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Forest
Service

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COUNTY LINE VEGETATION MANAGEMENT PROJECT

Towns of Livermore and Harts Location
Grafton and Carroll Counties, New Hampshire

Environmental Assessment



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County Line Project EA

Cover Sheet

Management Action: Timber harvest to implement timber and wildlife habitat management goals in the County Line Project Area, HMUs (Habitat Management Units) 511, 512 and 513.

Agency: United States Department of Agriculture, White Mountain National Forest, Saco Ranger District.

Cooperating Agency: New Hampshire Department of Fish and Game

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Abstract

The County Line Project is located in the Town of Livermore in Grafton County, and the town of Harts Location, Carroll County, New Hampshire. The analysis area lies south of the Pemigewasset Wilderness. Sawyer River is the primary drainage for the analysis area. Carrigain, Whiteface, Halfway, Nancy, Stony Brook and other small unnamed tributaries are within the analysis area. County Line analysis area contains approximately 15,776 acres in three HMUs. The analysis area contains MAs 2.1, 3.1, 6.1, 6.2, 6.3, 8.1 and 9.3 as identified under the White Mountain National Forest Land and Resource Management Plan. This includes approximately 1,756 acres of MA 2.1 and 3,174 acres of MA 3.1 in the analysis area.

"No Action", Alternative 1, does not propose active management within the project area.

The Proposed Action, Alternative 2, would diversify wildlife habitat in terms of successional communities and softwood development, harvesting approximately 4.0 MMBF (million board feet) of timber from approximately 573 acres of National Forest lands. Project objectives are to enhance softwood habitat through approximately 75 acres of single-tree selection, increase early successional habitat by creating approximately 153 acres of hardwood regeneration habitat through clearcutting, and improve timber quality and species composition in hardwood and mixedwood stands through approximately 345 acres of commercial thinning and single tree selection. Proposed operating seasons would be summer, fall, and winter. Access to the project area is via Forest Road 34, the Sawyer River Road. Use of secondary roads would include reconstruction of one mile of Forest Road 85, 1.4 miles of Forest Road 513 (including 1000 feet of road relocation), and 0.74 miles reconstruction of temporary access to units 1 and 2. Seven hundred feet of temporary road is also needed. Associated projects

include work on Whiteface Brook Bridge, trail improvement projects, improved facilities at Fourth Iron Campground and for winter parking, and a temporary bridge at Carrigain Brook. The Proposed Action would achieve management goals of diversifying wildlife habitat and producing timber products.

Alternative 3 would harvest approximately 1.5 MMBF of timber from 304 acres of National Forest lands. This alternative would enhance softwood habitat through approximately 5 acres of single-tree selection, increase early successional habitat by creating approximately 36 acres of hardwood regeneration habitat through clearcutting, and improve timber quality and species composition in hardwood and mixedwood stands through approximately 263 acres of commercial thinning and single tree selection. Proposed operating seasons would be summer, fall, and winter. This alternative includes access via Forest Road 34, the Sawyer River Road and includes reconstruction of 1.4 miles of Forest Road 513 (including 1000 feet of road relocation).

Seven hundred feet of temporary road is also needed. Associated projects include work on Whiteface Brook Bridge, and improved facilities at Fourth Iron Campground and for winter parking. This alternative would achieve some management goals by diversifying wildlife habitat on 304 acres and producing timber products.

Alternative 4 would diversify wildlife habitat in terms of successional communities and softwood development, harvesting approximately 2.2 MMBF (million board feet) of timber from approximately 455 acres of National Forest lands. This alternative would enhance softwood habitat through approximately 56 acres of single-tree selection, increase early successional habitat by creating approximately 51 acres of hardwood regeneration habitat through clearcutting, and improve timber quality and species composition on approximately 348 acres of northern hardwoods. This alternative would also implement a group selection harvest in a 22-acre stand. Proposed operating seasons would be summer, fall, and winter. Access to the project area is via Forest Road 34, the Sawyer River Road. Use of secondary roads would include reconstruction of one mile of Forest Road 85, 1.4 miles of Forest Road 513 (including 1000 feet of road relocation), and 0.74 miles reconstruction of temporary access to units 1 and 2. Seven hundred feet of temporary road is also needed. Associated projects include work on Whiteface Brook Bridge, trail improvement projects, improved facilities at Fourth Iron Campground, and a temporary bridge at Carrigain Brook. This alternative would achieve management goals of diversifying wildlife habitat and producing timber products.

County Line Vegetation Management EA

Document Summary

The Saco Ranger District of the White Mountain National Forest is proposing the following management activities under the Proposed Action in the County Line Project:

- Even-aged and uneven-aged timber management on 573 acres
- Road Reconstruction on 3.15 miles of existing road
- Road relocation on 1,000 feet of new road
- Seven hundred feet of temporary road
- Improvements to roads, recreation, and other resources in the area

County Line Project is located in the Town of Livermore in Grafton County, and the town of Harts Location, Carroll County, New Hampshire, on the Saco Ranger District of the White Mountain National Forest. Sawyer River is the primary drainage for the analysis area. Carrigain, Whiteface, Halfway, Nancy, Stony Brook and other small unnamed tributaries are included in the analysis area. County Line analysis area contains approximately 15,776 acres in HMUs 511, 512 and 513, and includes actions within Management Areas 2.1 and 3.1.

The following list describes the “need for change” and opportunities identified for the County Line project area that would implement the White Mountain National Forest Plan.

1. There is a need to increase the acres of early successional habitat.
2. There is a need to increase the softwood component in some stands.
3. There is a need to create a more desirable stocking of species, size, and quality hardwood trees, while providing forest products to the local economy.
4. There is a need to provide or maintain safe access (roads and bridges).
5. There is a need to replace or improve certain recreation facilities within the analysis area.

The proposed action may result in the following effects:

- Minor reduction in soil calcium within treated areas
- Short-term minor sedimentation may occur at temporary stream crossings
- Temporary openings where clearcutting and group selection harvests occur
- Establishment of new tree seedlings in partial cut units and within openings
- These openings, a maximum of 153 acres in units, would reduce mature forest by those 153 acres, and yet create an over-all increase in age-class diversity and the associated benefits to wildlife species dependent on this habitat
- Road reconstruction would maintain but not add to existing (non-vehicular) access
- Road reconstruction, skid trails, and the associated recreation projects may result in very minor, localized, and short-term direct and indirect effects to wildlife and fish habitat as related to sediment, turbidity, and/or travel impediments and displacement
- Timber Sale offer may provide 4,000 MBF of timber for harvesting, manufacturing, and

marketing jobs and may provide gross receipts of \$244,000 to the US Treasury and \$235,200 to the Town of Harts Location and the State of New Hampshire for the 10% Timber Yield Tax and the 25% fund.

This environmental assessment will provide the deciding officer (Saco District Ranger) with information to make informed decisions on the County Line Vegetation Management Project and provides the basis for determining:

- Which alternative best meets the purpose and need to move the County Line project area towards the desired condition in accordance with Forest Plan direction, addresses the need for change, and responds to the identified issues?
- Is the information in this analysis sufficient to implement the proposed action?
- Does the proposed project have a significant impact on the human environment that would trigger a need to prepare an Environmental Impact Statement?
- Are the proposed mitigation measures and monitoring requirements sufficient to meet Forest Plan standards and guidelines for all resources?
- Does the decision and alternatives considered meet applicable federal, state, and local laws and policies, including consistency with the Forest Plan?
- Is a Forest Plan amendment required prior to implementation of this project?

This document is available in large print.

