU 207 that would be accomplished by Action Alternatives

	Community	Northern Hardwoods		Paper Birch		Spruce/Fir		Wildlife Openings	
HMU 207									
Regeneration Age Class	**Existing**	66		0		0		5	
	Desired	123		35		37		106	
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	66	76	0	0	0	0	8	8
Young Age Class	**Existing**	754		0		0			
	Desired	431		156		93			
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	765	765	0	0	0	0		
Mature Age Class	**Existing**	707		0		91			
	Desired	554		122		205			
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	693	683	0	0	91	91		
Overmature Age Class	**Existing**	177		50		84			
	Desired	123		35		37			
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	177	177	50	50	84	84		
Uneven-Aged	**Existing**	743		0		275			
	Desired	814		0		329			
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	743	743	0	0	275	275		

Table 17. Summary of Wildlife Habitat Objectives for HMU 208 that would be accomplished by Action Alternatives

	Community	Northern Hardwoods		Paper Birch		Spruce/Fir		Wildlife Openings	
HMU 208									
Regeneration Age Class	**Existing**	90		0		0		23	
	Desired	184		52		56		207	
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	150	184	8	8	0	0	39	39
Young Age Class	**Existing**	1207		0		0			
	Desired	644		234		138			
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	1207	1207	0	0	0	0		
Mature Age Class	**Existing**	1516		0		39			
	Desired	827		182		3058			
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	1508	1498	0	0	39	39		
Overmature Age Class	**Existing**	489		0		16			
	Desired	184		52		56			
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	456	432	0	0	0	0		
Uneven-Aged	**Existing**	3075		0		570			
	Desired	2442		0		984			
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**
	Acres after harvest	3032	3032	0	0	570	570		

3.10.1.2 Cumulative Effects on Wildlife Habitat

Alternative 1: No Action Alternative

Mature and overmature northern hardwoods, in even-aged and uneven-aged stands, dominate the Analysis Area, and they would continue to do so in this Alternative. Those stands currently in a regeneration age class as a result of even-aged timber harvest or natural disturbance over the past 10 years, will have aged into young saplings over the next 10 years, and lost some of the attributes that make them beneficial to wildlife as early-successional habitat. With no timber harvest anticipated on National Forest lands within the Analysis Area over the next 10 years, the cumulative effect of Alternative 1 on MA 3.1 lands would be the loss of age, tree species and structural diversity. This alternative would continue to fall short of meeting the need for maintaining diversity for the full range of wildlife species that inhabit the National Forest, and show an overall decline in the regeneration age class. Early-successional habitat types such as paper birch and aspen would still be present in 10 years, but they would have matured and possibly begun converting towards northern hardwoods or softwood types.

Dead or dying trees or small groups of trees may continue to fall to the ground and open limited portions of forest floor to sunlight and regeneration.

Action Alternatives 2 and 3

Alternative 2 would continue to fall short of the DFC for regeneration age class for all community types in both HMUs. Alternative 3 would also fall short of the DFC for regeneration age class for all community types with the exception of northern hardwoods regeneration age class in HMU 208. Each HMU would continue to be dominated by mature and overmature northern hardwoods. Roads would be gated to vehicular access upon completion of any proposed timber harvest, so none of the Action Alternatives would likely cause an increase in effects to wildlife from interaction with humans beyond that which already exists.

There are concerns that even-aged harvest methods may fragment existing mature habitat and cause forest interior birds, such as wood thrush to be more vulnerable to increased predation from nest predators such as brown-headed cowbirds, blue jays, red squirrels, and raccoons. However, research has found no evidence of the negative aspects of forest fragmentation exhibited in isolated forest environments in large forested areas where active timber harvesting occurs (Askins et al. 1990, Askins 1993, DeGraaf and Healy 1988, Thompson et al. 1992, Yamasaki et al. 2000). The White Mountain National Forest and most surrounding private land are well forested. Suitable habitat for forest interior wildlife species, such as wood thrush, should be maintained under these alternatives. Effects of timber harvesting on wildlife are in large part mitigated by application of Standards and Guidelines listed in the Forest Plan in Chapter III and in Chapter VII, pages 18 –22 of Section B, and the Forest Plan Amendment (USDA Forest Service 2001c and 2001d), as well as specific mitigation measures described in this section.

3.10.2 Management Indicator Species and Other Species of Concern

Affected Environment for MIS and Other Species of Concern

Regulations developed in 1982 to implement the National Forest Management Act directed National Forests to identify **Management Indicator Species (MIS)** to monitor the effects of management activities on wildlife habitat. The White Mountain National Forest Plan selected Management Indicator Species that showed "a strong indication of an existing or definable population-habitat relationship"; appeared, as a group, "to cover the range of habitat conditions" found within the National Forest; and "whose population changes are believed to be a result of management activities". The Forest Plan selected MIS for representative community types on lands with and without active vegetation management and for endangered and threatened status. A full discussion of MIS, how they were selected, and how they relate to management activities can be found in Appendix B of the Forest Plan (VII-B, pp 1-28).

Monitoring guidelines for wildlife are found in the Forest Plan (Chapter IV-12). Habitat condition and MIS are monitored Forest-wide, with results compiled and evaluated in annual Forest monitoring reports (USFS 1993, 1994, 1995, 1996, 1998, 1999a, 2000a).

Table 18 identifies MIS on the National Forest and whether the indicator habitat occurs or has potential to occur in the Project Area. **The Analysis Area for direct and indirect effects on MIS** is the Project Area, which includes stands proposed for some type of vegetative management, as well as the area associated with connected actions (roads, landings and PWO maintenance). Representative indicator community types exist or have potential to exist in the Project Area for ten of the twenty-five MIS: chestnut-sided warbler, Northern goshawk, broad-winged hawk, ruffed grouse, snowshoe hare, Cape May warbler, mourning warbler, brook trout, American marten and Canada lynx. Habitat requirements and limiting factors are described in reference USFS 2001a. Effects to Brook trout are discussed in Section 3.8, Fisheries, and effects to Canada lynx are discussed in Section 3.10, TEP/RFSS and Rare Communities.

The Analysis Area considered for cumulative effects on MIS population trends is the "Focus of Analysis" area described in the report written on the Management Indicator Species and population viability for the White Mountain National Forest (USFS 2001a). The temporal scope for MIS is 10 years past and 10 years future, chosen because the benefits of regeneration age class for some wildlife species diminish after 10 years.

In addition to the MIS described in the Forest Plan, the White Mountain National Forest conducted a **Species Viability Evaluation** (SVE) in 2002 for plant and animal species that might have potential viability concern on the Forest (USFS 2004). Through the SVE process, a list was developed of 57 species that are likely to occur on the Forest whose viability, either within their entire range or only within the National Forest, is a concern now or in the next 20 years; or whose viability might become a concern depending on factors that management of the National Forest could impact. These species are referred to as **"Species of Concern",** and the list is found in Appendix B of this EA.

Twelve plant species on the list may have suitable habitat in the Project Area; however none of these species were detected during field reviews of or adjacent to the Project Area (Engstrom 2003, unpublished WMNF data, 2004, data in Planning Record). Two wildlife species have suitable habitat in the Project Area: the bay-breasted warbler and American marten. Habitat requirements and limiting factors for American marten and bay-breasted warbler are discussed in reference USFS 2004. The direct and indirect effects for American marten are discussed under MIS.

The Analysis Area considered for direct, indirect and cumulative effects to Other Species of Concern is the same as for MIS.

3.10.2.1 Direct and Indirect Effects on Management Indicator Species

Alternatives 1, 2 and 3

Direct effects to MIS would be the same as those described under Section 3.9.1.2 (Wildlife Habitat) for all Alternatives.

Table 18 lists the indirect effects on potential habitat for MIS species that may occur in the Project Area for all Action Alternatives. The presence of suitable habitat does not guarantee the presence of a MIS species nor does the lack of suitable habitat foreclose a species from being present. For this analysis, the presence of habitat is used as an indicator for a species presence and effect on population trend.

The creation of northern hardwoods and paper birch regeneration would provide habitat for chestnut-sided warbler, the Management Indicator Species for northern hardwoods regeneration and ruffed grouse, the Management Indicator Species for aspen and paper birch. Other species that would be favored by creating regeneration habitat include American woodcock, olive-sided flycatcher, and Nashville warbler. These species, as well as chestnut-sided warbler and ruffed grouse, are priority bird species associated with regeneration habitat listed in the Partner's in Flight Bird Conservation Plan for this region (Rosenberg and Hodgman 2000). A variety of woodland bats also would forage in this habitat (DeGraaf et al. 1992).

Maintaining mature and overmature northern hardwoods and mixedwoods, and spruce/fir, would provide habitat for species such as northern goshawk, Cape May warbler, and American Marten, Management Indicator Species that require mature forested habitat for all or part of their life cycle. The patchiness created by group harvesting in mixedwood habitat may benefit snowshoe hare, in the short term.

The expansion of permanent wildlife openings would benefit species associated with upland fields such as mourning warbler, the Management Indicator Species for upland shrubby openings.

3.10.2.2 Direct and Indirect Effects on Other Species of Concern

Direct effects to bay-breasted warbler would be the same as those described under Section 3.9.1.2 (Wildlife Habitat) for all Alternatives. Indirect effects to bay-breasted warbler would

be the same as described for Management Indicator Species associated with mature mixedwoods and softwoods under Section 3.9.2.2 for all Alternatives.

3.10.2.3 Cumulative Effects on Management Indicator Species and Other Species of Concern

Management Indicator Species

The forestwide habitat and population trends of MIS are described in Table 18.

Alternative 1: No Action Alternative

Management Indicator Species associated with mature northern hardwood, and mixedwood, spruce/fir habitats (northern goshawk, Cape May warbler, American marten) would be favored by this Alternative. Mature and overmature northern hardwood. mixedwood, and spruce/fir habitat has been increasing on the WMNF (WMNF Habitat trend analysis 1984-2003, Tables in Planning Records).

Northern goshawk populations appear to be stable within northern New England and the Maritimes (USFS 2001a). Regional data indicate that nesting habitat for this species is expanding in the eastern United States as forests mature. Cape May warbler population trends for northern New England and the Maritimes indicate Cape May warbler populations have fluctuated between 1966 and 1979 but are now stable (USFS 2001a). This species has only been detected sporadically during eight years of bird monitoring on the White Mountain National Forest (MacFaden and Capen 2000). Their populations are known to increase in areas infested by spruce budworm (USFS 2001a). American marten are slowly increasing on the WMNF, particularly in the northern section (USFS 2001a). American marten were reintroduced to the WMNF in the mid-1970s (USFS 2001a).

Implementation of this Alternative is expected to maintain current habitat and population levels of northern goshawk, Cape May warbler and American marten.

Management Indicator Species associated with aspen and paper birch (broad-winged hawk and ruffed grouse) would not be favored under this Alternative. Regeneration-age class for both types is declining on the WMNF with mature and overmature paper birch and aspen starting to decline in recent years (WMNF Habitat Trend Analysis 1984 – 2003, Tables in Planning Record).

Broad-winged hawk abundance trends in northern New England and the Maritimes appear to be stable (USFS 2001a). Ruffed grouse population trends for northern New England and the Maritimes are increasing slightly (USFS 2001a). Abundance trends on the White Mountain National Forest breeding bird survey plots indicated a decline in ruffed grouse between 1994 and 1998 but a slight increase in 1999 (MacFaden and Capen 2000).

Implementation of this Alternative is not expected to cause a change in broad-winged hawk or ruffed grouse populations over the next ten years as regeneration and existing young aspen and paper birch habitats begin to mature and continue to provide habitat.

Management Indicator Species associated with regeneration-age class northern hardwoods (chestnut-sided warbler) would not be favored under this Alternative. This type of habitat has been declining on the forest (WMNF 2003 Habitat trend analysis 1994 – 2003, Tables in Planning Record).

Chestnut-sided warbler trends for northern New England and the Maritimes indicate abundance of chestnut-sided warblers is declining, although abundance trends in northern Maine appear to be increasing (USFS 2000a). Abundance data for chestnut-sided warbler, on a series of transects across the White Mountain National Forest that include both managed and nonmanaged lands, showed a consistent significant decline during eight years of bird monitoring. This was at least partly attributed to forest succession within the study area (MacFaden and Capen 2000). The downward trend of wildlife species associated with regeneration and early successional habitats is well recognized across New England (Askins et al. 1990, Askins 1993, Smith et al. 1992, Hagan 1993, Litvaitis 1993, Litvaitis et al. 1999, Rosenberg and Hodgman 2000, Thompson et al. 2001). Regrowth of the forest on abandoned farmlands and large scale harvesting in the late 1800s and early 1900s, intensification of agriculture on remaining farmlands, and increased human development are all factors attributed to the decline of this group of species.

Implementation of this Alternative is expected to contribute towards the decline in chestnut-sided warblers across the Forest.

Management Indicator Species associated with regeneration-age class spruce fir (snowshoe hare) would not be favored under this Alternative. This type of habitat has declined on the WMNF below 2500' (WMNF 2003 Habitat trend analysis 1994 – 2003, Tables in Planning Record). However the higher elevation portions of the WMNF provide extensive softwood habitat for snowshoe hare (USFS 2000a).

Snowshoe hare population levels are subject to cyclic fluctuations. Forestwide populations were considered stable in the early 1990s and appear to be increasing now (USFS 2001a).

Implementation of this Alternative is expected to contribute to the continued low quantity of this habitat type for snowshoe hare in the lower elevations of the Forest. Population trends would not be expected to change due to the abundance of habitat in the higher elevation portions of the Forest.

Management Indicator Species associated with upland openings (mourning warbler) would not be favored under this Alternative. The amount of permanent wildlife openings have increased on the Forest (WMNF Habitat trend analysis 1984 – 2003, Tables in Planning Record). However, many of openings are not maintained. The amount of upland fields and shrubby habitats has declined across New England (Thompson et al. 2001).

Regional trends for northern New England and the Maritimes indicate mourning warbler populations are stable (USFS 2001a). Abundance data for mourning warbler, on a series of transects across the White Mountain National Forest that include both managed and nonmanaged lands, showed a consistent significant decline during eight years of bird monitoring. This was at least partly attributed to forest succession within the study area (MacFaden and Capen 2000).

Implementation of this Alternative is expected to contribute to a decline in mourning warblers across the Forest.

None of the MIS species are expected to have their viability jeopardized under this Alternative. For species associated with disturbance, such as chestnut-sided warblers and mourning warblers, populations are not expected to completely disappear from the Forest. Natural disturbances that create openings, such as windfalls or wetlands created by beavers, will continue to provide some of this habitat component across the Forest (USDA Forest Service 2001a).