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County Line Vegetation Management EA

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 four chapters:

- **Chapter 1 – Purpose and Need:** Chapter 1 includes information on the history of the project area, Forest Plan direction, the purpose and need for the project, and the agency’s proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal (Scoping), and lists the unresolved (40CFR1501.7) issues for the proposed action.
- **Chapter 2 - Alternatives:** Chapter 2 details the Proposed Action and alternatives to the proposed action that were considered to meet the purpose and need for the project. Included are a list of Alternatives Eliminated from Detailed Consideration, Mitigation Measures to be applied, and a table comparing the alternatives.
- **Chapter 3 – Affected Environment and Environmental Consequences:** This chapter describes the environmental effects of implementing the proposed action and the other identified alternatives and is organized by resource area. Each section details:
 1. The affected environment
 2. Direct and indirect effects of the No Action and the action alternatives
 3. Cumulative effect of the alternatives with past, present and future actions.
- **Chapter 4 – List of Preparers and Agencies Consulted:** This section provides a list of people involved in the analysis and preparation of the environmental assessment including internal and external contacts.

Appendices of additional information including:

- Appendix A Biological Evaluation
- Appendix B Management Indicator Species Table
- Appendix C Management Systems and Harvest Methods
- Appendix D Acronyms and Abbreviations
- Appendix E Glossary
- Appendix F References and Literature Citations

Additional documentation may be found in the project planning record located at the Saco Ranger District Office in Conway, NH.

COUNTY LINE PROJECT ENVIRONMENTAL ASSESSMENT

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Environmental Assessment

County Line Project

Chapter 1. Purpose and Need for Action

A. Introduction and Document Structure

The Forest Service has prepared this Environmental Assessment (EA) 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: This section includes information on the history of the project proposal, the purpose and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- Alternatives including the Proposed Action: This section provides a more detailed description of the agency's proposed action and alternatives for achieving the stated purpose. These alternatives were developed based on issues raised by the public and other agencies. The discussion also includes identification of mitigation measures and 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. Each resource area is first described, followed by the effects of the No Action Alternative, which provides a baseline for evaluation and comparison of the other alternatives that follow.
- Agencies and Persons Consulted: This section provides a list of agencies and persons consulted during the development of the environmental assessment.
- Appendices: The appendices provide more detailed information to support the analysis presented in the environmental assessment.

Additional documentation including detailed analyses of analysis area resources may be found in the project planning record located at the Saco Ranger District Office in Conway, New Hampshire.

B. Background

“County Line Project” is a new analysis of two former projects. These former projects are Tremont Project, for which analysis and public involvement began in 1997, and Stony Brook Project, which was scoped in February 1999. Tremont Project analyzed the need for change in HMUs 512 and 513, while Stony Brook Project analyzed HMU 511. Tremont Project resulted in a Decision Notice on October 28, 1998. The Tremont Project was appealed on December 4, 1998, and the decision was withdrawn.

This Environmental Assessment includes analysis of the original Tremont project along with the additional HMU 511, which is largely within Sawyer River watershed, and partially within the adjacent Stony Brook watershed, and the Saco River watershed. This is a ‘stand alone’ analysis as relates to these two former projects. Public comments for these two former projects have been incorporated into the analysis, however Tremont Project and Stony Brook Project are considered separate projects.

County Line analysis area contains approximately **16,844 acres** in three HMUs. The analysis area contains MAs 2.1, 3.1, 6.1, 6.2, 6.3, 8.1 and 9.3. There are approximately 1,730 acres of MA 2.1 and 3,174 acres of MA 3.1 in the analysis area. Sawyer River flows through the middle of the analysis area and is the primary drainage.

Timber management activities began in this area in the late 1800’s. The historical town of Livermore was founded to support early logging activities in Sawyer River drainage prior to the establishment of the White Mountain National Forest. Evidence of old logging roads are evident throughout the drainage. Sections of the railroad grade through Hancock Notch are also evident. These logging roads extend into and beyond the units proposed for treatment in this project.

C. Description of County Line Analysis Area

The project is located in the Town of Livermore in Grafton County, and the town of Harts Location, Carroll County, New Hampshire. The analysis area lies south of the Pemigewasset Wilderness. Proposed harvest units are about 1.5 miles or further southeast of the Wilderness. The northern boundary of the analysis area extends along Nancy Brook Scenic Area, along the Pemigewasset Wilderness to a point north of Hancock Notch, and then south through Hancock Notch to Mount Huntington, east to the Sawyer River Trail, along the north boundary of Sawyer Pond Scenic Area, continuing along the ridge to Mount Tremont and Bartlett Haystack, and then north along the height of land to Sawyer Rock and the Saco River, then up the Saco River to Nancy Brook (see Figure 1, County Line Project Location Map and Figure 2, County Line Project Vicinity Map).

Sawyer River is the primary drainage for the analysis area; Carrigain, Whiteface, Halfway and Nancy Brook, Stony Brook and other small unnamed tributaries are within the analysis area.

Management Areas within the analysis area and their approximate acreages are as follows:

- (a) MA 2.1 - Multiple-Use Forest, Lower Intensity of Management, 1,750 acres
- (b) MA 3.1 - Multiple-Use Forest, Higher Intensity of Management, 3,164 acres
- (c) MA 6.1 - Semi-Primitive, Non-Motorized Recreation, 5,530 acres
- (d) MA 6.2 - Semi-Primitive, Non-Motorized Recreation, 4,000 acres
- (e) MA 8.1 – Nancy Pond Scenic Area, 315 acres

(f) MA 9.3 - Nancy Brook Natural Research Area, 972 acres

(g) MA 8.1 – Sawyer Pond Scenic Area, 1154 acres

The primary access to the analysis area is Sawyer River road (Forest Road 34), which parallels Sawyer River and is a National Forest system road. It is open from after mud season until deep snow prevents vehicular traffic, at which time it is gated at Highway 302. Several existing closed roads join FR 34 along its length. A number of hiking trails can be accessed from FR 34, and there are two trailheads with parking, Signal Ridge and Sawyer Pond. Forest Road 34 is used as a snowmobile trail in winter. Some cross-country skiers and others on snowshoes use FR 34 for day trips.

Other Forest Roads to be used in the proposed action include spur roads 34B, 513, 85, and 86. These roads are currently closed to public vehicular traffic. They were constructed in conjunction with past timber sales and have historically been used for timber hauling. Other use on these roads includes dispersed hiking and hunting, snowmobile use on FR 34 and FR86, and use by wildlife as travel corridors.

Forest Road 34 remains open during summer and fall for vehicular traffic and is gated or blocked at its intersection with State Highway 302 during the winter and spring. Forest Road 34 is a designated winter snowmobile route that receives a fair amount of use.

Whiteface Brook Bridge on Sawyer River Road is in need of structural refurbishing for use by heavy equipment. Heavy equipment is used during periodic maintenance on Forest Road 34. Continued normal deterioration of Whiteface Brook Bridge could prevent use of heavy equipment needed for this maintenance. Maintenance is needed to prevent deterioration of the road surface and then possible road closures.

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

The White Mountain National Forest (WMNF) has prepared this Environmental Assessment (EA) in accordance with the White Mountain National Forest Land and Resource Management Plan Final Environmental Impact Statement and Record of Decision, as Amended (USDA, 1986 FEIS).

The Forest Plan is a programmatic document required by law that implements the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA). The purpose of the Forest Plan is to provide direction for multiple use management and sustained yield of goods and services from National Forest lands in an environmentally sound manner.

The Forest Plan sets management direction for the White Mountain National Forest through the establishment of short term (10-15 years) and long-range goals and objectives throughout the year 2036. It prescribes the standards, practices, and the approximate timing and vicinity necessary to achieve goals and objectives. The Forest Plan prescribes monitoring and evaluation needs necessary to ensure that direction is carried out, measures quality and quantity of actual operations against predicted outputs and effects, and forms the basis for implementing revisions.

NFMA states that forest plans “shall be revised from time to time when the Secretary finds conditions in a unit have significantly changed, but at least every 15 years.... (16 U.S.C. 1604(f)(5))”. However, Congress did not intend management to cease if the 15-year target date for plan revision was not met. NFMA, Section 1604 (c) illustrates this point. In the development of the original forest plans, Congress specifically allowed management of the forests to continue under existing resource plans pending approval of the first NFMA forest plan for each administrative unit. Section 321 of the Fiscal year 2003 interior Appropriations Act included language that allowed National Forests to continue managing. The language states “Prior to October 1, 2003, the Secretary of Agriculture shall not be considered to be in violation of subparagraph 6(f)(5)(A) of the Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C. 1604(f)(5)(A) solely because more than 15 years have passed without revision of the plan for a unit of the National Forest System.”

A Notice of Intent to revise the Forest Plan was published February 14, 2000, and the revision process is underway. The Final Environmental Impact Statement is expected in December 2004.

E. Purpose and Need

The Proposed Action is intended to meet objectives outlined in the White Mountain National Forest Land and Resource Management Plan (Forest Plan) for Management Areas 2.1 and 3.1.

1. Management Areas – County Line Project

The Forest Plan classifies National Forest land into Management Area (MA) designations. Each Management Area is designed to provide a specific mix of public and resource benefits. County Line Analysis area contains MAs 2.1, 3.1, 6.1, 6.2, 6.3, 8.1 and 9.3 (see Figure 5: County Line Project Management Area Map).

MA 2.1 goals applicable to this proposed action are:

- Protect and enhance visual quality
- Maintain water quality
- Maintain existing recreation opportunities
- Provide moderate amounts of high quality hardwood sawtimber and other timber products on a sustained yield basis
- *Provide a balanced mix of habitats for all wildlife species*

MA 3.1 goals applicable to this proposed action are:

- 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*
- Maintain the range of recreation options
- Grow small diameter trees for fiber production

This proposal does not include any harvest activities in MAs 6.1 and 6.2.

2. Purpose and Need – Wildlife Habitat Diversity

A primary objective of Management Areas 2.1 and 3.1 is to provide for wildlife habitat diversity.

The wildlife management strategy employed on the White Mountain NF uses Habitat Management Units (**HMUs**) as logical land areas to measure and manage wildlife habitat diversity. An HMU is a land area large enough to contain a variety of vegetation, water, and other habitat features required by a range of wildlife species indigenous to the White Mountain National Forest. Desired vegetative conditions for HMUs are described in the Forest Plan. HMUs not meeting these conditions are tabbed for possible management actions. HMUs 511, 512 and 513 do not meet these desired HMU conditions. The proposed actions in this Environmental Assessment are designed to improve the vegetative conditions for these HMUs to better match the desired future condition described in the Forest Plan.

Interdisciplinary teams (IDT) of specialists consider many factors when monitoring forest conditions. Forest vegetative conditions change over time as trees mature, and thereby present opportunities in some areas to enhance overall conditions within individual HMUs. The County Line interdisciplinary team evaluated current conditions for HMUs 511, 512 and 513. In addition to vegetative conditions of disease, stand structure, stand age, species diversity, mortality and growth, field observations included evidence of wildlife presence through winter track surveys, response calling, stream habitat surveys, and botanical surveys. Surveys for sensitive plant and animal populations, cultural and historic resources, water quality concerns, soil type and stability, recreation use, and visual characteristics were conducted. The culmination of these observations along with extensive public involvement and the application of Forest Plan guidance is a need for carefully designed change specifically regarding vegetation within these three HMUs (the analysis area), recreation facilities (campground and trail improvements), and bridge improvements.

Forest stand data for HMUs 511, 512 and 513 provide evidence that these HMUs do not currently meet Forest Plan goals and objectives for diversity of vegetation age classes. Specifically lacking are: (a) areas of early-successional habitat (hardwood regeneration areas), and (b) even-aged and uneven-aged stands with moderate to high softwood component.

a. Early-Successional Habitat

As forest stands mature (age), they continually move into older age classes. An absence of young age classes can occur if not periodically created through harvesting. Forest management projects are proposed to maintain a consistent ratio of age classes within an HMU to meet Forest Plan desired conditions. The County Line analysis area currently includes ample acreages of young (10-59 years) and mature (60-119 years) hardwood forest, but contains very little acreage of young regenerating hardwood stands (0-9 years). This results in a decreased vegetative diversity within these HMUs.

At this time there are no regeneration-age (0-9 years old) or early successional acres of any community type within the analysis area. There are no stands of paper birch or aspen though presence of suitable soils indicate a potential for this habitat. Based on soil capabilities the desired amount of even-aged northern hardwood regeneration stands in these HMUs is about 300 acres.

There is a shortage of softwoods within all of the HMUs. Fostering an increase in softwood community types and diversifying the age classes within all of these HMUs would move the analysis area in the direction established in the Forest Plan for wildlife habitat.

Regenerating forest stands provide open seedling/shrub habitat for plants and animals associated with or reliant on this open condition. Open conditions allow shade intolerant species such as paper birch, aspen, and pin cherry to become established and eventually develop into mature stands of these forest types. Wildlife species such as ruffed grouse, white-tailed deer, and several species of neotropical migrant songbirds are associated with or reliant upon these early-successional habitats for food, protection, and reproduction during critical phases of their life cycles.

b. Stands with a moderate to high softwood (conifer) component

As described in this EA, the analysis area is predominantly made up of northern hardwood forest, with a small component of softwoods scattered within hardwood stands. Pure softwood stands are found on the high elevation peaks where soils are thin and conditions are harsh, such as Mount Tremont, Mount Hancock, and Mount Carrigain. Spruce, fir and hemlock are the primary softwood species in this area. They provide important thermal and hiding cover and browse habitat for a number of species including snowshoe hare, white-tailed deer, bobcat. There are fewer softwood and mixedwood acres within Sawyer River drainage than is desired under the Forest Plan. Some stands have a developing softwood understory which can be perpetuated with single-tree selection treatments.

The softwood component of some of these stands can be increased where soil types will allow, or the development of an existing softwood understory can be accelerated through silvicultural treatments including thinning and single tree selection. These treatments can promote development of hemlock, spruce, and fir. Single-tree selection can also be designed to favor late successional, shade tolerant hardwood species such as sugar maple and ash, or to create stands with multiple age classes. Many wildlife species, including broad-winged hawk, some neotropical migrant birds, snowshoe hare, and white-tailed deer use softwood or mixedwood habitat during much of their life cycles.

3. Purpose and Need - High quality hardwood sawtimber on a sustained yield basis and other timber products

In addition to wildlife habitat needs, analysis and field reconnaissance revealed some overcrowded hardwood stands whose overall stand health would benefit from a thinning or single-tree selection treatment. These treatments would increase residual stand growth and vigor, produce forest products, and improve future sawtimber quality (see Forest Plan Appendices C1 and C3).

Silvicultural treatments are prescribed in the proposed action and alternatives to create a more desirable stocking of species, sizes, and quality of hardwoods, while providing forest products to the local economy.