Action Alternatives 2 and 3

Management Indicator Species associated with regeneration habitat including chestnut-sided warbler would be favored under both Action Alternatives with Alternative 3 creating 34 more acres of regeneration habitat. Several bird species, such as chestnut-sided warbler, only occur in regeneration habitat after 2 years and begin to decline in these habitats after 10 years (DeGraaf et al. 1992).

Implementation of this Alternative is likely to contribute towards maintaining populations of chestnut-sided warblers across the Forest.

Management Indicator Species associated with upland openings including mourning warblers would be favored under both Alternatives. Expectations are mourning warbler populations would remain stable within the Analysis Area. Both Alternatives would only provide a slight increase in the size of the existing upland openings in the Analysis Area.

Implementation of either Action Alternative is likely to contribute towards maintaining populations of mourning warblers across the Forest.

Management Indicator Species associated with paper birch including ruffed grouse and broad-winged hawk would be favored under both Alternatives. Within other stands that have an intermediate or uneven-aged harvest prescription, mitigation measures to maintain a component of existing mature aspen and paper birch would continue to provide a food source for some species of wildlife and potential nest trees for raptors.

Implementation of either Action Alternative would contribute to maintaining stable populations of broad-winged hawk and ruffed grouse across the Forest.

Management Indicator Species associated with mature northern hardwood, mixedwood, and spruce/fir habitats (northern goshawk, Cape May warbler, and American marten) would still retain suitable habitat under either Action Alternative. In the short term, American marten may find that up to 2 % of the habitat is less suitable if the basal area goes below 80ft^2. This does not mean marten would totally avoid the area as they utilize a variety of habitats. For stands with an intermediate or uneven-aged treatment, this effect would only last for ten years at the most as basal area would not fall below 60 ft2 and stands may grow approximately 2 ft2 per year (Leak et al 1987). For stands with a regeneration harvest, once they move into the young age class (10 to 59 years old), many have a basal area above 80 ft2.

Implementation of these Alternatives is not expected to result in any changes in northern goshawk, Cape May warbler, and American marten populations across the Forest.

Management Indicator Species associated with spruce/fir regeneration age class (snowshoe hare) would have some minimal habitat benefits under these Alternatives. The small groups created in softwoods habitat may begin to provide cover after a few years. Snowshoe hare also may find an increased browse source in the clearcut and seed tree cut units.

Implementation of this Alternative is not expected to result in any changes to forestwide population levels of snowshoe hare.

None of the MIS species are expected to have their viability jeopardized under either Action Alternative.

Other Species of Concern

Other Species of Concern are described in Appendix B.

Alternative 1: No Action Alternative

Habitat favored by **bay-breasted warbler** would be maintained and continue to mature in the Analysis Area. Mature and overmature mixedwood and spruce/fir has been increasing on the Forest (WMNF Habitat trend analysis 1984 – 2003, Tables in Planning Record).

Breeding Bird Survey data (1980-1994) showed a continent-wide 12.2% decrease for this species. However surveys show that the population increases and decreases depending on outbreaks of spruce budworm. WMNF breeding bird surveys showed a mean number of individuals per 15 point transect of 2 in 1997; the mean was less than 1 in 1992-96 and 1998-99 (USFS 2004). This type of fluctuation has been tied to spruce budworm outbreaks.

Implementation of this Alternative is expected to maintain current habitat and population levels of bay-breasted warbler across the Forest.

Action Alternatives 2 and 3

Both Alternatives would enhance 57 acres of mature and overmature character of mixedwoods habitat in the Project Area, providing habitat for bay-breasted warbler**.** This might result in minor benefits to habitat favored by bay-breasted warbler.

Implementation of either Action Alternative is expected to maintain current habitat and population levels of bay-breasted warbler across the Forest.

Table 18. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Chestnut-sided warbler *Dendroica pensylvanica*	Regeneration (0-9yrs old) Northern Hardwood & Mixedwood	Yes	Suspect	Declining	Declining	No Change	**HMU 207** – Regen No change **HMU 208** –Regen (+) 60 ac	**HMU 207** –Regen (+) 10 ac **HMU 208** – Regen (+) 94 ac
Northern Goshawk *Accipiter gentilis*	Mature and Overmature (60+ yrs old)) Northern Hardwood & Mixedwood	Yes	Document	Un-common but Stable	Mature and Overmature Hardwood Age Class Increasing	No Change	**HMU 207** – Nesting Habitat **(-)** 14 ac **HMU 208** – Nesting Habitat (-) 84 ac	**HMU 207** – Nesting Habitat **(-)** 24 ac **HMU 208** – Nesting Habitat **(-)** 118 ac
Broad-winged Hawk *Buteo platyperus*	Mature and Overmature Paper Birch & Aspen Aspen: 40+ yrs Birch: 50+ yrs	Yes	Suspect	Stable	Mature Age Class decreasing; Overmature Age Class Somewhat Stable	No Change	**HMU 207** – No Change **HMU 208** – *Present:* Nesting Habitat No Change *Future:* Nesting Habitat No Change; Paper Birch Component No Change	**HMU 207** – No Change **HMU 208** – *Present:* Nesting Habitat No Change *Future:* Nesting Habitat (+) 8 ac; Paper Birch Component (+) 8 ac

Table 18. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Ruffed Grouse *Bonasa umbellus*	All Ages Classes of Aspen & Regeneration and Young (0-49 yrs) Paper Birch	Yes	Suspect	Declining or uncertain	Paper Birch & Aspen Regen Age Class Decreasing Young Age Classes Increasing	No Change	**HMU 207** – No Change **HMU 208** – Aspen Regen No Change Paper Birch Regen No Change; Paper Birch Component No Change	**HMU 207** – No Change **HMU 208** – Aspen Regen No Change Paper Birch Regen (+) 8 ac; Paper Birch Component (+) 8 ac
Rufous-sided Towhee *Pipilo erythrophthalmus*	Regeneration or Young Oak or Oak/Pine (0-59 yrs)	No	No	Declining	Decreasing	No Change	No Change	No Change
Gray Squirrel *Sciurus carolinensis*	Mature and Overmature Oak or Oak/Pine (60 + yrs)	No	No	Stable	Stable	No Change	No Change	No Change
Northern Junco *Junco hyemalis*	Regeneration and Young Pine (0-69 yrs)	No	No	Slight decline	Decreasing	No Change	No Change	No Change
Pine Warbler *Dendroica pinus*	Mature and Overmature Pine (70+ yrs)	No	No	Increasing	Stable	No Change	No Change	No Change

Table 18. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
White–tailed Deer *Odocoileus virginianus*	All Ages Hemlock During Deep-snow Winters.	No	Document	Stable	Stable to decreasing	No Change	No change	No change
Snowshoe Hare *Lepus americanus*	Regeneration or Young Spruce, Spruce/Fir and Fir (0-39 yrs)	No/Yes	Suspect	Stable to increasing	Decreasing	No Change	**HMU 207** – Release Spruce/Fir in 7 ac of Mixedwood **HMU 208** – Release Spruce/Fir in 50 ac of Mixedwood	**HMU 207** – Release Spruce/Fir in 7 ac of Mixedwood **HMU 208** – Release Spruce/Fir in 50 ac of Mixedwood
Cape May Warbler *Dendroica tigrina*	Mature and Overmature Spruce, Spruce/Fir and Fir (40+ yrs)	Yes	Suspect	Stable, fluctuate with spruce budworm outbreaks	Increasing	No Change	**HMU 207 –** No Change **HMU 208 –** No Change	**HMU 207** - No Change **HMU 208** – No Change
Eastern Kingbird *Tyrannus tyrannus* **Eastern Bluebird** *Sialia sialis*	Upland Openings – Grass, Forbs, Orchard	No	No	Declining Increasing	Stable to Decreasing	No Change	No change	No change

Table 18. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Mourning Warbler *Oporornis philadelphia*	Upland Openings-Shrub, Forest Ecotone	Yes	Suspect	Stable	Decreasing	No Change	**HMU 207** – Wildlife Opening (+) 3 ac **HMU 208** – Wildlife Opening (+)16 ac	**HMU 207** – Wildlife Opening (+) 3 ac **HMU 208** – Wildlife Opening (+) 16 ac
Black Duck *Anas rubripes*	Wetlands and Water	No	No	Declining	Fluctuates with Beaver Activity	No Change	No Change	No Change
Brook Trout *Salvelinus fontinalis*	Permanent Lakes, Ponds, Streams	Yes	Document	Stable	Stable	No Change	No Change	No Change
American Peregrine Falcon *Falco peregrinus*	Cliffs and Talus	No	No	Increasing	Stable	No Change	No Change	No Change
American Marten *Martes americana*	At least 80% of their home range must have forest that is 30+' tall with at least 80 ft² of basal area	Yes	Suspect	Increasing	Increasing	No Change	**HMU 207** – Habitat Suitability: Potential of (-) 0.6%. **HMU 208** – Habitat Suitability: Potential of (-) 0.9%.	**HMU 207** – Habitat Suitability: Potential of (-) 1.5 %. **HMU 208** – Habitat Suitability: Potential of (-) 2 %.

Table 18. Management Indicator Species in Project Area. **See last page of table for explanation of abbreviated headings**								
Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Osprey *Pandion haliaetus*	Large water bodies	No	No	Increasing	Stable	No Change	No Change	No Change
Common Loon *Gavia immer*	Large water bodies	No	No	Increasing	Stable	No Change	No Change	No Change
Sunapee Trout *Salvelinus aureolus*	Deep cold water bodies with shallow gravel bars	No	No	Considered Extirpated from WMNF	Stable	No Change	No Change	No Change
Robbin's Cinquefoil *Potentilla robbinsiana*	Alpine	No	No	Stable to Increasing; Delisted in 2002	Stable	No Change	No Change	No Change
Canada Lynx *Lynx canadensis*	Dense Softwoods	Yes	No	Considered Extirpated from WMNF	Increasing	No Change	**HMU 207** – Enhance Spruce/Fir: component within mixedwoods 7 ac **HMU 208** – Enhance Spruce/Fir component within mixedwoods: 50 ac	**HMU 207** – Enhance Spruce/Fir component within mixedwoods: 7 ac **HMU 208** – Enhance Spruce/Fir component within mixedwoods: 50 ac

Table 18. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Bicknell's Thrush *Catharus bicknelli* **Blackpoll Warbler** *Dendroica striata*	High Elevation Spruce/Fir	No	No	Declining Stable Fluctuates with spruce budworm outbreaks	Stable	No Change	No Change	No Change

Key to Table 18 Abbreviated Headings;

- **Habitat Present or Potential** – Habitat is present in Project Area or has potential to occur in Project Area
- **Status** – Management Indicator Species is either Documented or Suspected (or neither of the two) within the Project Area
- **RPT** - Regional Population Trend (From: USFS. 2001a. Evaluation of Wildlife Monitoring and Population Viability WMNF Management Indicator Species. White Mountain National Forest, Laconia, NH. 37pp.)
- **FHT** - Forest-wide Habitat Trend – (From: USFS. 1993, 1994, 1996. Monitoring Reports, White Mountain National Forest, Laconia, NH; USFS. 2003. CDS database; USFS. 2001b. Analysis of the Management Situation for Wildlife, White Mountain National Forest, Laconia, NH; Thompson et. al. 2001)

3.10.3 Habitats of Concern

Four types of habitat are considered: exemplary communities, vernal pools/seeps, bear-clawed beech trees, and deer wintering areas (deer yards). **The Analysis Area for direct and indirect effects to these habitats** is the Project Area, including stands proposed for treatment and the connected actions that facilitate treatment (roads, landings, etc.). **The Analysis Area for cumulative effects to these habitats** is the public and private lands within and adjacent to HMUs 207 and 208. The temporal scale is 10 years past and 10 years future.

3.10.3.1 Exemplary Communities

A landscape analysis and/or field reviews have been conducted for exemplary communities within or near the Project Area (Sperduto 1995, Bechtel 1999, Engstrom 2003, unpublished WMNF 2004 (data available in Project Planning Record). No exemplary communities were documented in the Project Area, although some were identified in the Analysis Area (HMUs 207 and 208), including riverside meadows, alder thickets, and low elevation spruce/fir forests in the vicinity of the Upper Ammonoosuc River, an exemplary northern hardwood/spruce fir area adjacent to the Project Area, and pockets of semi-rich forest and small seeps to the east and south of the Keenan Brook Road.

Alternatives 1, 2 and 3

There would be no direct, indirect or cumulative effects on exemplary communities from any of the Alternatives since none occur within the Project Area.

3.10.3.2 Vernal Pools/Seeps

Vernal pools are valuable habitat to certain species of amphibians and reptiles; and seeps provide a source of water for wildlife during winter months, as well as providing habitat for rare plants (Tappan 1997, Taylor et al. 1996, Society for Protection of New Hampshire Forests 1997, Carlson and Sweeney 1999). Seeps and vernal pools most likely would form in low lying areas with compacted sediments or underlying ledge where drainage is poor. Compartment 14/Stands 38, 40, 56, 57, 61; Compartment 17/Stands 8, 25, 39, 56, 57; Compartment 18/Stands 1, 3, 8, and 20 are located on ELTs 115A or 115G. These ELTs are characterized by soils with compacted sediment and would most likely have vernal pools or seeps. During field visits by White Mountain staff and Brett Engstrom (consulting botanist), wet seepy areas were recorded near drainages adjacent to Compartment 14/Stand 56; Compartment 17/Stands 8, 25, 53, 56, and Compartment 18/Stands 4 and 20.

Alternative 1

The No Action Alternative would have no direct or indirect effects on vernal pools or seeps.

Alternatives 2 and 3

There could be direct effects from the Action Alternatives. While riparian areas and any known wet sites are excluded from the harvest area, there is a risk of impacting unidentified wetlands such as vernal pools and seeps.

Leaving excessive slash and skidding in and adjacent to vernal pools or seeps could affect the hydrologic function of these areas and impede animal movements. Harvesting adjacent to vernal pools could reduce leaf litter and shade to vernal pools eliminating organic matter input and elevating water temperatures. Mitigation measures described in Section 3.8.1 should mitigate these potential effects and minimize the probability of affecting unidentified vernal pools or seeps.

Cumulative Effects on Vernal Pools/Seeps

Past harvesting in HMUs 207 and 208 followed Forest Plan Standards and Guidelines to protect seeps. Forest Plan Standards and Guidelines (Forest Plan Chapter III–19), including Best Management Practices, and mitigation measures listed in Appendix D should protect seeps and vernal pools during the proposed harvest. No harvesting is anticipated on National Forest lands over the next 10 years. The potential for present or future human presence to impact vernal pools or seeps is considered small as few of these areas occur near trails or roads, and future routes would avoid wet areas.