4. Purpose and Need - Provide safe access to the planning area and manage National Forest lands, resources and recreation facilities in accordance with the White Mountain National Forest Plan including needed improvements to these facilities as listed in Chapter 2.

F. Proposed Action

The Saco Ranger District of the White Mountain National Forest proposes to manage forest vegetation to increase wildlife habitat diversity within the County Line Analysis area through use of a commercial timber harvest.

The Proposed Action is designed to fulfill the Purpose and Need for Action in the analysis area, as described above, and to achieve the desired vegetative condition described in the Forest Plan. These goals include creating regeneration age habitat, increasing softwood development, increasing red oak reproduction, and providing high quality hardwood sawtimber and other forest products on a sustained yield basis.

The analysis area is within HMUs (Habitat Management Unit) 511, 512 and 513 (See Figure 1, County Line Project Area Location Map and Figure 2, County Line Project Area Vicinity Map).

The following is the proposed action designed to respond to the purpose and need for action:

1. Promote desired vegetation and habitat conditions outlined in the Forest Plan, and produce forest products to benefit the local economy.
 - Increase early successional habitat by creating approximately 153 acres of hardwood regeneration habitat through clearcutting
 - Enhance softwood habitat on approximately 75 acres
 - Improve timber quality and species composition in hardwood and mixedwood stands through approximately 345 acres of commercial thinning and single tree selection.

2. Provide safe access to manage the natural resources and multiple uses on National Forest lands in accordance with the White Mountain National Forest Plan
 - Reconstruct approximately one mile of existing Forest Road 85 and provide a temporary (log stringer) bridge across Carrigain Brook. Road reconstruction would consist of grading, placing culverts and ditches where needed, brushing, and re-aligning one corner near the beginning. This road serves units 1-3, which are scheduled for winter logging and thus eliminates the need for road surfacing.
 - Reconstruct approximately 1.4 miles of Forest Road 513 to access Units 30 - 34. Culverts would be placed where needed, drainage ditches are absent and needed, and the running surface would be graded and spot rocked. One thousand feet of new road behind the existing sanitation facility on FR 513 would be needed to eliminate a second approach onto State Highway 302.
 - Replace existing bridge deck (horizontal section) on FR34 bridge at Whiteface Brook and replace the deck surface for Carrigain Brook bridge
 - Provide 0.74 miles of temporary road to access Units 1 and 2
 - Perform pre-haul maintenance on Forest Road 34B to Unit 22 (0.2 miles)
 - Provide 700 feet of temporary access into units 28, 40, and 41

3. Improve recreation, fisheries and other resources for multiple use objectives

- Improve parking at Sawyer River Snowmobile Trailhead to safely accommodate vehicles with trailers
- Perform erosion control work on existing roads and trails in the project area
- Widen the walking surface on the first footbridge, and put in a permanent footbridge at the second stream crossing on the Sawyer Pond Trail
- Relocate away from Whiteface Brook, the first quarter mile of Signal Ridge Trail
- Upgrade sanitary facilities at Fourth Iron campsite to a single SST type toilet with permanent access, for servicing (only)



Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

G. Decision Framework

Considering the purpose and need for action, the deciding official, Saco District Ranger Terry Miller reviews the proposed action, the public comments, the issues and alternatives, the proposed mitigations, and the environmental effects in order to make decisions based on the following questions:

- Which alternative best meets the Purpose and Need and whether to implement that action?
- Is the information presented in this analysis sufficient to provide a basis for implementing those actions?
- Do the proposed actions pose significant impacts on the human environment and would an Environmental Impact Statement be required prior to implementation?
- Is a Forest Plan amendment required to prior to implementation of this project?
- Does the decision and alternatives considered meet applicable federal, state, and local laws and policies, including consistency with the Forest Plan?
- Are the proposed mitigation measures and monitoring requirements sufficient to meet Forest Plan standards and guidelines for all resources?

H. Scope Of This Environmental Analysis - Public Involvement, Scoping Efforts

Scoping efforts for the County Line Project began on January 30, 2002. Public contacts included those individuals and organizations that had notified the White Mountain National Forest of their interest in all timber related projects for the Saco Ranger District. A letter dated January 30, 2002 describing the Proposed Action and seeking public comments for County Line Project was sent to over three hundred individuals, organizations, government agencies and adjacent landowners.

The Proposed Action was advertised in the *Conway Daily Sun*, the *Mountain Ear*, and the *Manchester Union Leader*. During the ensuing 30-day public review period, 18 people or organizations provided comments. Public Issues are listed in section I, Issues Used to Formulate Alternatives, or in section J, Other Issues Brought Forward During Public Involvement.

Public issues brought forward in response to the January 30, 2002 letter and those from the previous public involvement for Tremont Project are brought forth and included in this EA.

The IDT (interdisciplinary team) studied the public issues brought forward in relation to their potential effects, including (where possible) mitigating effects with project design features such as location (*where*), season of harvest (*when*), and silvicultural prescription and road design (*what*). These issues were used in the design of alternatives and mitigations. Following CEQ § 1500.4(c-f), Chapter 3 analyzes the environmental effects of the proposed action and alternatives in relation to these issues. Chapter 3 also provides pertinent background information on the existing condition relative to a given resource or issue.

This is a 'stand alone' document as relates to the former Tremont Project and Stony Brook Project. Public comments for those projects are incorporated into this analysis; however, other components such

as alternatives or environmental consequences are not brought forward unilaterally, but are re-analyzed. Tremont Project and Stony Brook Project are considered separate projects.

I. Applicable Management Direction

The Forest Service administers National Forest Lands under authority of the Organic Administration Act, the Forest and Rangeland Renewable Resources Planning Act and the National Forest Management Act. Other laws governing National Forest management that are applicable to this project include the National Environmental Policy Act (NEPA) and the Federal Land Policy and Management Act.

This document is *tiered to* the White Mountain National Forest Land and Resource Management Plan, (WMNF-LRMP), 1986. The Forest Plan designated Management Areas (MA) to all land within the White Mountain National Forest. The Forest Plan specifies management goals and objectives, as well as standards and guides for each Management Area. County Line Project proposes management activities under the authority and direction of the Forest Plan.

This document *incorporates by reference* the following:

- ★ County Line Project BE (Biological Evaluation), 2003
- ★ Cultural Resource Report for County Line Analysis area, 2001.
- ★ Annual Forest Monitoring Reports (1993 through 2000)
- ★ Habitat Trend Analysis and other literature cites in Appendix C – MIS trends and viability
- ★ USFS Management Indicator Species - Monitoring Report (2001)

J. Issues Used to Formulate Alternatives

The Forest Service separated the issues into two groups: “Issues Used to Formulate Alternatives” and “Other Issues Brought Forward During Public Involvement.” Issues Used to Formulate Alternatives are defined as those directly or indirectly caused by implementing the proposed action and for which an alternative action was developed.

Other Issues Brought Forward During Public Involvement are either resolved through project design including mitigations, or are resolved at a higher level including 1) *outside the scope* of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality NEPA regulations requires this delineation in Sec 1501.7, “... identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)”. Other Issues Brought Forward During Public Involvement are listed below in sections I and J, and in Chapter 3, part 3.11.

The IDT (interdisciplinary team) studied all the issues brought forward and identified the following three **Issues Used to Formulate Alternatives**. For each issue listed the IDT identified indicators that are used to compare alternatives relative to these issues. These measurement indicators are listed and displayed in Chapter 2, Section F, Table 6: Comparison of Alternatives - County Line Project.