3.10.3.3 Bear-clawed Beech Trees

Black bear use a diversity of habitats to obtain a source of green vegetation in the spring, berries and insects during the summer, and hard mast, such as acorns or beechnuts, during the fall (Rogers and Allen 1987). Since beech is a primary hard mast producer in the northern portion of the White Mountain National Forest, areas with concentrations of bear-clawed beech are considered critical habitat for this species. Evidence of bear-clawed beech was noted in Compartment 14/Stand 57 and Compartment 18/Stand 4 during field reviews of the Project Area.

Alternative 1

Alternative 1 would have no direct or indirect effects on bear-clawed beech trees.

Alternatives 2 and 3

There would be no direct effects to bears feeding in beech trees as both Action Alternatives would occur during the winter when bears are in hibernation. Indirect effects of harvesting could be a reduction in fall foraging habitat from the removal of bear-clawed beech trees.

Cumulative Effects on Bear-clawed Beech Trees

Of the 1,466 acres harvested in HMUs 207 and 208 over the past 10 years and the proposed 455 acres being proposed for harvest from this timber sale, approximately 4% of the HMUs, were even-aged cuts (clearcut, shelterwood, overstory removal) in northern hardwoods. The balance of the HMUs is dominated by mature and overmature northern hardwoods, which would be expected to harbor components of beech trees for hard mast. Mitigations for harvesting proposed in the Action Alternatives would defer high concentrations of bear-clawed beech trees, and protect heavily scarred individual trees in harvest units. Connected actions related to this project would not affect bear-scarred beech trees.

3.10.3.4 Deer Wintering Habitat

The State of New Hampshire recommends managing deer wintering habitat by interspersing mature softwoods with small openings to perpetuate critical softwood cover, maintain high quality browse production, and ensure deer mobility throughout an area during the harsh winter months (Society for the Protection of New Hampshire Forests 1997, W. Staats personal communication, 2002).

There is a historical documented deeryard within the Analysis Area. The Kilkenny deeryard was identified within Compartments 9 -17 (Sikes Act Report 1978, unpublished WMNF Report). It was primarily located in the softwoods along the Upper Ammonoosuc River in the Stony, Keenan, and Spruce Brook drainages. Historically, it encompassed 5000 acres and supported approximately 200 white-tailed deer. Very few deer winter in this yard now due to population declines caused by severe weather conditions over the past several years (unpublished WMNF winter track counts and deer yard surveys). Compartment 14/Stand 56 is within the historical yard.

Alternative 1

Alternative 1 would have no direct or indirect effects on deer wintering habitat.

Alternatives 2 and 3

Both Action Alternatives would have no direct effects on wintering habitat, since very few deer, if any, are wintering in the Project Area. In the short-term, timber harvest would benefit deer by providing an increased source of browse. In the long-term, removal of individual trees and groups of overstory hardwoods in hardwoods and mixedwood stands where there is a softwood understory would enhance softwood regeneration, possibly providing winter cover for deer in the future. Alternatives 2 and 3 propose softwood enhancement on 57 acres, including 7 acres in Compartment 14/Stand 56 (Tables 16 & 17).

Cumulative Effects on Deer Wintering Habitat

Forest Plan Standards and Guidelines, to protect documented deer wintering habitat (Forest Plan -III-18) and to maintain mature and overmature softwood habitat (Forest Plan- III-13),

should ensure that deer wintering habitat is maintained across the forest. Connected actions related to this project would not affect deer wintering habitat.

3.10.4 Invasive Plants

Affected Environment for Invasive Plants

Invasive plants can spread to other disturbed habitats by wind, water, wildlife, humans or vehicles transporting seeds or vegetative parts of the plant. Under Executive Order 13112 (February 3, 1999) Federal agencies whose actions may affect the status of invasive species shall not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species.

The White Mountain National Forest has been working with The New England Wildflower Society to determine species and locations of non-native invasive plant species. Findings to date have produced a list of invasive species that exist on or near the National Forest. The majority of locations observed have been on the perimeter of the National Forest, primarily along roads, highways and in developed areas such as towns, residential areas and recreation areas.

Roads: The majority of non-native invasive species (NNIS) locations observed within the vicinity of the WMNF have been along roads and highways, and in developed areas (e.g., towns, housing developments, and recreation areas). Roads, as fragmenting agents, increase the amount of forest-edge habitat on the landscape. The resulting "road-effect zone" is subject to alterations of the microclimate (e.g., increases in light and temperature and a decrease in relative humidity), as well as to frequent and intense disturbance activities (maintenance and traffic), the combined effects of which tend to favor the growth of opportunistic NNIS (Parendes and Jones 2000; Forman and Deblinger 2000). Moreover, roads also serve as major corridors for the dispersal of invasive plants through the spread of seed propagules (e.g., seeds or vegetative fragments) that attach to vehicle hardware (e.g., tires and undercarriages) (Westbrooks 1998; Parendes and Jones 2000; Lonsdale and Lane 1994). Resulting weed infestations can extend from the road's edge to 250 meters into the adjacent forest, or beyond (Saunders et al. 1991; Primack 2000; Forman and Deblinger 2000). A Wisconsin study found that non-natives were most prevalent within 15 meters of the road; however, a few species penetrated up to 150 meters into the adjoining hardwood forest (Watkins et. al. 2003).

Skid trails: Skid trails and haul roads within timber sales serve as the primary conduits for non-native species invasion for the same reasons outlined above. A study on managed forest landscapes in Upper Michigan found that understory plant richness was significantly greater in haul roads than in skid trails and forest, due in large part to a greater percentage of introduced species (Buckley et al. 2002). This increase in non-natives was due predominately to elevated levels of photosynthetically active radiation (a measure of light

intensity), soil moisture, and compaction along the road edges. The discrepancy between haul roads and skid trails is likely due to improved conditions (e.g., graded and graveled) and increased traffic along the former. A study in Utah supports this reasoning, finding that roadside habitats adjacent to paved and improved surface roads contain a greater cover of both exotic and native species than similar habitats adjacent to less-impacted four-wheel-drive tracks, a trend that extended well beyond the road cut into adjacent, interior plant communities (Gelbard and Belnap 2003).

Riparian Areas: Several studies have found that riparian areas that have high native species richness also have high non-native species richness, due in part, to the availability of virtually unlimited resources (i.e., high levels of light and nutrients), as well as a relatively constant state of intermediate disturbance (via flooding and bank scouring) that results in continual structural and compositional changes (Stohlgren et al. 2001; Stohlgren et al. 1998, and Planty-Tabacchi et al. 1996). Moreover, streams and rivers form a connected network throughout the landscape, and thus, facilitate the spread of both native and non-native species at a large geographical scale. Disturbance, therefore, in and around riparian areas, would greatly increase the risk of introducing and spreading non-natives to these vulnerable ecological communities.
No invasive plants have been reported within the Project Area (Engstrom 2003, upublished WMNF data, 2004) and no invasive plants were found along Forest Road 15 during an inventory for invasive plants during 2001 and 2002 (WMNF database, Map in Project Planning Record). The resulting WMNF database was used, in conjunction with site-specific field surveys, to evaluate the likelihood of NNIS spreading to the project area and the environmental consequences of their potential establishment.

The Analysis Area for direct and indirect effects to invasive species is the Project Area, including stands proposed for treatment and the connected actions that facilitate treatment (roads, landings, etc.). The Analysis Area for cumulative effects to invasive species is public lands within HMUs 207 and 208. The temporal scale is 10 years past and 10 years future. For cumulative effects analysis, it is assumed that roads open to vehicular traffic may introduce and/or spread invasive species.

3.10.4.1 Direct and Indirect Effects on Invasive Plants

Determination of Risk

Forest Service Manual 2080.44.6 outlines the responsibilities of Line officers to determine the risk of NNIS introduction or spread as part of the NEPA process for proposed actions. Risk assessments are to be completed for any ground disturbing activities (FSM 2081.03). For projects having moderate to high risk of introducing or spreading noxious weeds (as determined by project Risk Assessments), the project decision document must identify noxious weed control measures that should be undertaken during project implementation to reduce the potential environmental effects of NNIS(FSM 2081.03-1). The overall risk rating assigned for the Lower Loop Timber Sale is low (Project Planning Record).

There is potential for invasive plants to spread into the Project Area along existing roads and other disturbed habitats such as gravel pits and recreation sites. Alternative 1 would not introduce new migration routes or sites for invasive species. Heavy equipment used for timber harvest and road restoration in the Action Alternatives could spread invasive species into harvest areas and along roadways. A mitigation to reduce this potential is to clean logging equipment prior to moving it into the Project Area.

The potential for invasive species to migrate into the Project Area from surrounding areas (Map in Project Planning Record) is greatest in clearcuts, patch cuts, and seed tree cuts, where the canopy is removed. The risk of migration is greatest for 1-2 years after harvesting, when native plant species are just starting to revegetate the sites. Alternative 3 would create the most clearcuts, patch cuts, and seed tree cuts. To help mitigate the spread of invasive species, at least a 75 foot buffer of vegetation would be maintained between proposed clearcuts, patch cuts and seed tree cuts, and adjacent infested roads and trails.

3.10.4.2 Cumulative Effects on Invasive Plants

Most known locations of invasive species are in developed landscapes surrounding the Analysis Area. These known populations do not appear to be expanding into adjacent forested habitats, due to the inherent stability of closed-canopy ecosystems however, that could change with the introduction of disturbance into these systems. The cumulative effect of timber harvest, particularly even-aged harvest, is the increased risk of introducing invasive species into the HMUs.

3.11 Federal Threatened, Endangered & Proposed Species (TEPS), Regional Forester Sensitive Species (RFSS), and Rare Communities

Affected Environment for TEPS, RFSS and Rare Communities

New Hampshire Natural Heritage Inventory (NHNHI) conducted a landscape analysis and/or field reviews near the Project Area 1995 and 1998 (Sperduto 1995, Bechtel 1999). Brett Engstrom and Kathy Fife conducted plant surveys in June 2003 and 2004 within the Project Area (Engstrom 2003, 2004 WMNF unpublished plant survey (Reports in Project Planning Record).

The Analysis Area for direct and indirect effects to TEPS/RFSS is the Project Area, including stands proposed for treatment and the connected actions that facilitate treatment (roads, landings, etc.). The Analysis Area for cumulative effects to TEPS/RFSS is the public lands within HMUs 207 and 208. The temporal scale is 10 years past and 10 years future.

3.11.1 Biological Evaluation

A Biological Evaluation (BE) for Federally Threatened, Endangered, and Proposed (TEP), and Regional Forester Sensitive Species (RFSS) was completed on July 12, 2004 for all Alternatives proposed for the Lower Loop Vegetative Management Project in HMUs 207 and 208 (BE, Project Planning Record). The process used and the sources examined to determine potential occurrence of TEP or RFSS presence are listed in the BE.
Based on a pre-field review of all available information, it was the Forest Service Biologist's determination that potential habitat may occur within the Project Area for one Federally Endangered Species (Indiana bat), and three Regional Forester Sensitive Species (eastern small-footed myotis, northern bog lemming and squirrel corn). The area could provide adequate habitat for Canada lynx, although this species is considered extirpated from the White Mountain National Forest.

The Biological Evaluation was sent to United States Department of Interior Fish and Wildlife Service (USFWS) for review of effects determination and compliance with Indiana Bat Terms and Conditions, and consistency with Canada Lynx Conservation Measures (July 12, 2004, Letter in Project Planning Record).

There is a risk of unintentional damage if Threatened, Endangered, or Sensitive species of plants exist that were not discovered prior to project implementation (FEIS IV-68, USDA Forest Service 1986b.)

The BE details direct and indirect effects to Indiana bat, eastern small-footed myotis, northern bog lemming and squirrel corn. The expected adverse or beneficial effects to the Indiana bat were determined to be small and "discountable" (defined as those effects that are extremely unlikely to occur). There may be minimal direct and indirect effects to eastern small-footed myotis foraging and roosting habitat. There is a slight potential for the Action Alternatives to temporarily displace northern bog lemmings, although the potential for presence of this species in the Project Area is low. There would be no direct effects to squirrel corn from timber harvest but road restoration and periodic maintenance could impact the population that occurs in a roadside ditch. Indirect effects to squirrel corn may occur from timber harvesting if the canopy is opened up too much.

Canada Lynx Conservation Assessment and Strategy

The Canada Lynx Conservation Assessment and Strategy describes a process to define suitable, unsuitable, and non-lynx habitat and Lynx Assessment Units (LAU) on federal lands. Conservation measures were described for suitable and unsuitable lynx habitat within an LAU (Ruediger et al. 2000). The application of LAU mapping criteria, factors used to define suitable and unsuitable lynx habitat and application of conservation measures on the White Mountain National Forest are discussed in USDA Forest Service 2000e and 2000f. All Alternatives are consistent with the conservation measures outlined in the Canada Lynx Conservation Strategy and Assessment (BE, Project Planning Record).

Terms and Conditions from the Biological Opinion for Indiana Bat

The USFWS outlined Terms and Conditions that must be followed to minimize impacts of incidental take of Indiana bats on the White Mountain National Forest (USFWS 2000), as amended in the Forest Plan (USDA Forest Service 2001c and 2001d). The Terms and Conditions are divided into those that are applicable throughout the year, and those that are applicable during the non-hibernation season (May 15 through August 30). All Alternatives are consistent with the Terms and Conditions outlined in the Biological Opinion (USFWS 2000), as amended in the Forest Plan (USDA Forest Service 2001c and 2001d) (BE, Project Planning Record).

3.11.2 Effects Determination and Rationale

Federally Threatened, Endangered and Proposed Species (TEP)

Canada Lynx

All Alternatives will have *no effect* on Canada lynx since this species is considered extirpated from the White Mountain National Forest. Should lynx reoccupy the Forest, consultation with the USFWS is required under Section 7 of the Endangered Species Act.

Rationale
1) The lynx is considered extirpated based on surveys conducted over the past two decades for this species.

Indiana Bat

All action alternatives *may affect, but would not likely adversely affect* Indiana bat. Since the likelihood of occupancy by Indiana bat is extremely low in the Analysis Area, any effects to Indiana bat from any Action Alternative would be insignificant (cannot meaningfully measure or detect) and therefore discountable (not expected to occur).

Rationale
1) Located at the northern edge of the Indiana bat's summer range, the habitat in the Project Area is mature northern hardwoods, mixedwood, and softwood, with canopy closure often exceeding 80%. Indiana bats prefer roosting and foraging canopy closure ranging from 50% to 70%. The likelihood of Indiana bats occurring in the Project Area is very low.
2) Forest Plan Standards and Guidelines (USFS 1986a) maintain adequate habitat for Indiana bat by providing direction to maintain a diversity of habitat conditions well distributed across the Forest (III-13), reserve large wildlife trees in areas managed for vegetation, retain standing dead trees where possible (III-15), and maintain riparian habitats (III-18). Implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000), as incorporated in the Forest Plan Amendment (USFS 2001c and USFS 2001d), should also maintain habitat components needed by Indiana bat and minimize the potential for incidental take of an Indiana bat.