1. ***Effect that proposed harvest treatments and road reconstruction for Units 1-15 might have on the suitability of this area for inclusion in Wilderness or roadless designation.***

This issue responds to the comment that no logging or road building activities should occur northwest of Sawyer River Road (FR 34) above the confluence with Whiteface Brook until the Forest Plan Revision is complete. This issue arises from disagreement over whether proposed harvesting and road reconstruction in Units 1-15 would foreclose options to designate this area as Wilderness or Roadless.

Measurement Indicators:

- Percent area treated in HMUs 512 & 513 in this project
- Miles of road to be reconstructed to access Units 1-15 and then closed
- Degree of impact to Wilderness potential from units treated and roads reconstructed

2. ***Effects of the proposed actions on wildlife habitat and on wildlife species***

Creating early successional habitat, enhancing conifer stands to maintain softwood community types, and enhancing timber resources within this area may affect some wildlife species.

Measurement Indicators:

- Acres of early successional habitat (clearcuts) created
- Acres of softwood habitat enhanced
- Acres treated to improve timber quality and species composition in hardwood and mixedwood stands
- Total Acres Treated

3. ***Proposed management activities may impact recreation, including views from Mount Tremont, Mount Hancock, Mount Carrigain, Highway 302, Conway Scenic Railroad, and Hancock Notch trail.***

Portions of proposed clearcut Units 2, 4 - 7 and 14 may be visible as background views from Mount Tremont, Mount Hancock and Mount Carrigain. Portions of proposed clearcut units 33, 35, 37 and 38 may be visible as background views from Highway 302, Conway Scenic Railroad, Saco River, and from River Road in Bartlett.

Portions of selective cut units (single tree and thinning Units 13, 21, 22, 24, 28, 32, 40, 41 and 42) may be visible in foreground views from along Highway 302, Sawyer River Road, Fourth Iron developed site, Conway Scenic Railroad, and Hancock Notch Trail, where selection harvest activities are proposed in close proximity to these locations.

Measurement Indicators:

- Estimated Acres of openings viewed (middle-ground and background) from key viewpoints
- Miles of trail (Hancock Notch) along which harvest activity would occur (foreground views)
- Miles of open roads along which harvest activity would occur (foreground views)
- Comparison to Recreation Opportunity Spectrum (ROS) classification

K. Other Issues Brought Forward During Public Involvement

Following CEQ § 1500.4(c)(d) the following issues are incorporated into discussions in Chapter 3 under the related resource. The issues listed in this section are limited in extent, duration, and intensity and were not used to generate an alternative. The first section (I) discloses issues that can be resolved by project design including mitigations. The second section (J), discusses Other Issues Brought Forward During Public Involvement that are resolved at a higher level as listed under section H of this chapter.

Recreation

- ***Improvements to Sawyer River Road (roads, bridges and parking) would invite increased use and associated impacts in the Sawyer River area and especially the high use Sawyer Pond area***
- ***Improvements to Sawyer River Road (roads, bridges and parking) would invite increased use and associated impacts in the Sawyer River area and especially the high use Sawyer Pond area.*** One writer suggested we consider using Fourth Iron Parking facility if the need arises, rather than enlarge existing parking.
- ***Winter use of Sawyer River Road by logging trucks would close this road to snowmobiling***
Use of Sawyer River Road in winter months by logging trucks would impact snow machine, skiing and snowshoeing opportunities. Closure of the Sawyer River Road to snowmobiling would temporarily sever the trail system. Conflicting winter use has been mitigated in the past on other roads by requiring timber sale purchasers to plow only one lane of the road and leave the other lane available for other users. The narrow width of Sawyer River Road precludes this option. Sawyer River Road is a single lane road with turnouts. Minimizing the closure of Sawyer River Road is important to many publics.
- ***Summer and fall use of Sawyer River Road by logging trucks may be a safety concern for mountain bikers and vehicle operators using Sawyer River Road***
- ***Opening Forest Roads 513, 85, and 86 may encourage off road vehicle use and result in subsequent resource impacts unless these roads are properly closed following their use***
- ***If road closures are not planned, use of the secondary roads and skid roads following sale activities for recreational motorized use would impact wildlife and other resources.*** Even though off road vehicle use is prohibited on the National Forest, care in preventing their use may be needed following completion of the sale.
- ***Units 21-24 must not intrude upon the Rare II boundary, as this would be a violation of law***
- ***Winter logging should be proposed despite possible impacts on winter uses on Sawyer River Road because it is least impacting on natural resources***
- ***In order to provide more opportunities for mountain biking, leave drainage pipes in place and keep Forest Road 513 open following the sale***
- ***In order to provide more opportunities for mountain biking, leave drainage pipes in place and keep Forest Road 513 open following the sale***

Disperse camping currently occurs on or adjacent to Forest Road 513 within a short distance of Highway 302. However, there are no plans to keep Forest Road 513 open, or to increase recreation opportunities as part of the project.

- ***Restoring the road into Units 1 and 2 would cause more resource damage and be more permanent than skidding, even though the distance is long for skidders***

The road distance from Forest Road 85 to the proposed landing for Units 1 and 2 is approximately ½ mile. Along with resources, consider the expense of a permanent road (that would be less costly to move logs over versus skidding that distance. This is part of the transportation system analysis, coupled with anticipated vegetation management objectives for these manageable lands.

- ***Improving sanitary facilities at Fourth Iron Campground is fine although increasing access for administration with a permanent road would invite additional resource impacts such as trampling by four wheelers that go around closures, and vandalism that accompanies such improvements***

The current sanitary facility at Fourth Iron could be improved, however increased access by the general public may result in increased impact to the area, and would alter the character of this site.

- ***Buffer zones along trails should maintain the integrity of these trails in order to minimize evidence of the activity***

Where treatment of trees is proposed near streams, skid roads and marking density should take into consideration the effects to recreation.

- ***Nancy Pond Scenic Area should not be impacted by the proposed action as this would disturb the integrity of this Natural and Scenic area***
- ***Harvest and road work could effect hunting and fishing opportunities in the area***
- ***Noise of logging would affect the visiting public unless done when use is lowest***
- ***Cumulative impacts from this sale combined with other sales in the WMNF may reduce the recreation opportunities***

Vegetation Management Activities

- ***Because of the popularity of Fourth Iron campground, long-rotation management with retention of large diameter trees and winter-only harvesting in Unit 28 would reduce impacts to this facility.***
- ***Cumulative effects of other harvest proposals scheduled in or near the analysis area could have adverse resource impacts***
- ***Whole tree harvesting could reduce soil calcium and organic material depth***
- ***The windstorm of 1999 and the ice storm of 1998 should have caused creation of early successional habitat or forage in the analysis area and subsequent sprouting of understory trees and shrubs, creating ample wildlife browse.***

Wind storms and other natural disturbances alter existing conditions in forests. These disturbances can be described as beneficial in many instances, and may compel forest managers to adjust existing management plans or initiate new plans depending on the resources and values involved.

- ***Regeneration of created openings must be assured to prevent resource impacts***
- ***Perform post sale monitoring to assure that contract requirements and mitigations are performed***
- ***Minimize damage to the residual stand, roots and soil in order to sustain productive forests.***
The type of equipment used, season of harvest, harvest method, and operator skill influence the effects to the residual stand and soils.
- ***The proposed action does not propose enough cutting to meet the goals of the Forest Plan, especially clearcutting and creating new regenerating stands of over ten acres. This would continue to cause a decrease in the game populations in the area.***

Forest Plan goals include managing for wildlife species by providing the necessary habitat diversity to maintain viable populations of existing native and non-native vertebrate species in the planning area. There are approximately 339 inland wildlife species in New England. Habitat preference for 233 (90 %) of these species is for regenerating stands in young age classes (Forest Plan VII-B-1).

- ***Use weed-free native seeding for erosion control to prevent introduction of non-native species***
Use of weed-free native seed would eliminate the concern for introduction of non-native species or weeds where erosion control seeding is implemented, such as on landings or skid roads.
- ***Log during periods when the noise of logging would be least noticeable to the visiting public***

Streams and Water

- ***Provide specific information regarding what uses are compatible and what mitigations would be prescribed in riparian areas to limit degradation and adverse effects to water quality***
Portions of stands in partial cut Units 3, 11, 13, 22, 23 and 42 that border streams or brooks may be thinned where this action is beneficial to the stand. Forest Plan standards allow for removal of no more than 50% of the basal area in riparian areas. Other restrictions and mitigation measures apply.
- ***Buffer zones along streams should maintain the integrity of these streams to minimize water quality impacts***
Where treatment of trees is proposed near streams, skid roads and marking density should take into consideration the possible effects to streamcourse stability and water quality.
- ***Minimize the water quality impacts of stream ecosystems***
Management activities upslope from stream areas may have secondary beneficial or adverse effects on stream ecology.

Soil

- ***Document the effect on soil from this sale, the cumulative effect of past logging on soil in this planning area; and include estimates of nutrient loss and expected impacts on re-vegetation processes***
Soil impacts can be minor and temporary, or can be long lasting. Harvesting in winter, leaving tree branches and tops on the ground, partial cutting, design of skid road systems, and waterbaring and seeding skid trails following their use are examples of mitigations that can minimize impacts to soils.

L. Other Issues Brought Forward During Public Involvement that are Resolved at a Higher Level

- *Compare adverse external economic costs to the ecosystem service value of standing forests. Analyze the opportunity costs of the logging program, which include the value of uses forgone on areas logged plus the (potential) benefits associated with alternative uses of timber sale funds. Include the projected loss of recreation user fees that may occur because of the logging operation.* Since the logging program increases costs of water purification and filtration, decreases the value of private timberlands, unfairly competes against alternative fiber and building material businesses, increases wildfire risk, increases repair and maintenance costs for highways and public roads, and decreases the number of jobs in recreation, tourism, fisheries, and alternative forest products, the Forest Service must quantify these adverse economic effects.
- *Clearcutting in this planning area would retard development of contiguous late successional forest conditions connected to the Pemigewasset Wilderness and the White Mountain National Forest as a whole.* This issue responds to disagreement over the benefits or impacts at a large scale, in conjunction with the Pemigewasset Wilderness and other National Forest lands, that management activities would have in terms of retarding or enhancing development of late-successional forest and the associated ecosystem processes that occur at a regional scale.
- *Demonstrate how much direct subsidy this sale would provide to the timber industry.*
- *Logs from this sale should not be exported to other countries in an unprocessed form, which would reduce employment at local mills. Address the cumulative impacts of where the timber is shipped to, and if removal and processing of raw logs would impact the quality of human health.*
- *Postpone management in this and all areas within the WMNF until the Forest Plan Revision is complete.*
- *This project should be removing roads and allowing the forest to return to a natural condition. Provide in your alternatives, an alternative that does not log in this area.*
- *Analyze the opportunity costs of the logging program, which include the value of uses forgone on areas logged plus the (potential) benefits associated with alternative uses of timber sale funds. We specifically request an alternative that would utilize available funds for this project to support the ecological restoration component of this sale by itself, without completing the commercial sale component*
- *Require the use of natural oils in logging equipment for this project*

M. Applicable Regulatory Requirements and Required Coordination

NFMA (National Forest Management Act)

NFMA gives direction to manage wildlife habitat within National Forests for all existing native and desirable non-native species. The wildlife strategy adopted in the Forest Plan provides the framework for projects to address developing wildlife habitat diversity on the Forest. In addition NFMA also gives direction for managing timber resources on a sustainable basis.

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 Officer) Review

Before a decision is made for a project, State Historic Preservation Office (SHPO) reviews the cultural resource report for the project. SHPO concurrence with the cultural resource report, and approval to implement the proposed action with mitigations has been received.

USDI (United States Department of the Interior) Fish and Wildlife Service Concurrence

US Fish and Wildlife Service has been asked to review the project biological evaluation for federally listed threatened and endangered species. US Fish and Wildlife Service “concurrence” with the Biological Determination for this project is expected.

Chapter 2. Alternatives Including the Proposed Action

A. Introduction

This chapter describes alternatives considered in detail and lists alternatives considered but eliminated from detailed study. It concludes with a summary of proposed mitigation measures and a comparison of the alternatives considered in detail.

It examines a total of five alternative proposals for management of the County Line Analysis area, including the No Action alternative and the original Proposed Action.

All projects on National Forest lands must comply with the respective Land and Resource Management Plan (Forest Plan) and with other applicable laws and policies. This EA is prepared in conjunction with all applicable laws, regulations and policies.

B. Process Used to Formulate the Alternatives

This section describes how the Forest Service utilized a systematic, interdisciplinary approach to insure integrated use of natural and social sciences and environmental considerations in planning for this project (NEPA, Sec. 102 (A)).

The IDT (interdisciplinary team) for this project was established in October 1997 by the Saco District Ranger. It consists of a project coordinator, wildlife biologist, silviculturist, hydrologist, recreation specialist, cultural resource para-professional, soil scientist, landscape architect, and a forest engineering technician. The IDT reviewed compartment data and records, aerial photographs, and maps of the analysis area, and conducted extensive field reconnaissance to identify the current condition and opportunities to meet Forest Plan objectives in the analysis area. A Proposed Action was designed and public involvement began.

Issues brought forth by the public were used to develop the range of alternatives and actions considered in the EA. This range is intended to: a) provide clear choices for the decision maker, b) respond to public comments, c) respond to management direction, including the White Mountain Forest Plan, and d) respond to the Purpose and Need for the Proposed Action. The No-Action Alternative is a viable alternative and provides a benchmark against which to evaluate the other alternatives. The Purpose and Need section provided in Chapter 1 shows the desired outcome that each action alternative would need to respond to. Briefly, these are to move toward attaining the timber and wildlife habitat management goals for Management Area 2.1 and 3.1 as described in the Forest Plan.

Public input resulted in identification of three issues “used to formulate alternatives” and several “other issues brought forward during public involvement” as documented in Chapter 1.

In addition to the applicable regulatory requirements and required coordination listed in Chapter 1 section K, alternatives considered would need to comply with the environmental standards listed below.

- ⇒ Forest-wide Standards and Guidelines from the Forest Plan
- ⇒ Forest Plan standards and guidelines specific to Management Areas 2.1, 3.1, 6.1 and 6.2
- ⇒ New Hampshire Department of Environmental Services, State of New Hampshire Surface Water Quality Regulations, Env-Ws. September 30, 1996

- ⇒ Endangered Species Act requirements
- ⇒ Clean Water Act and Clean Air Act requirements

C. Alternatives Considered and Eliminated from further Detailed Study

- ***Conduct harvest operations during May to minimize conflicts between recreation and logging activities.*** Harvest operations do not generally occur in May in the White Mountain National Forest due to the potential for damage to Forest Roads where wet weather and lack of drying temperatures cause wet road surfaces; and during this time, soil conditions in the forest are wet causing soils to be susceptible to rutting and compaction; and trees are in their most vulnerable state pertaining to damage to residual trees (the bark is easily separated from the tree when bumped).
- ***Use animals such as horses and oxen for skidding logs instead of fossil fuel- burning industrial machinery.*** Skidding with animals is best suited to relatively small timber and moderate slopes with little underbrush. Logging activities are limited to summer and fall operations when log skidding is much less likely to result in danger to the animals and the operator.