Regional Forester Sensitive Species (RFSS)

Eastern Small-Footed Myotis (Bat)

All action alternatives *may impact individual eastern small-footed myotis, but would not likely cause a trend toward federal listing or loss of viability*. Alternatives 2 and 3 may reduce suitable roosting habitat by cutting some roost trees, but provide some beneficial effects by increasing foraging habitat through openings created by clearcut and seed-tree harvests, as well as expansion of permanent wildlife openings.

Rationale

1) Most literature indicates that eastern small-footed myotis roost under rocks on hillsides and open ridges, in cracks and crevices in rocky outcrops and on talus slopes, as well as in buildings (Erdle and Hobson 2001). The likelihood that individual bats are roosting in trees in the Project Area is considered low.
2) Forest Plan Standards and Guidelines (USFS 1986a) maintain adequate habitat for eastern small-footed myotis by providing direction to maintain a diversity of habitat conditions well distributed across the Forest (III-13), reserve large wildlife trees in areas managed for vegetation, retain standing dead trees where possible (III-15), and maintain riparian habitats (III-18). Implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000) as incorporated in the Forest Plan amendment (USFS 2001c and 2001d), should also maintain habitat components needed by eastern small-footed myotis.

Northern Bog Lemming

The No Action Alternative would have *no impact* on northern bog lemming. Both Action Alternatives *may impact individual northern bog lemmings, but would not likely cause a trend to federal listing or loss of viability*.

Rationale

1) Northern bog lemmings are rare in New England. The likelihood of an individual occurring in the Project Area is considered low.
2) Identifiable riparian habitat or wet areas are usually excluded from harvest units minimizing the risk of disturbing an individual animal or associated habitat.
3) Forest Plan Standards and Guidelines maintain a diversity of habitats (III, 12-13) and protect riparian habitats (III-19). It is expected these would minimize negative effects and provide adequate habitat for northern bog lemming.

Squirrel Corn

The No Action Alternative, except with occasional mowing would have no *impact* on squirrel corn. Both Action Alternatives *may impact individual squirrel corn, but would not likely cause a trend to federal listing or loss of viability*.

Rationale

1) Only individual tree selection would be allowed in the area where populations of squirrel corn have been identified to maintain the light regime that would be tolerated by this species.
2) Any road restoration or standard maintenance of Forest Road 33 will avoid identified peopulations of squirrel corn.
3) Forest Plan Standards and Guidelines (USFS 1986a) will provide special treatment to protect sensitive plants (III-16).

3.12 Heritage Resources

Affected Environment for Heritage Resources

A cultural resource report (CRRR #04-2-03) was completed for the Project Area based on field surveys and a review of historic maps and literature. The full report is available in the Project Planning Record. No pre-European artifacts or improvements were found within the Project Area. The State Historic Preservation Office (SHPO) is currently reviewing the cultural resource report.

No known Heritage Resource sites lie within or adjacent to the Project Area which are eligible for or are being evaluated for the National Register of Historic Places.

Scoping of local Native American groups and descendants of the Original People has indicated no concerns that any special areas would be disturbed by proposed timber harvest. A careful search of records and local histories has not indicated any unusual activities or camp locations.

The Analysis Area for direct, indirect and cumulative effects to heritage resources is the Project Area since all ground disturbing activities will occur in this area.. Forest Plan Standards and Guidelines require that all earth disturbing activities be designed to avoid, minimize or mitigate adverse effects to heritage resources. Any effects to heritage resources are specific to past, present and potential disturbance to specific sites. An inventoried heritage site within the Analysis Area may have been affected by past actions, but will be avoided in any proposed or future actions.

3.12.1 Direct, Indirect and Cumulative Effects on Heritage Resources

Alternative 1: No Action Alternative

This alternative would not have any effects on heritage resources.

Action Alternatives 2 and 3

All known sites within the Project Area would be avoided during layout, marking and harvesting operations in all Action Alternatives. There are possible indirect effects on undiscovered artifacts, but winter harvest should minimize these by reducing soil disturbance. Mitigation measures (Appendix D) are designed to eliminate or lessen any impacts to undiscovered artifacts caused by timber harvesting, road restoration or temporary road construction. The timber sale contract also provides protection to cultural resources through cancellation or modification of the contract if cultural resources are identified during harvest operations.

No other vegetative management activities or projects are anticipated in the Project Area for the next 10 years.

3.13 Socio-Economics

Affected Environment for Socio-Economics

The northern New Hampshire economy relies on the forest products industry and tourist trade. Forest products jobs are among the highest-paying jobs in the area. There are two pulp mills and one paper mill located within 25 miles of the Project Area. There are also several sawmills and forest product-based manufacturers within close proximity. These businesses purchase timber from a variety of sources, including commercial timber lands, private lands, state and town forests, and the White Mountain National Forest.

There is a steady demand for timber products sold by the National Forest, as reflected by bids on timber sales. Typically, average bid prices on National Forest timber equal or exceed those received on private land. This is especially true for sawtimber.

The proposed sale units are all located within the Towns of Berlin and Randolph, Coos County. The main travel route providing access to the Project Area is US Route 2 and US Route 16. These roads have been used for hauling timber in the past, and continued use for this purpose would not represent a change in expectations for people who regularly travel these roads.

There are numerous costs with implementing a vegetative management project on the National Forest. One significant cost is for Analysis: planning the project and analyzing alternatives and potential environmental effects. This includes: 1) surveys (silvicultural, biological, soil, hydrological and cultural resource); 2) supporting analysis (roads, visual objectives and field data); 3) literature reviews; 4) public involvement; 5) interdisciplinary team planning meetings and; 6) preparation of environmental assessment and decision documents.

Another significant cost is incurred with project implementation, including timber sale preparation (project layout, development of stand prescriptions, boundary marking, marking trees for cutting, contract preparation and appraisal, and advertisement) and timber sale administration (laying out skid trails, contract administration, site inspections, accounting, and supervising road work).

While one purpose for harvesting timber in the Lower Loop Project Area would be to provide high quality sawtimber, the National Forest Management Act provides the direction that a harvesting system should not be selected because it will give the greatest dollar return or the greatest unit output of timber.

Communities within which National Forest timber is harvested are reimbursed for the value of that timber through two separate funds.

- The State of New Hampshire has a tax on the value of timber harvested that is paid by the timber purchaser to the towns in which the timber is harvested. This tax averages about 10% of the value harvested, although it is actually based on the species cut. If the timber is harvested in an unincorporated town, the timber tax is paid to the county. In the case of the Lower Loop project, the Towns of Berlin and Randolph would receive timber tax directly, while Coos County would receive tax returns for timber harvested in unincorporated towns in the Project Area.
- The Twenty-Five Percent Fund Act of 1908, as amended, directed that 25% of all monies received from a National Forest during any fiscal year should be reimbursed to the state in which the National Forest is located, to be used "for the benefit of public schools and public roads of the county or counties in which such National Forest is situated." For the Lower Loop project, 25% of gross timber receipts would be returned to Coos County.

Table 19 lists the five most recent timber sales on the White Mountain National Forest. The revenue generated by these sales is based on timber value minus road costs (which are built into the bid). The average price of $145 per thousand board feet harvested is used to estimate the gross receipts for the Lower Loop project alternatives.

Table 19. Gross Revenue Generated from Timber Sales on the White Mountain National Forest for FY 2002 and 2003.

Timber Sale Name	FY Sold	Total Value	Total Volume (mbf)	Price/mbf
Higgins Brook	2003	$217,711	1611	$135.14
Fogg Brook	2003	$321,290	1631	$196.99
Tremont	2004	$99,610	739	$134.79
Rattle River	2004	$193,135	1312	$147.21
Pine Mountain	2004	$212,420	1923	$110.46

The Analysis Area for direct, indirect and cumulative effects to socio-economics is the townships of Berlin and Randolph within Coos County since they would receive

funds generated from the proposed harvest (timber harvest tax and 25% Fund). Cumulative effects analysis will consider socio-economic activities past (1994-2004), present, and future (2004-2014).

3.131 Direct and Indirect Effects on Socio-Economics

Alternative 1: No Action Alternative

Since Alternative 1 harvests no timber, local government in the Towns of Berlin and Randolph and Coos County would not generate revenue from timber tax receipts, the 25% fund, or through indirect economic activity associated with a logging operation. This alternative would not meet the Forest Plan Forest-wide goal of "assuring a stable, reliable source" of high quality hardwoods as a "raw material to support community stability" (Forest Plan, III-3). The cost of Analysis (project planning and environmental analysis) for this project would be $55,800, the average cost of Analysis for a project on the Androscoggin Ranger District of the White Mountain National Forest (Table 20).

Table 20. Economic Characteristics by Alternative

Measure	Alt 1	Alt 2	Alt 3
Harvest Volume (mbf)	0	2234	2530
Stumpage Gross Receipts	$0	$323,930	$366,850
Total Costs	$55,800	$119,352	$126,640
• Analysis	$55,800	$ 55,800	$ 55,800
• Sale Preparation	$0	$43,446	$ 48,070
• Sale Administration	$0	$ 20,106	$ 22,770
Net Value of Receipts	($55,800)	$204,578	$240,210
Unit Cost $/mbf	$0	$ 53.43	$ 50.05
10% Yield Tax Receipts	$0	$ 32,000	$ 37,000
25% Fund Payments	$0	$80,982	$91,712

NOTES:
- Unit Cost = Total Cost / Harvest Volume
- 10% Yield Tax Receipts to the Town of Randolph, Coos County
- 25% Fund Payments to Coos County for schools and roads

Action Alternatives 2 and 3

Each of the Action Alternatives would harvest timber, generating revenue for local governments in the Towns of Berlin and Randolph and Coos County from timber tax receipts, the 25% fund, and through indirect economic activity associated with a logging operation. The Action Alternatives would meet the Forest Plan Forest-wide goal of "assuring a stable, reliable source" of high quality hardwoods as a "raw material to support community stability" (Forest Plan, III-3). The cost of Analysis for this project would be the same for the Action Alternatives as it was for Alternative 1 ($55,800).

For each of the Alternatives, Table 20 provides a breakdown of estimated gross timber receipts (based on proposed harvest volume and an average bid price of $145/mbf), costs to the Forest Service for preparing and administering the proposed harvest, net receipts, and estimated return to local communities through the NH timber tax and the 25% fund.

Among the action alternatives, Alternative 2 harvests the least volume of timber and generates the least in stumpage and net receipts. It has the highest unit costs and the lowest return to local communities through the timber tax and the 25% fund. Alternative 3 harvests the greatest volume of timber, and generates the most in stumpage and net receipts. It has the lowest unit costs and the highest return to local communities through the timber tax and the 25% fund.

3.13.2 Cumulative Effects on Socio-Economics

Revenue generated from the timber harvest between 1994 and 2004 on 1,243 NF acres of NF lands are no longer an economic factor. Treatments that emphasized improvement to the quality of hardwood sawtimber in the harvested stands will be an economic factor in the future, but not within the next 10 years.

Alternative 1 does not harvest timber, but it does not preclude the harvest of timber in the future. Each of the Action Alternatives would generate revenue for local communities. Alternative 3 maximizes present net worth of the harvested stands by proposing the most acres of regeneration harvest. All of the Action Alternatives would provide a continued source of quality hardwood sawtimber and other forest products on a sustained basis; and they would support continued employment in harvesting, manufacturing, transportation, and associated forest products industries. Experience has indicated there is and would continue to be demand for timber products locally and nationally. The Forest Service does not anticipate any additional timber harvest in HMUs 207 or 208 over the next 10 years.

CHAPTER FOUR
PREPARATION & CONSULTATION

4.1 ID Team Members and Forest Service Contacts

The following individuals participated in development and analysis of the proposed action and all other alternatives as well as subsequent preparation of the environmental assessment.

Interdisciplinary Team:

Lesley Rowse	Wildlife Biologist
Wayne Millen	Assistant Ranger - Forester
Gail Wigler	Forester
Don Muise	Assistant Ranger - Recreation
Steve Fay	Soil Scientist
Tracy Weddle	Hydrologist

Forest Service Personnel consulted for professional and technical assistance:

Karl Roenke	Forest Archeologist
Reg Gilbert	Forestry Technician & Timber Sale Administrator
Robert Mengel	GIS Coordinator
Joe Gill	Heritage Resource Paraprofessional
Pat Nasta	Public Affairs and NEPA Specialist
John Jakubos	Engineer Technician
Erin Larson	Botanist

4.2 Other Agencies and Individuals Contacted

Other agencies and organizations consulted for professional and technical assistance:

Brett Engstrom	Botanist, Private Contractor
Will Staats	New Hampshire Fish & Game Department

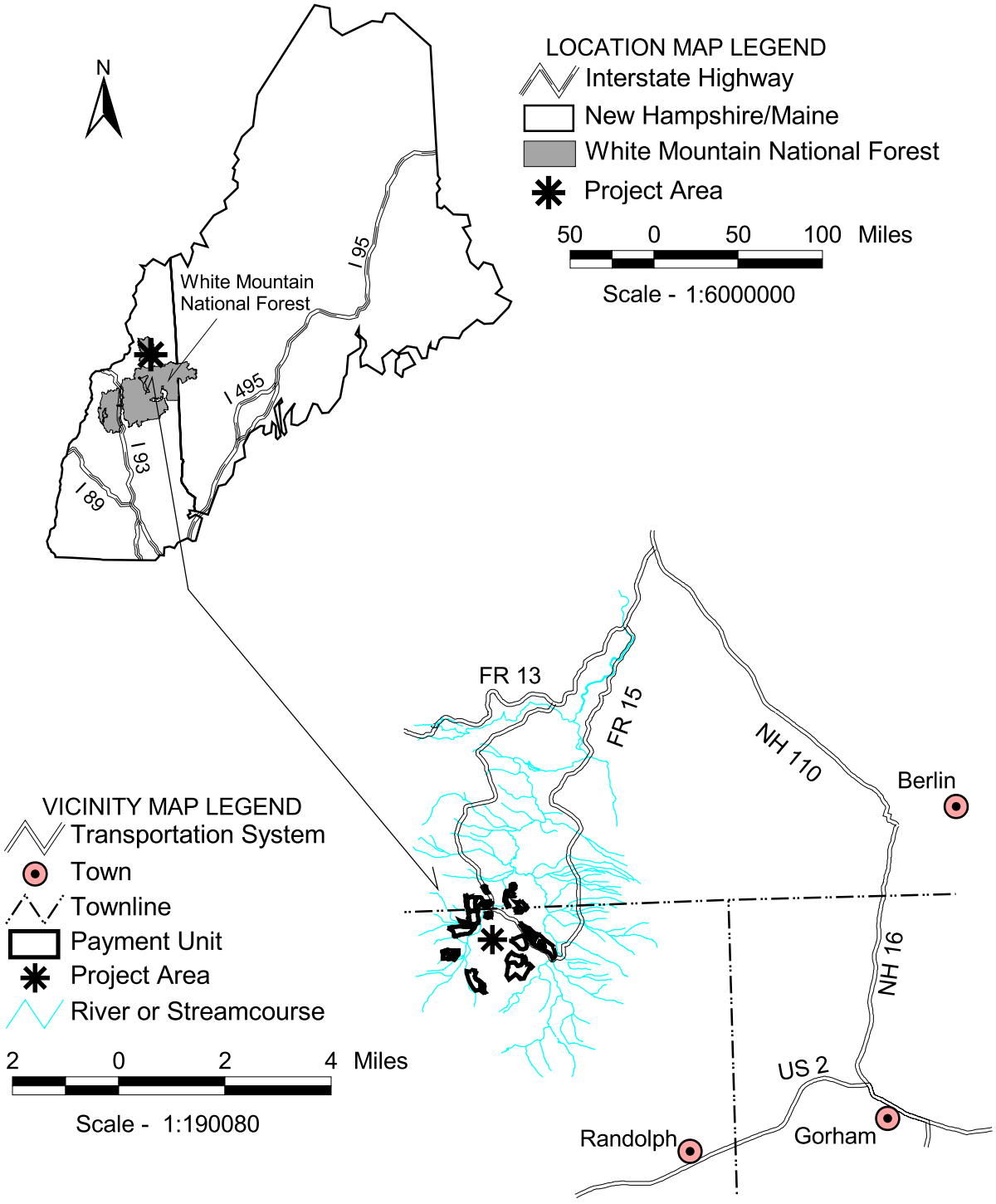
LOWER LOOP VEGETATION MANAGEMENT PROJECT

Environmental Assessment

APPENDICES

Appendix A: Project Maps
Appendix B: Species with Potential Viability Concerns
Appendix C: Scoping Comments
Appendix D: Mitigation Measures
Appendix E: Literature Cited
Appendix F: Glossary

MAP 1
Lower Loop Timber Sale Area Map
White Mountain National Forest
Androscoggin Ranger District
Towns of Berlin & Randolph
Coos County, New Hampshire



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Compartment # / Stand#	Acres	Treatment
Habitat Management Unit 207		
14/38	47(6)	Group Selection
14/40	12	Overstory Removal
14/50	3	Patch Clearcut
14/56	7	Individual Tree & Group
14/57	11	Overstory Removal
14/61	25(3)	Group Selection
Total	105(9)	
Habitat Management Unit 208		
17/8	50	Individual Tree & Group
17/23	4	Patch Clearcut
17/25	70	Individual Tree & Group
17/53	8	Seed Tree Cut
17/56	30	Clearcut
17/57	30	Clearcut
18/4	73	Individual Tree & Group
18/8	37	Individual Tree & Group
18/17	5	Patch Clearcut
18/20	36	Individual Tree & Group
18/36	3	Patch Clearcut
18/38	4	Patch Clearcut
Total	350	

MAP 2 - Alternative 2
Proposed Lower Loop Analysis Area
White Mountain National Forest
Androscoggin Ranger District
Towns of Berlin & Randolph
Coos County, New Hampshire

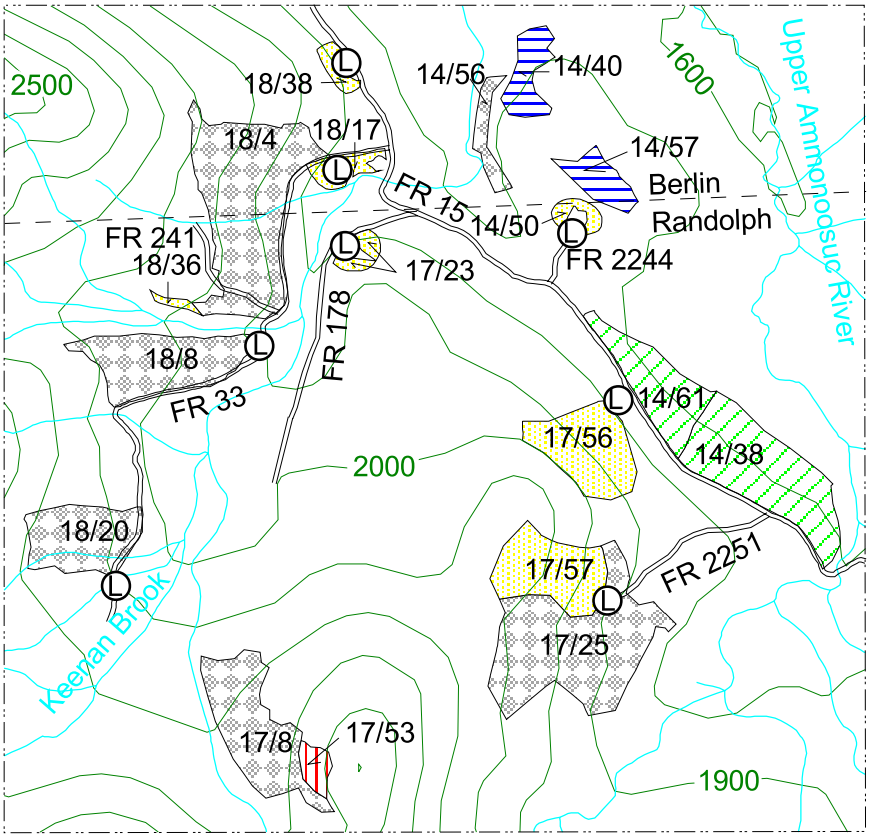
N

0.2 0 0.2 0.4 0.6 Miles

Scale - 1:31680

LEGEND

- Analysis Area Boundary
- Transportation System
- Townline
- River or Streamcourse
- Contour Interval - 100'
- Patch Clearcut or Clearcut
- Seed Tree Cut
- Overstory Removal Cut
- Group Selection Cut
- Individual Tree & Group Selection Cut
- Landing



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Compartment # / Stand#	Acres	Treatment
Habitat Management Unit 207		
14/38	42(5)	Group Selection
14/38a	5	Patch Clearcut
14/40	12	Overstory Removal
14/50	3	Patch Clearcut
14/56	7	Individual Tree & Group
14/57	11	Overstory Removal
14/61	20(2)	Group Selection
14/61a	5	Patch Clearcut
Total	105(7)	
Habitat Management Unit 208		
17/8	50	Individual Tree & Group
17/23	4	Patch Clearcut
17/25	70	Individual Tree & Group
17/53	8	Seed Tree Cut
17/56	30	Clearcut
17/57	30	Clearcut
18/4	49	Individual Tree & Group
18/4a	24	Clearcut
18/8	37	Individual Tree & Group
18/17	5	Patch Clearcut
18/20	26	Individual Tree & Group
18/20a	10	Clearcut
18/36	3	Patch Clearcut
18/38	4	Patch Clearcut
Total	350	

MAP 3 - Alternative 3
Proposed Lower Loop Analysis Area
White Mountain National Forest
Androscoggin Ranger District
Towns of Berlin & Randolph
Coos County, New Hampshire

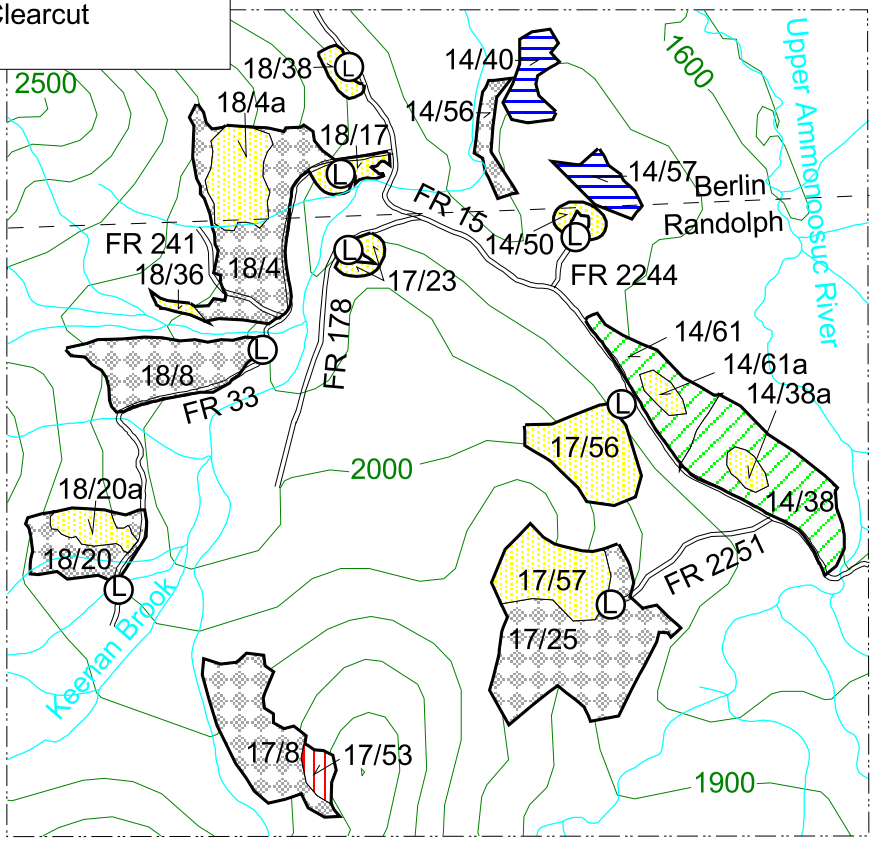
N

0.2 0 0.2 0.4 0.6 Miles

Scale - 1:31680

LEGEND

- Analysis Area Boundary
- Transportation System
- Townline
- River or Streamcourse
- Contour Interval - 100'
- Patch Clearcut or Clearcut
- Seed Tree Cut
- Overstory Removal Cut
- Group Selection Cut
- Individual Tree & Group Selection Cut
- (L) Landing



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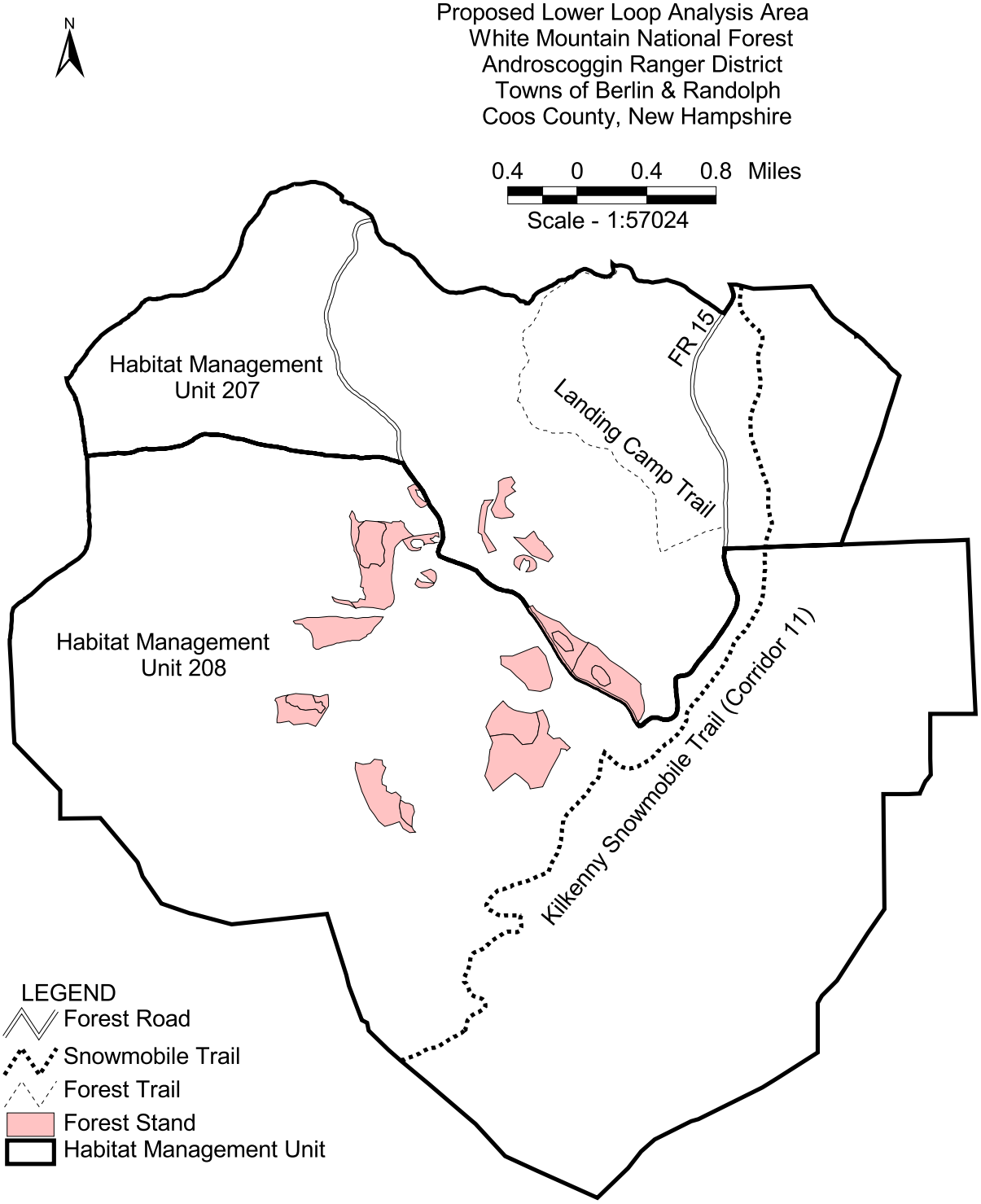
MAP 4 - Habitat Management Units
Proposed Lower Loop Analysis Area
White Mountain National Forest
Androscoggin Ranger District
Towns of Berlin & Randolph
Coos County, New Hampshire