Certain aspects of horse logging can be more impacting than with conventional equipment. For example, more passes are required with a horse or oxen since the loads must be smaller. Secondly, roads must be constructed further into the proposed harvest areas, since the skidding distance capabilities is much shorter. Finally, the soil compaction and soil disturbance caused by animals (much greater pounds of weight per square inch) pulling heavy loads may increase the resource damage far beyond that of conventional equipment.

For this project, an additional 4.5 to 5.0 additional miles of new road would be needed to facilitate horse logging. Many of these locations would be skid roads during conventional logging.

Some benefits are obtained in disturbing the duff layer with conventional equipment. For instance, sugar maple and oak seedlings are more prevalent in the regenerating stand when duff layers are disturbed and mineral soil is exposed.

Finally, additional time is required to accomplish harvest activities with horses. Up to five times as much time is required to complete a timber sale as is accomplished using conventional equipment. This reduces the degree that the purpose and need for the action is met, and increases the cost of administering an individual timber sale, or cumulatively, the timber sale program for the White Mountain National Forest.

- ***Perform the needed timber cutting and leave the cut trees on the site or make them available to hikers, and firewood gatherers.*** The amount of slash and downed logs created by such a treatment would inhibit stand regeneration or development in both clearcut and uneven-aged management units. National forest Management Act requirements to provide a sustained yield

of products and services from the National Forests would not be met. Forest Plan goals of producing high quality hardwood would also not be met. This alternative would clearly not meet the purpose and need for which the action is proposed.

- **Analyze an alternative that proposes only uneven-aged management.** This alternative was considered and deleted from further study because it does not meet an important component of the Purpose and Need for the proposed action as directed in the White Mountain National Forest Plan. The Forest Plan, and the Purpose and Need for action for this project specifically include creation of openings within each HMU. Section 3.2 – Wildlife, in Chapter 3 provides detailed discussion on the effects to wildlife and wildlife habitat that even-aged and conversely, only uneven-aged management would have.

D. Description of the Alternatives

Alternative 1 (No Action)

Issues Influencing Development of the Alternative

Alternative 1 does not propose active management within the analysis area at this time. Alternative 1 has no potential adverse effect from road construction or logging on National Forest land. The No Action Alternative has subtle environmental and social effects by not taking action at this time. Development and discussion of Alternative 1 in this document provides for a comparison with the action alternatives.

General Harvest Prescription

Under Alternative 1, the actions of harvesting, harvest-related road use and harvest-related road improvement and development would not take place. Alternative 1 briefly summarizes the current environmental (baseline) conditions within the analysis area. The term “No-Action” means no management actions at this time.

Estimated Outputs

Alternative 1 would not provide any harvest outputs or create young regenerating stands for wildlife habitat in the analysis area at this time. Only through infrequent and unpredictable natural disturbances would creation of early-successional regeneration habitat occur. Slower, natural development of softwoods within mixedwood stands would occur where softwood is present.

Connected Actions for the No Action Alternative

No connected actions or associated activities would occur as a result of this alternative. Routine road maintenance on Forest Road 34 would continue in the analysis area.

Due to the condition of the bridges, traditional periodic road maintenance may be infeasible and in time, the Sawyer River Road may decline significantly in standard. Other management implications may need to be considered as this occurs. Failure to provide for the necessary road maintenance and bridge improvements over time may necessitate road closures or alternative funding to repair them.

Alternative 2 (Proposed Action)

Issues Influencing Development of the Alternative

The proposed action was developed to address the Purpose and Need as stated in Chapter 1. The proposed action is to move toward attaining the timber harvest and wildlife habitat diversity goals for the analysis area. These goals include creating early successional habitat, increasing softwood development, providing for sustained timber production and providing for improved management of recreation facilities.

Proposed Action: The following proposed actions are designed to respond to the purpose of and need for action:

1. Promote desired vegetation and habitat conditions outlined in the Forest Plan, and produce forest products to benefit the local economy with the following actions:
 - Increase early successional habitat by creating approximately 153 acres of hardwood regeneration habitat through clearcutting.
 - Enhance softwood habitat through approximately 75 acres of single-tree selection.
 - Improve timber quality and species composition in hardwood and mixedwood stands through approximately 345 acres of commercial thinning and single tree selection.

2. Provide safe access to the planning area and manage National Forest lands, resources and facilities in accordance with the White Mountain National Forest Plan.
 - Reconstruct approximately one mile of existing Forest Road 85 and provide a temporary (log stringer) bridge across Carrigain Brook. Road reconstruction would consist of grading, placing culverts and ditches where needed, brushing, and re-aligning one corner near the beginning. This road serves units 1-3, which are scheduled for winter logging and thus eliminates the need for road surfacing.
 - Reconstruct approximately 1.4 miles of Forest Road 513 to access Units 30 - 34. Culverts would be placed where needed, drainage ditches are absent and needed, and the running surface would be graded and spot rocked. One thousand feet of new road behind the existing sanitation facility on FR 513 would be needed to eliminate a second approach onto State Highway 302.
 - Replace existing bridge deck (horizontal section) on FR34 bridge at Whiteface Brook and replace the deck surface for Carrigain Brook bridge
 - Provide 0.74 miles of temporary road to access Units 1 and 2
 - Perform pre-haul maintenance on Forest Road 34B to Unit 22 (0.2 miles)
 - Provide 700 feet of temporary access into units 28, 40, and 41

3. Improve recreation, fisheries and other resources for multiple use objectives

- Improve parking at Sawyer River Snowmobile Trailhead to safely accommodate vehicles with trailers
- Perform erosion control work on existing roads and trails in the project area
- Widen the walking surface on the first footbridge, and put in a permanent footbridge at the second stream crossing on the Sawyer Pond Trail
- Relocate away from Whiteface Brook, the first quarter mile of Signal Ridge Trail
- Upgrade sanitary facilities at Fourth Iron campsite to a single SST type toilet with permanent access, for servicing (only)

Estimated Outputs

Alternative 2 would create approximately 153 acres of early successional habitat, promote softwood development on approximately 75 acres, thin or single-tree select approximately 345 acres in hardwood and mixedwood stands and produce an estimated 4.0 million board feet of timber.

Units identified for clearcut harvest are designed to increase the percentage of early successional habitat (forest stands 0-9 years old) to benefit wildlife. Natural regeneration with paper birch, yellow birch, pin cherry, and aspen are expected in these areas.

Commercial thinning units address long-term forest management goals of producing high quality hardwood timber for the future. Commercial thinning reduces stand densities, improves species composition, and retains the healthiest trees. These treatments improve growth and vigor of the remaining trees and ultimately result in healthier forest conditions and higher quality timber for the future.

Single-tree selection is proposed in softwood stands to increase the softwood component by removing smaller softwoods and dominant competing hardwoods while maintaining an uneven-aged stand structure. The goal is to increase the uneven-aged softwood community type in this planning area. Single-tree selection is also proposed in some hardwood and mixedwood stands where reduction in stand density while maintaining an uneven-aged stand structure is desirable.

An explanation of the harvest methods proposed are described in Appendix B, Management Systems and Harvest Methods.

Connected Actions for Alternative 2

Harvested trees from Units 34-38 would be skidded to an existing landing at the terminus of road reconstruction at Unit 34. Timber from these units would be skidded to the landing on that portion of FR 513 beyond the landing.