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APPENDIX B - SPECIES WITH POTENTIAL VIABILITY CONCERNS

The following table addresses species identified during Forest Plan Revision as of viability concern for the White Mountain National Forest that are not already listed on the Regional Forester's Sensitive Species (RFSS) list for the Forest. For information on RFSS, see the Biological Evaluation.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Analysis Area?**	**Suitable Habitat within the Analysis Area?**	**Surveys Conducted within the Analysis Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
AMPHIBIANS						
Jefferson Salamander *Ambystoma jeffersoniannum*	Mixed wetland and forested habitat. Vernal to semi-permanent pools are preferred breeding areas. Surrounding habitat usually mature forest with rocky soils, a duff layer, pit and mound topography, large (> 10 cm) logs, and relatively closed canopy. Usually below 1700' elev. Avoids floodplains.	NO	Vernal Pools may occur in areas with hardpan soils.	NO	**NO**	This species has only been documented on the southern portion of the WMNF.
BIRDS						
Bay-breasted Warbler *Dendroica castanea*	Primarily mature coniferous forests (though mixed forests used) up to 4000'. Prefers the thick lower vegetation at edges of small forest openings.	NO	YES	NO	YES	Mature mixedwood in the Project Area.
Rusty Blackbird *Euphagus carolinus*	Prefers northern ponds, wetlands, beaver ponds typically between 1000' to 4000' in elev. Nests found in spruce and fir.	NO	NO	N/A	**NO**	No ponds in the Project Area**.**
Three-toed Woodpecker *Picoides tridactylus*	Year-round resident of spruce/fir zone, which typically occurs above 2500'. Breeds in mature coniferous forest with clumps of snags, including at least some 10-12" in diameter. May prefer flooded or swampy areas.	NO	NO	N/A	**NO**	Project Area below 2500'.
Pied-billed Grebe *Podilymbus podiceps*	Waterbodies usually ≥ 12 acres with both open water and emergent vegetation.	NO	NO	N/A	**NO**	No large water bodies in the Project Area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Analysis Area?**	**Suitable Habitat within the Analysis Area?**	**Surveys Conducted within the Analysis Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
FISH						
Atlantic salmon *Salmo salar*	Larger streams of the Merrimack and Connecticut River watersheds. Also Saco River watershed below Hiram Falls.	NO	NO	NO	**NO**	Atlantic salmon have been stocked into the Upper Ammonoosuc watershed below Godfrey Dam. The Project Area is above Godfrey Dam, which is barrier to salmon movement upstream.
INSECTS						
Boulder Beach Tiger Beetle *Cicindela ancocisconensis*	Open sand or mix of sand and cobble along permanent streams of mid-sized rivers; feed and live on the sandy areas exposed by receding rivers.	NO	NO	NO	**NO**	Project Area is not near a mid-sized river with sandy areas.
Black lordithon rove beetle *Lordithon niger*	Late-successional or old growth northern hardwood or mixed coniferous forest below 2500'. Presently known from The Bowl RNA.	NO	NO	NO	**NO**	No old growth in Project Area**.**
A big-headed fly *Nephrocerus slossonae*	Late-successional or old growth northern hardwood or mixed coniferous forest above 1500'. Presently known from The Bowl RNA.	NO	NO	NO	**NO**	No old growth in Project Area
MAMMALS						
American Marten *Martes americana*	Inhabits coniferous, mixed, and deciduous forest that is 30+' tall with at least 80 ft² of basal area. Prefers structural complexity in stands, including large hollow trees or downed logs.	SUSPECT	YES	NO	**YES**	Most of Project Area has forest 30+ ft. tall with basal area >80 $ft^{2.}$
ODONATES						
Southern Pygmy Clubtail *Lanthus vernalis*	Lives in small, shady spring-fed creeks, preferring clean sandy or mud substrates and shallow running water.	NO	NO	NO	**NO**	No streams with sandy or mud substrates in Project Area.
Forcipate emerald *Somatochlora forcipata*	Found in spring-fed steamlets within subalpine hillside fens with floating vegetation or in pools associated with flowing groundwater in fen areas. Avoid open, sunny fen areas.	NO	NO	N/A	**NO**	Project Area is not subalpine.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Analysis Area?**	**Suitable Habitat within the Analysis Area?**	**Surveys Conducted within the Analysis Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Ebony boghunter *Williamsonia fletcheri*	Found in low elevation sphagnum bogs adjacent to coniferous or mixed coniferous/deciduous forested areas. Absent from most bogs without sphagnum. Larvae may develop in shallow pools (6" to 12") in sedge fens or among sphagnum mats with open pools and not choked with heaths. It appears to utilize openings within the forest rather than completely open upland habitat.	NO	NO	N/A	**NO**	No sphagnum bogs in Project Area.
PLANTS						
Missouri rock-cress *Arabis missouriensis*	In the WMNF, probably restricted to semi-open conditions of richer sites. Typically south or west-facing slopes below 1500'. Associated species include red oak, ash, basswood, sugar maple.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Pickering's Reed Bent-grass *Calamagrostis pickeringii*	Uses a variety of habitats including bogs, wet shores, ditches, and dry streambeds. Often, though not always, at high elevations. Acidic peats, sands, gravels, and shores.	NO	SUSPECT	YES	**NO**	Some streams and ditches occur in the Project Area but surveys did not document this species.
Cut-leaved Toothwort *Cardamine concatenata*	Primarily in rich woods; also in wooded bottoms and on calcareous rocky banks, talus, and ledges. Prefers vernal deciduous openings and closed canopy in summer.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Rocky Mountain Sedge *Carex backii*	Calcareous to circumneutral, dry-mesic, rocky oak-hardwood and limestone hardwood habitat. Also may occur on calcareous to neutral rock outcrops and ledges.	NO	SUSPECT	YES	**NO**	No oak in Project Area**.** Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Hair-like Sedge *Carex capillaris*	Snowbank communities and wet rocks in alpine, and wetter areas of dry-mesic heath alpine habitats.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.
Head-like Sedge *Carex capitata ssp. arctogena*	Wet, acidic, rocky or gravely soil in the alpine. May also occur in similar dry habitats.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.
Scirpus-like Sedge *Carex scirpoidea*	Strongly associated with circumneutral or calcareous rocky summits, outcrops, and cliffs. In NH, only known from open ledges and subalpine habitats.	NO	NO	N/A	**NO**	No cliffs, rocky summits, or subalpine habitat in Project Area.
Pale Painted-cup *Castilleja septentrionalis*	Cool, wet ravines, along alpine brooks, and in wet alpine and subalpine meadows. Soil conditions vary by location from moist organic soil to gravelly soil to calcareous cliffs. Good representative of the snowbank/wet meadow/streamside ravine alpine communities.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Analysis Area?**	**Suitable Habitat within the Analysis Area?**	**Surveys Conducted within the Analysis Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Fogg's goosefoot *Chenopodium foggii*	At cliff bases, on rocky slopes and outcrops, and in sparsely wooded areas; apparently associated with circumneutral habitats	NO	NO	N/A	**NO**	No cliffs or rocky areas in Project Area.
Northern Wild Comfrey *Cynoglossum virginianum var. boreale*	Can occur in enriched northern hardwood or mesic red oak northern hardwood, as well as transition limestone hardwood forests. It is mainly in rich mesic woods on sandy or rocky soil where light is available to the understory. Favors southern and western aspects. May also occur on ledges, cliffs, and talus.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Yellow Lady's Slipper *Cypripedium parviflorum var. pubescens*	Rich deciduous woods and swamps, often along the edges of spring run-off streams, usually at low elevations.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Boreal bedstraw *Galium kamtschaticum*	Prefers somewhat rich seep habitats with non-channelized flowing surface water; found in cool, wet hardwood, mixed, or conifer woods, swamps, and streamsides.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment ans seeps occur in the Project Area but surveys did not document this species.
Moss Bell-heather *Harrimanella hypnoides*	Snowbank communities, wet seeps, and crevices in alpine habitats.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.
Alpine Azalea *Loiseleuria procumbens*	Exposed dry-mesic heath alpine areas including alpine heath snowbank and the Diapensia-azalea-rosebay dwarf shrubland communities.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.
Northern Woodrush *Luzula confusa*	In WMNF, appears to be limited to wet ravine alpine and subalpine communities.	NO	NO	N/A	**NO**	No wet ravines or subalpine habitat in Project Area.
Smooth Sandwort *Minuarta glabra*	Species prefers non-calcareous rocky summits and outcrops up to 3000 ft in elevation. When found in forested habitat in northern New England, it is in openings created by rocky ledges in oak-pine and jack pine communities.	NO	NO	N/A	**NO**	No rocky summits or ledges in Project Area.
Prairie Goldenrod *Oligoneuron album*	Occurs primarily on dry, calcareous cliffs and ledges. May also occur in open fields and roadsides. All known NH occurrences are on calcareous soil or bedrock.	NO	SUSPECT	YES	**NO**	No cliffs or ledges in Project Area. Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Mountain Sorrel *Oxyria digyna*	Typically occurs in snowbank communities and on rocky slopes and ledges of headwalls. May occur near alpine streamsides. Above 3500' in northern New England.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Analysis Area?**	**Suitable Habitat within the Analysis Area?**	**Surveys Conducted within the Analysis Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Viviparous Knotweed *Persicaria viviparum*	Snowbank communities, wet mossy rocks and seeps, and near streams in alpine and subalpine areas.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in Project Area.
Alpine Timothy *Phleum alpinum*	In NH, usually uses wet alpine meadows; may also occur in wet ravines and on damp shores in the alpine zone.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.
Jack Pine *Pinus banksiana*	In WMNF, occurs on rocky summits, rock outcrops and ledges from 2200-4000' elevation; often found on dry, gravelly or sandy sites. Requires moderate to high levels of sun for establishment.	NO	NO	N/A	**NO**	No rocky summits or ledges in Project Area.
Alpine Meadow Grass *Poa pratensis ssp. alpigena*	In NH, uses nutrient poor soils in alpine/subalpine dry-mesic heath and meadow communities.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in Project Area.
Douglas Knotweed *Polygonum douglasii*	Prefers exposed rocky slopes and hillside ledges in well-drained soil where little other vegetation grows. Can also grow in nutrient-enriched hardwood forests if the canopy is open enough; often associated with rocks even in forest.	NO	SUSPECT	YES	**NO**	No exposed rocky summits or ledged in Project Area. Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Algae-like Pondweed *Potamogeton confervoides*	Occurs in strongly acidic soft-water bogs, lakes and ponds at a variety of elevations. Also found in slow-flowing acidic streams. Likes muddy shores with lots of vegetation. Not known to occur in beaver ponds.	NO	NO	N/A	**NO**	No slow moving streams, ponds, or bogs in Project Area.
Yellow Rattle *Rhinanthus minor ssp. groenlandicus*	Snowbank, wet ravine, and wet meadows in alpine/subalpine zone.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in Project Area.
Lapland Rosebay *Rhododendron lapponicum*	Strongly associated with dry-mesic heath communities in the alpine. Prefers slightly sheltered locations. Does not grow on rock outcrops.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.
Silverleaf Willow *Salix argyrocarpa*	Moist soils in alpine or subalpine streamside and ravine.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in Project Area.
Dwarf Willow *Salix herbacea*	In NH, typically occurs in cool, wet ravines, snowbank communities, and along alpine brooks. Grassy, sandy, or rocky places in alpine areas; often on thinner soils than other snowbank/wet ravine species.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.
Satin Willow *Salix pellita*	Uses river or stream banks, floodplain forest, moist thickets, forested swamps, and lake or pond shores. Prefers nutrient rich alluvium	NO	SUSPECT	YES	**NO**	Streams occur in Project Area but surveys did not document this species.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Analysis Area?**	**Suitable Habitat within the Analysis Area?**	**Surveys Conducted within the Analysis Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Three-leaved Black Snake Root *Sanicula trifoliata*	Limy deciduous woods below 1500'. Most occurrences on steep slopes. Appears associated w/ dense, lush ground cover and relatively closed canopy but has been found near clearcuts and cliffs which may indicate it can take advantage of sunny conditions.	NO	SUSPECT	YES	**NO**	No steep slopes in Project Area**.** Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Alpine Brook Saxifrage *Saxifraga rivularis*	Alpine ravines, wet and mossy areas, wet cliffs, and some dry-mesic heath alpine/subalpine communities. May benefit from reduced competition associated with moderate disturbance. May be a nitrophile.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in Project Area.
Arizona cinquefoil *Sibbaldia procumens*	Snowbank/wet meadow/streamside alpine communities; only occurrence is at bottom of a snowfield.	NO	NO	N/A	**NO**	No alpine habitat in Project Area.
Rock Goldenrod *Solidago calcicola*	Edges of and openings in moist rich woods, rocky or gravelly thickets, talus, and cliffs. Open canopy and nutrient richness are key factors.	NO	SUSPECT	YES	**NO**	No cliffs in Project Area. Some pockets of enrichment occur in the Project Area but surveys did not document this species.
Anderson's sphagnum *Sphagnum andersonianum*	Low hummocks in very poor ericaceous fens.	NO	NO	N/A	**NO**	No ericaceous ferns in Project Area.
Angerman's sphagnum *Sphagnum angermanicum*	Poor fens, including at edges of ponds	NO	NO	N/A	**NO**	No ericaceous ferns or ponds in Project Area.
a sphagnum *Sphagnum brevifolium*	Known from poor and intermediate fen habitats. Occupies low hummocks and wet carpets, but seems to prefer high-level carpets.	NO	NO	N/A	**NO**	No fens or bogs in Project Area.
a sphagnum *Sphagnum flavicomans*	Medium to tall hummocks in bogs and poor fens. An indicator species for the *Sphagnum rubellum/Vaccinium oxycoccus* dwarf heath moss lawn in New Hampshire	NO	NO	N/A	**NO**	No fens or bogs in Project Area
Lindberg's sphagnum *Sphagnum lindbergii*	In New Hampshire, restricted to alpine and subalpine peatlands, forming carpets in high elevation heath balds and bogs; prefers peatlands with full sun, low to medium nutrient levels, and pH of 4.0-6.0.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in Project Area.
a sphagnum *Sphagnum majus ssp. norvegicum*	Occurs in lawns in poor sedge fens and along pond margins.	NO	NO	N/A	**NO**	No fens or ponds in Project Area.
Pylaes' sphagnum *Sphagnum pylaesii*	Forms mats over moist or wet rock or is submerged in fen pools; prefers acidic conditions.	NO	NO	N/A	**NO**	No fens or Ponds in the Project Area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Analysis Area?**	**Suitable Habitat within the Analysis Area?**	**Surveys Conducted within the Analysis Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Alpine Meadow-sweet *Spirea septentrionalis*	Cool wet ravines and snowbank communities in alpine and subalpine habitats. Needs open habitats where forest cannot get established.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in Project Area.
Ciliated Aster *Symphyotrichum ciliolatum*	Open woods and dry to moist thickets, shores, and clearings; occurs in openings in pine barrens and dry northern hardwood and red spruce-hardwood forest, and likes clearings and roadsides. Prefers scattered small or large openings in the forest canopy, but not necessarily early-successional forest habitat. Uses sandy soils and sometimes rocky sites.	NO	SUSPECT	YES	**NO**	Small openings and roadsides adjacent to hardwoods and mixedwoods occur in the Project Area but surveys did not document this species.
Northeastern bladderwort *Utricularia resupinata*	Pond, lake and bog shores and margins as well as some wet ditches. Prefers clear, acidic waters with sandy, muddy, or peaty shores. May require low water levels to bloom, and needs a slightly higher than average water temperature.	NO	NO	N/A	**NO**	No ponds or bogs in the Project Area.
Mountain hairgrass *Vahlodea atropurpurea*	In northern New England, is limited to the alpine/subalpine zone, especially herbaceous snowbanks communites.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in Project Area.

#Two plant surveys have been conducted within the Project Area (Engstrom, B. 2003 Report on rare plant field surveys in the Androscoggin Ranger District, White Mountain National Forest, Coos County, New Hampshire. Unpublished report submitted to the White Mountain National Forest, Sept. 25, 2003., Fife K. 2004 unpublished report of plant surveys conducted in the Lower Loop Project Area, Coos County, NH, 6/25/2004.)

APPENDIX C – List of Scoping Comments and Responses

Each comment received during the March 2004 scoping period was reviewed to identify specific issues and concerns. Each comment is listed with a response of how the comment was addressed and where supporting information can be located in the EA.

We appreciate the time all respondents spent reviewing and commenting on the Lower Loop Project Scoping Letter. Thank you for your thoughtful comments.

Where possible in the following discussions, the respondent is quoted directly and in the context of their full comments. All correspondence is filed and available for public inspection in the Lower Loop Project Planning Record located at the Androscoggin Ranger Station in Gorham, NH.

Comments and responses are grouped by category:

1. Support for Proposed Lower Loop Project
2. Vegetation
3. Soils
4. Wildlife
5. Roads

1.0 Support for Lower Loop Project

1.1 **Comment:** "Support of the Lower Loop Project"

Comment: "I find the project well thought out and effective for both environment and economy."

Comment: "I support the proposed project as the correct way to improve the forest and the wildlife habitat."

Comment: "Good project. Seems to help benefit everyone, wildlife and regenerate tree growth."

Response to the Above Comments: We appreciate your interest and support of the Lower Loop Project.

2.0 Vegetation

2.1 **Comment:** "I support the Lower Loop Vegetation Management Project with the exception that I encourage you to increase the acreage planned for regeneration and PWO to the full prescription of the 1986 Forest Plan."

Response: We developed Alternative 3 in response to your comment to increase the planned acres of regeneration harvest. However due to past timber management, current stand conditions and location of treatable stands, we were not able to meet the full prescription of the Forest Plan for regeneration age habitat. As for PWO, we do not have the funds or manpower to maintain all the PWOs required to meet the DFC for HMU 207 and 208.

2.2 **Comment:** "I wonder if previous logging, prehistoric conditions and the natural range of variability have been adequately considered, as they may give information concerning land capacity and Needs in the Project Area."

Response: During the timber sale planning stage, criteria for selecting potential stands for harvest are based on past management history and current stand condition from field surveys. The lands within the analysis area have a long history of logging based on past records and physical evidence in the woods (old stumps and skid trails). Cultural Resource surveys are conducted to identify potential cultural resources within the project area and the findings are documented in a cultural resource report (Section 3.11) which is sent to the State Historic Preservation Officer (SHPO) for review. Range of viability is documented in the Wildlife Section (Section 3.9).

2.3 **Comment:** "The Purpose of this project is to accomplish resource objectives, but seems to not consider all objectives and all reasonable means of reaching objectives."

Response: All the lands within the analysis area fall within MA 3.1 whose goals are to provide large volumes of high quality sawlogs on a sustainable yield, increase habitat diversity with an emphasis on early successional species and grow small diameter trees for fiber. The most reasonable means of achieving these goals, both economically and in reasonable time frame, is through commercial timber operations. Though natural disturbance events also help achieve these goals, predicting when, where and the extent of damage is not possible. Thus we can not rely on natural disturbance to achieve our HMU goals for 207 and 208.

2.4 **Comment:** "Is there evidence that sawlog quality has improved under USFS management?"

Response: Research conducted by Leak and Sendek in the northern hardwood stands of New England has shown that the percent volume of grade 1 and 2 butt logs has increased from 21% to 30% for beech and increased from 40% to 65% for sugar maple. This was looking at changes spanning 48 years of individual tree selection harvest.

2.5 **Comment:** "It seems that the Proposed Action gives inadequate consideration to vegetation management by methods other than commercial logging. The DFC for early successional habitat might be at least partly met on land with natural capacity for remaining

in a brushy condition. Timber is best suited for areas with fast reproduction and growth. Early successional habitat in such areas is ephemeral and may have less value"

Response: The only lands that have a natural capacity to remain in a permanent brushy condition are wetlands which make up 2% of the analysis area. Wetlands provide a unique habitat that differs from the early successional habitat created on drier land. Each one of these habitats contains different herbaceous species mix which adds to the diversity of the forest habitat. Though the creation of regeneration age habitat on timberland is ephemeral, it still is a valuable component for many early successional species.

2.6 **Comment:** "Existence in the past of extensive s/f forest seems to indicate a natural capacity for quality spruce and the DFC calls for more s/f. Uneven-aged management can be used to increase the acres, but Table 3 seems to indicate "maintain softwood component" at best. Please explain what seems to be a failure to meet the Need to approach DFC for s/f."

Response: Taking actions such as removing overtopping hardwoods to encourage softwoods is moving us toward the objectives. Also, focusing our efforts on uneven-age silviculture on softwood-capable ELTs maintains or increases the softwood composition, and helps avoid an intermediate stage predominated by hardwoods. On many sites, however, especially at low elevations, it will take a long-term investment of time and effort to increase softwood representation because much of this land was heavily harvested, burned, and in some cases, used for agriculture, in the early 1900s.

3.0 Soils

3.1 **Comment:** "Is there evidence that repeated harvesting is sustainable? I am particularly concerned by possible loss of calcium and organic matter and by soil compaction and residual damage by heavy equipment."

Response: The Forest has been working on this issue since the early 1990's. The EA discloses that trends in biomass accumulation (an ecological measure of growth) show no apparent changes since early measurements starting in 1931 on the least calcium rich soils, despite acid deposition starting in the 1950's and lasting most intensely until passage of the Clean Air Act in 1970. Some believe species composition is a more useful measure, but this measurement, also on the least calcium rich soils, does not show any substantial change over time. It was believed that as soils acidify, due especially to excess nitrogen (an acid anion), that more nitrate would appear in stream water. However, re-measurement of streams done initially in the late 1970's did exactly the opposite, nitrates went down. The reasons are unclear.

In this proposed timber sale, "bole-only", not "whole-tree" harvest, is proposed. This diminishes calcium removed from the site by about 35%. As you may know, the Forest harvests about 20-24 MMBF of timber a year, compared to a biological

potential of about 60 MMBF (where cut would equal growth); so our rate of harvest is overall comparably low. And finally, as you may also know, our soil scientist is currently working with scientist's from the Northeast Research Station and Complex Systems evaluating forest health at 40 sites on the Forest. These sites, previously visited to establish long-term soil monitoring for soil calcium, are now being evaluated for forest health and productivity.

Our evidence to date is not leading us to believe that sustainability is at risk in our forest soils.

4.0 Wildlife

4.1 Comment: "How would the Proposed Action increase habitat for species other than early successional species? Which early successional species would benefit from the Proposed Action? Are there any species which would fail to thrive without the Proposed Action?" "The forest plan may not provide a balanced mix of wildlife habitat because of a lack of old growth at low elevations."

Response: The Forest developed a wildlife strategy to provide the major habitat components required by all of the wildlife species that occur on the Forest. This strategy was designed to distribute these habitat components across the landscape (Appendix B. of the Forest Plan, USFS 1986a).

Much of the information that was used to assess species/habitat associations is compiled in *DeGraaf, R. M. and Rudis, D. 1986. New England wildlife: habitat, natural history, and distribution. USDA Forest Service, Northeastern Forest Experiment Station Gen. Tech. Rep. NE-108.* This publication has now been updated (DeGraaf and Yamasaki 2001). Many of the wildlife species on the Forest require mature forested habitats for all or part of their life cycle and many require disturbed habitats for all or part of their life cycle. Disturbed habitats occur as the result of natural disturbances such as wind or ice storms or by manmade disturbances such as timber harvesting.

The wildlife strategy ensures that a large percentage of habitat on the Forest is mature or overmature. Most of the forested habitat on the Forest (approximately 400,000 acres) is not actively managed to change vegetative conditions and is mature or overmature. In addition, approximately 50% of forested habitat within actively managed areas (180,000 acres) is designated to be in mature or overmature age class. In general, actively managed lands are below 2500 feet elevation. A ten-year review of the Forest Plan concluded that habitat conditions in the managed portion of the Forest strongly favored species that prefer mature forests (USFS 1997). The Forest has only achieved about 50% of its desired goal for regeneration or young age classes of forested habitat and far exceeded its goal for overmature habitat (USFS 1997).

Management Indicator Species are defined for the various habitats on the Forest. An evaluation of these species showed that most species were stable or increasing in population levels and habitat. The only exception appears to be with species associated with early successional habitats (USFS 2000a, 2001a). Species that would benefit from the creation of early successional habitat are the chestnut -sided warbler, ruffed grouse, rufous-sided tohee, northern junco, eastern kingbird, mourning warbler, eastern bluebird, moose and the snowshoe hare.

Finally, there is old growth habitat at low elevations on the WMNF. Mountain Pond RNA (Research Natural Area) is one example for northern hardwoods. Shingle Pond RNA is another, for both hardwoods and softwoods. The lower reaches of Nancy Brook RNA would qualify. The Bowl RNA is hardwood and softwood old growth (the first RNA designated in the USFS). There is also a hemlock spruce old growth stand along Rattle River, about a mile upstream.. We also have approximately 35,000 acres in softwoods and 60,000 acres in hardwoods in low elevation areas that are in an MA where no vegetation management can occur. While these areas are not likely old growth, they are in or moving towards late successional habitat.

We currently have no information that leads us to believe that any of the wildlife species on the White Mountain National Forest are dependent on old growth habitat. One study done on birds in old growth northern hardwood stands in the White Mountain National Forest versus managed northern hardwood stands found no difference in bird species composition (*Absalom S. 1988. Comparison of avian community structure and habitat structure in mature versus old-growth northern forests. M. S. thesis. University of Massachusetts, Amherst. 80pp.*). A recent Species Viability Assessment on the Forest did identify some invertebrate species that are associated with late successional forest (USDA Forest Service 2004).

4.2 Comment: "PWO should preferably be in areas with a natural tendency to remain brushy. Stump removal should not necessarily be required as it might result in compaction, loss of organic matter, erosion and stumps may be valuable habitat."

Response: Based on years of experience, the forest tends to revegetate quickly to saplings via forest succession and few areas tend to remain in a brushy state without some type of active management. We agree that there might be some areas that are more conducive for creation of permanent wildlife openings than others. As a result, a research project is ongoing to assess bird and butterfly use of permanent wildlife openings on the Forest to assess if factors such as location of wildlife openings, types of treatment, or vegetative condition make a difference in use by birds that nest in brushy openings or types of butterflies that occur in these areas.

Due to the relatively small size of a Permanent Wildlife Opening, the potential amount of compaction, loss of organics, or erosion would not be substantial. Down woody debris is considered valuable habitat and Forest Standard and Guidelines as well as mitigation measures ensure that this habitat feature will be protected. Stumping is necessary in order to maintain the opening via mowing.

4.3 Comment: "Bear claw marks are evidence of past use but are they evidence of future value?"

Response: Yes. Bear clawed beech trees used are often revisited in the future, and the EA considered these trees as valuable wildlife habitat via foreseeable future cumulative effects. Mitigation measures ensure that beech trees that have an abundance of bear claw marks are reserved unless they are a safety hazard.

4.4 Comment: "Because of potential risk of chronic waste disease, care should be taken to avoid high deer population."

Response: There are no documented cases of Chronic Wasting Disease in NH to date, and the New Hampshire Fish and Game Department (NHFGD) is monitoring the situation and taking precautions. To learn more about how the State is addressing this concern you can visit their website at http://www.wildlife.state.nh.us/Wildlife/CWD_QandA.htm).

The WMNF manages habitat for all the wildlife species that occur on the Forest, including white-tailed deer. The Forest works closely with the New Hampshire Fish and Game Department in managing white-tailed deer habitat. Currently, white-tailed deer populations are below desired levels in the northern portion of the White Mountain National Forest (NHFGD 2003 Wildlife Harvest Summary). The State Harvest Summary which addresses population goals for white-tailed deer can be found at http://www.wildlife.state.nh.us/Hunting/Hunting_PDFs/Wildlife_Harvest_2003.pdf.

5.0 Roads

5.1 **Comment:** "The Roads Analysis Proposal gives insufficient information to know whether mileage would increase or decrease."

Response: The roads analysis proposal identified all roads, their mileage and classification within the analysis area. We are not reclassifying any roads at this time, but are considering decommissioning or removing a total of 1.9 miles of roads from the Forest Service transportation inventory and converting .94 miles of unclassified roads to classified roads and adding them to the Forest Service transportation inventory.

5.2 **Comment:** "With all the roadless advocates… you'll have a tough job getting more roads approved in the future. It may be wise to keep the existing roads for future management use."

Response: Many of the roads within the analysis area were built to access stands for timber harvest. Reviewing stands and their future logging potential, we are only considering decommissioning roads not needed for long term vegetative management. The rational for decommissioning specific roads or portions of roads is: they are near existing main roads and are not required for logging, they are located on steep terrain, or as one road does, extends into a management area (MA 6.1) that is designated as non-motorized.

5.3 **Comment:** "Need to address snowmobile access and disability impact due to decommissioning of existing roads or declassifying roads."

Response: The only snowmobile trail in the analysis area is Corridor 11 snowmobile trail which runs parallel to Bog Dam Road and along the Pond of Safety Road. We only allow snowmobiles on designated trails and none of these are proposed for decommissioning. As mentioned in Response 5.1, we are not reclassifying any roads at this time, but in the future, when we do evaluate our transportation system, we will evaluate the effects on all resources.

APPENDIX D – Mitigation Measures

In addition to the applicable Forest-wide and Management Area standards and guidelines listed in the Forest Plan (pages III-5 through III-29 and III-36 through III-41). The following specific mitigation would be applied to all action alternatives.

Vegetation

- To ensure that early-successional species are present in mature hardwood stands for wildlife, a component of mature aspen, paper birch, and softwood would be reserved. For paper birch, 2 or 3 mature or over mature trees would be reserved per acre. For aspen, 2 or 3 mature or over mature trees would be reserved per acre and for softwoods, reserve small inclusions of 2 or 3 trees per acre.
- Beech trees genetically resistent to scale complex would be reserved from harvest.
- Only individual tree selection would be allowed in the portion of stand 18/4 where squirrel corn has been identified.
- The sale administrator will lay out or approve main skid trails through the stands before harvesting begins. This will reduce the area affected by skid trails in the stand, thereby reducing the number of trees damaged.

Visual Quality

- Slash disposal zones would be along FR 15. All slash would be removed within 50 feet of the roadway and lopped to within 3 feet of the ground for another 50 feet.

Soils

- For landings that are designated as a permanent wildlife opening (18/17,17/23, 18/38 and 14/50), limit the area used for a landing to minimize soil compaction from heavy machinery. If adequate topsoil is left upon completion of harvesting, scatter any remaining slash on landing. If topsoil is removed and the site is compacted, revegetate with winter rye and allow native vegetation to reestablish over time. If needed use straw as mulch.
- At the completion of the timber harvesting activity, skid trails and temporary access roads to landings will be water barred and seeded with winter rye where there is exposed mineral soil and risk of erosion. With few exceptions, this should prevent soil erosion.

Water

- Any harvesting within 100 feet of a perennial stream will maintain at least 70% crown closure (SPNHF 1997).
- Trees adjacent to the channel will be retained to provide structure and stability and stream crossings will be in designated locations.

- Trees will be felled directionally away from streams where possible.
- Monitor stream crossings that need restoration and continue to treat until stabilized.
- For stream crossing during the winter, ensure ice is thick and ground is frozen. Where these conditions are not met, use additional mitigations such as more sediment and drainage control and alternate crossing structures.
- The timber sale contract will contain clauses entitled "Prevention of Oil Spills, CT 6.341", "Sanitation and Servicing CT 6.34", and Hazardous Substances CT 6.342, requiring the timber purchaser to take preventive measures to ensure that any spill of petroleum products does not enter any stream.
- Main skid trails will be located on slopes 40 percent or less.
- Watershed protection measures such as waterbars and sediment control will be maintained as considered necessary until no longer needed.
- Stream crossings will be restored, as needed using shaping, matting, seeding, or other effective methods to restore stream morphology and function.
- Install stream-crossing structures at right angles to the stream channel in straight sections.
- An intermittent tributary (number 4) in the Keenan Brook watershed would be moved back to its original channel.
- Logging debris would not be placed in riparian areas.
- Old bridge abutments would be removed along FR 33 during culverts installation.

Fisheries

- Within stream channels that support brook trout, bridge and culvert and bridge installations that have the potential to disturb soils would be installed during the period of May 1 to September 15 to protect spawning and egg rearing habitat.

Wildlife

- During the raptor nesting season, avoid harvesting activities within 0.25 miles of known, active raptor nests. Maintain an uncut buffer of at least 66 feet around known raptor nest trees and retain 65-85% canopy closure within 165 feet of any nest (Flatebo 1999).
- During harvesting, avoid disturbing existing large woody material on the ground, especially hollow logs greater than 18 inches in diameter. Exceptions may include skid trail locations that cannot be moved to avoid such material because of land features.
- Beech trees with an abundance of bear claw marks should not be marked for cutting unless the tree is expected to die in the near future. Exceptions may include hazardous trees or parts of skid trails or landings that cannot be moved because of land features. Another exception would be in regeneration harvests designed to create optimum conditions for the regeneration of paper birch, aspen or softwoods. In these instances, beech trees may be reserved to meet requirements for reserve patches or wildlife trees. In areas with heavy concentration of bear trees, patches of habitat will be reserved to minimize damage to the trees.
- To have the least impact on wildlife that roost or feed in dead and decayed trees, snags will be left standing unless they pose a threat to personal safety during harvesting activities or they lie within a necessary skid trail location. When implementing Forest

Plan Standards and Guidelines for wildlife trees (Forest Plan III-15 and Appendix B-21 as amended in April, 2001), priority will be given to trees that have existing or potential exfoliating bark and observable cavities.

- Vernal Pool Recommendations (from Carlson and Sweeney 1999): Vernal pools are defined as naturally occurring seasonal, semi-permanent or permanent bodies of water, free of predatory fish populations, that provide breeding habitat for certain amphibians and invertebrates. To guide forestry activities, the vernal pool and surrounding area can be divided into three management areas.

  Vernal Pool: The vernal pool depression is the area that is saturated at the time of spring high water. It may be dry during summer or early fall. This depression should remain in an undisturbed state year-round; specifically, the soils should not be compacted or excavated, vegetation should not be disturbed and the area should remain free of slash and sediments associated with harvesting.

  Vernal Pool Protection Zone: The area within 100 feet of the edge of the vernal pool is important to maintain water quality, provide shade and leaf litter, and habitat for migrating amphibians. A forest having at least 70% canopy cover should be maintained and the forest floor should be kept free of ruts, bare soil, and sources of sedimentation. Where possible, harvesting activities should occur during winter when the ground is frozen in order to minimize possible rutting, litter disturbance and sedimentation. However, careful operations under dry conditions can also minimize these effects.

  Upland Amphibian Habitat: Amphibians live in the associated upland habitat for the majority of the year. Where possible, in this zone (between 100 and 500 feet from the edge of the vernal pool) forestry activities should a) minimize disturbance to the forest floor by using controlled yarding, harvesting on frozen ground, and avoiding location of landings and roads in this area; b) maintain natural litter composition by avoiding stand type conversion; c) maintain coarse woody material by leaving limbs onsite (including snags for future down wood) and, d) maintain a shaded and moist forest floor with at least 60% canopy closure.
- Contract provisions will ensure protection of any known T&E plants as well as those identified during the contract term.
- Any prescribed burning of the permanent wildlife openings or forest stands will follow guidelines outlined in an authorized prescribed burn plan.
- Mowing or stumping of the permanent wildlife opening would occur during dry site conditions, usually between late July and November.
- Slash within permanent wildlife opening expansions would be pulled back 30 feet from the edge of into the harvest unit to reduce damage to residual trees along the edge.

Invasive Plants

- Heavy equipment must be visibly free of mud, dirt, seeds, and plant parts prior to entering the project area. Cleaning should take place off-Forest unless an on-Forest cleaning site has been approved by a Forest Officer in advance.
- To reduce the risk of spreading weed infestations, project operations would begin in uninfested areas before operating in weed-infested areas.

- Before ground disturbance is initiated, control any weeds already existing in the project area.

- Gravel and fill must come from weed-free sources. The Forest will be available to work with owners of local gravel sources to identify weed-free borrow material in their pits. The entire pit or fill area need not be identified as weed-free; material may be used that is not likely to contain invasive plants or seeds.
- Retain native vegetation in and around the project activity to the maximum extent possible. For clearcuts adjacent to infested roads, maintain a vegetation buffer of at least 75 feet between the road and cutting boundary. For activities adjacent to streams and rivers follow current standards and guidelines regarding management within riparian areas.
- Minimize soil disturbance to no more than needed to meet project objectives. Logging practices that reduce soil disturbance include, but are not limited to, oversnow logging and reuse of landings, skid trails, and haul roads.
- Where project disturbance creates bare ground, consistent with project objectives, re-establish vegetation to prevent conditions to establish weeds. Use native seed where appropriate and feasible, and use certified weed-free or weed-seed free hay or straw where certified materials are reasonably available. Where impractical, use a non-persistent, fast growing species like winter rye.

Plants

- Minimal road maintenance (ie.snow plowing, mowing) would occur along portions of the Keenan Brook road where Squirrel Corn has been identified. Mowing would be limited to the fall to minimize disturbance.

Heritage Resources

- Timber markers will create a buffer around any discovered Heritage Resource sites by not marking trees within one-and-one-half tree lengths from artifacts.
- The Sale Administrator will ensure that skid trails and felling/skidding operations do not interfere with any of these sites.
- If unknown sites or artifacts are located within the Project Area, harvesting would be halted until the Forest archaeologist or district paraprofessional can evaluate the findings and make recommendations on how to proceed.
- Cultural resources would be identified on sale area maps and in the timber sale contract.
- Provisions within the timber sale contract would address protection to heritage resource sites should any be discovered within the Project Area.

Recreation

- Speed limit and hazard safety signs will be posted on FR 15 during harvest activity.

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APPENDIX F – Glossary

Basal Area (BA) - The area of the cross section of a tree a 4.5 feet above the ground. Generally expressed as total Basal Area per acre. Under uneven-aged management, usually 30 to 40 percent of the basal area is removed. Under even-aged management, 30 to 100 percent of the basal area is removed depending upon the needed silvicultural treatment.

Ecological Land Type (ELT) - An area of land with a distinct combination of natural, physical, chemical, and biological properties that cause it to respond in a predictable and relatively uniform manner to the application of given management practices. In a relatively undisturbed state and/or at a given stage (sere) of plant succession, an ELT is usually occupied by a predictable and relatively uniform plant community. Typical size generally is several hundred acres.

Ecological Land Type Phase - These are subdivisions of those ELTs where vegetation management is most common. They share the same characteristics as ELTs; however, their size is smaller (10-100 acres) and the biological and physical conditions are more limited. They are locally known as Forest Habitat Types.

Even-aged Management - A timber management system that results in the creation of stands where trees of essentially the same age grow together. Harvest methods producing even-aged stands are clearcut, thinning shelterwood, and seed tree.

Clearcutting - removal in a single harvest of the entire stand to prepare the area for rapid seed germination and growth of a new even-aged stand of shade intolerant trees. Shade intolerant trees are tree species that need full or near full sunlight to regenerate and grow.

Salvage Cut - Trees are harvested after some natural disturbance in order to salvage potential wood products before the trees become less valuable or unmerchantable. Depending on the severity of damage, the harvest may consist of harvest of individual trees or of groups of trees. In severe cases, all trees in a stand may be removed to begin a new stand. Disturbances include but are not limited to wind, ice storms, fire, insect infestations and disease.

Seed Tree – A harvest that leaves five or so dominant trees per acre as a seed source for the regenerating stand. A seed tree harvest appears similar to current clearcut units in that both prescriptions leave individual trees standing per acre within a unit to meet silvicultural or other resource objectives.

Shelterwood - This harvest method provides a source of seed and shade protection for regeneration. The original stand is removed down to a prescribed basal area, in

two or more successive harvests. The first harvest is ordinarily the seed cutting (sometimes called the regeneration cut). A second harvest often follows a number of years later once regeneration is well established, and is referred to as a final harvest or shelterwood removal harvest. An even-aged stand results.

Thinning - Thinning operations where the harvested material can be sold on the market as opposed to pre-commercial thinning.

Overstory Removal – Mature trees are removed to release regeneration once it has become established, for example in a shelterwood final harvest.

Forest Product - Sawtimber, millwood, pulpwood, and chipwood are the raw products utilized from a tree in a minimum piece length of 8 feet.

Sawtimber minimum piece specification requires a minimum diameter outside bark of 9.0 inches for softwood and 11.0 inches for hardwood and 40 percent sound wood.

Pulpwood minimum piece specification requires a minimum diameter outside bark of 5.0 inches and 50 percent sound and reasonably straight.

Habitat Management Unit (HMU) - A large unit of land with boundaries commensurate with compartment boundaries, and which includes a mix of habitat types. At least one of these types must be a pond or stream with wetland potential.

Habitat Type - A small unit of land from a few to over 100 acres lying within a given climatic mineralogical zone and supporting a distinct successional sequence of vegetation growing on a unique type of soil material.

Indicator Species - A plant or animal species adapted to a particular kind of environment. The arrangement of habitats (by tree species and age group) reflects requirements for selected wildlife species. They are designated a management indicator species. Their presence is sufficient indication that specific habitat conditions are also present. These species represent groups of other species with similar habitat requirements.

Interdisciplinary (ID) Team - A group of individuals with skills for management of different resources. Team member interaction provides necessary insight to all stages of the process.

Projected Existing Condition of Habitat Management Unit - The existing acres of the community type by age class would change over time. The expected changes are projected to a future year that becomes the existing condition for that community type by age class.

Riparian Management Zone - A term used by the Forest Service which includes stream channels, lakes, adjacent riparian ecosystems, flood plains, and wetlands.

Road reconstruction – upgrading a road to a different use level such as from winter use to summer use road.

Road restoration - rebuilding a road to the standard originally constructed. For example, replacing temporary drainage structures, temporary removal of waterbars or other drainage features to allow for traffic, clearing vegetation that obstructs visibility and smoothing and grading road surfaces.

Road construction – building new road.

Temporary road – a low standard road constructed for a single entry with a minimum of disturbance and that is waterbarred and closed following use.

Silviculture - A combination of actions whereby Forests are tended, harvested, and replaced.

Stand (Forest) - A community of naturally or artificially established trees of any age sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities, thereby forming a silvicultural or management entity. A Hardwood Stand is defined as a stand which at least 75 percent of the overstory and understory are hardwood trees. A Softwood Stand is defined as a stand which at least 65 percent of the overstory and understory is softwood (conifer) trees. A Mixed wood Stand is defined as a stand with hardwoods trees mixed with softwoods trees. The 25 to 65 percent of this stand consists of red spruce, balsam fir, and eastern hemlock.

Streams - Non-perennial and perennial are two types of stream that the quantity of water can be measured.

Intermittent Streams - Streams with a defined channel that the quantity of flowing water can be measured except during the dry summer months.

Perennial Streams - Streams with a defined channel that the quantity of flowing water can be measured year round.

Uneven-aged management - The application of a combination of actions needed to maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Harvesting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Harvest methods that develop and maintain uneven-aged stands are individual selection, improvement, and group selection, and salvage.

Individual Tree Selection - A method where individual trees are selected and harvested in a stand while maintaining a prescribed number of trees in each diameter class ("Q" Factor).

Improvement Cut - An interim step to developing an uneven-aged stand structure by removing lower quality stems, leaving a residual basal area of about 65-70 sq.ft. (hardwood) or 80 to 100 sq.ft. (mixedwood) per acre.

Group Selection - A harvest method that describes the silvicultural system in which trees are removed periodically in small groups, resulting in openings that do not exceed an acre or two in size. This leads to the formation of an uneven-aged stand, in the form of a mosaic of age-class groups in the same forest stand.

Visual Quality Objectives - A desired level of scenic quality. Refers to the acceptable degree of alteration of the characteristic landscape:

Preservation - A visual quality objective that provides for ecological change only.

Retention - A visual quality objective that means that management activities are not evident to the casual Forest Visitor.

Partial Retention - A visual quality objective that means management activities may be evident but must remain subordinate to the characteristic landscape.

Modification - A visual quality objective that means that management activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture.

Volume - The measure of quantity forest products (sawtimber, pulpwood, and chipwood).

Board Foot - A measure of lumber volume for sawtimber. The cubic equivalent of a piece of lumber 12 inches wide, 12 inches long, and 1 inch thick. MBF is the measure for 1000 board feet.

Cord - A measure of volume for pulpwood and millwood. One cord equals one stack of wood measuring 4 by 4 by 8 feet or the equivalent of 500 board feet.