Pre-haul road maintenance would be required on Sawyer River Road (FR 34). Road restoration (spot rocking) may be needed on Forest Road 86 to allow for summer or fall log haul.

Table 2: County Line Project Alternative 2 (Proposed Action)

Unit	C-Std	Forest Type	Acres	Rx Objective	MA	Harvest Method	Operating Season
1	38-13	Hardwood	31	High Quality Hardwood	2.1	Commercial Thin	Winter
2	38-3	Hardwood	25	Regenerate Stand	3.1	Clearcut	Winter
3	38-6	Mixedwood	21	Increase softwood component	2.1/3.1	Single-Tree Selection	Winter
4	28-39	Hardwood	15	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
5	28-39	Hardwood	13	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
6	28-28	Hardwood	23	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
7	28-28	Hardwood	19	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
8	28-6	Hardwood	19	High Quality Hardwood	3.1	Commercial Thin	Fall/Winter
9	28-2	Mixedwood	10	Increase softwood component	2.1/3.1	Single-Tree Selection	Fall/Winter
11	28-25	Softwood	6	Enhance Softwood	3.1	Single-Tree Selection	Fall/Winter
12	29-2	Hardwood	32	High Quality Hardwood	3.1	Commercial Thin	Fall/Winter
13	29-33	Softwood	14	Enhance Softwood	3.1	Single-Tree Selection	Winter
14	29-2	Hardwood	22	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
15	29-1	Softwood	19	Enhance Softwood	3.1	Single-Tree Selection	Fall/Winter
21	25-15	Hardwood	24	High Quality Hardwood	2.1	Commercial Thin	Fall/Winter
22	25-15	Hardwood	15	High Quality Hardwood	2.1	Single-Tree Selection	Fall/Winter
24	25-10	Hardwood	11	High Quality Hardwood	2.1/3.1	Commercial Thin	Fall/Winter
28	40-3	Mixedwood	35	Enhance pine and oak	2.1	Single-Tree Selection	Fall/Winter
30	40-12	Hardwood	27	High Quality Hardwood	2.1/3.1	Single-Tree Selection	Fall/Winter
31	39-2	Mixedwood	44	High Quality Hardwood	2.1/3.1	Single-Tree Selection	Fall/Winter
32	40-5	Hardwood	13	High Quality Hardwood	2.1	Single-Tree Selection	Fall/Winter
33	40-5	Hardwood	7	Regenerate Stand	2.1	Clearcut	Summer/Fall/Winter
34	39-3	Hardwood	54	High Quality Hardwood	3.1	Commercial Thin	Fall/Winter
35	40-27	Hardwood	8	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
37	40-1	Hardwood	11	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
38	40-1	Hardwood	10	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
40	40-4	Hardwood	22	High Quality Hardwood	2.1	Single-Tree Selection	Fall/Winter
41	41-1	Hardwood	18	High Quality Hardwood	2.1	Commercial Thin	Fall/Winter
42	41-27	Mixedwood	5	Increase softwood component	2.1	Single Tree Selection	Fall/Winter

C-Std - Compartment and Stand where the unit is located

Rx objective –the proposed prescriptions are designed to meet the Purpose and Need for treatment, in each unit.

MA - Management Area

Operating Season - Time of year when harvest activities are scheduled to occur. Activities may occasionally occur outside these periods when soil conditions and other resource considerations allow.

Forest Type – represents the primary species composition of the unit

Figure 6

Alternative 3

Issues Influencing Development of the Alternative

Alternative 3 was developed to address logging and road building issues north of Sawyer River Road and west of Whiteface Brook.

In order to respond to these specific issues, **Alternative 3** would:

1. Promote desired vegetation and habitat conditions outlined in the Forest Plan, and produce forest products to benefit the local economy
 - Increase early successional habitat by creating approximately 36 acres of hardwood regeneration habitat through clearcutting
 - Enhance softwood habitat through approximately 5 acres of single-tree selection
 - Improve timber quality and species composition in hardwood and mixedwood stands through approximately 263 acres of commercial thinning and single-tree selection

2. Provide safe access to the planning area and manage National Forest lands, resources and facilities in accordance with the White Mountain National Forest Plan.
 - Replace bridge deck (horizontal section) on FR34 bridge at Whiteface Brook
 - Reconstruct approximately 1.4 miles of Forest Road 513 to access Units 30-34
 - Perform pre-haul maintenance on Forest Road 34B to Unit 22 (0.2 miles)
 - Provide 700 feet of temporary access into units 28, 40, and 41

3. Improve recreation, fisheries and other resources for multiple use objectives
 - Improve parking at Sawyer River Snowmobile Trailhead to safely accommodate vehicles with trailers
 - Upgrade the composting toilets at Fourth Iron Campground to a SST type design with permanent access, for servicing (only)

Estimated Outputs

Alternative 3 would create approximately 36 acres of early successional habitat, promote softwood development on approximately 5 acres, thin or single-tree select approximately 263 acres in hardwood and mixedwood stands and produce an estimated 1.5 million board feet of timber.

Units identified for clearcut harvest are designed to increase the percentage of early successional habitat (forest stands 0-9 years old) to benefit wildlife. Natural regeneration with paper birch, yellow birch, pin cherry, and aspen are expected in these areas.

Commercial thinning units address long-term forest management goals of producing high quality timber for the future. Commercial thinning reduces stand densities, improves species composition, and retains the healthiest trees. These treatments improve growth and vigor of the remaining trees and ultimately result in healthier forest conditions and higher quality timber for the future.

Single-tree selection is proposed in softwood stands to increase the softwood component by removing smaller softwoods and dominant competing hardwoods while maintaining an uneven-aged stand structure. The goal is to increase the uneven-aged softwood community type in this planning area. Single-tree selection may also be used in some hardwood stands where reduction in stand density while maintaining an uneven-aged stand structure is desirable.

An explanation of the harvest methods proposed are described in Appendix D, Management Systems and Harvest Methods.

Connected Actions for Alternative 3

Harvested trees from Units 34-38 would be skidded to an existing landing at the terminus of road reconstruction at Unit 34.

Table 3: County Line Project - Alternative 3

Unit	C-Std	Forest Type	Acres	Rx objective	MA	Harvest Method	Operating Season
21	25-15	Hardwood	24	High Quality Hardwood	2.1	Commercial Thin	Fall/Winter
22	25-15	Hardwood	15	High Quality Hardwood	2.1	Single-Tree Selection	Fall/Winter
24	25-10	Hardwood	11	High Quality Hardwood	2.1/3.1	Commercial Thin	Fall/Winter
28	40-3	Mixedwood	35	Enhance pine and oak	2.1	Single-Tree Selection	Fall/Winter
30	40-12	Hardwood	27	High Quality Hardwood	2.1/3.1	Single-Tree Selection	Fall/Winter
31	39-2	Mixedwood	44	High Quality Hardwood	2.1/3.1	Commercial Thin	Fall/Winter
32	40-5	Hardwood	13	High Quality Hardwood	2.1	Commercial Thin	Fall/Winter
33	40-5	Hardwood	7	Regenerate Stand	2.1	Clearcut	Summer/Fall/Winter
34	39-3	Hardwood	54	High Quality Hardwood	3.1	Commercial Thin	Fall/Winter
35	40-27	Hardwood	8	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
37	40-1	Hardwood	11	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
38	40-1	Hardwood	10	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
40	40-4	Hardwood	22	High Quality Hardwood	2.1	Single-Tree Selection	Fall/Winter
41	41-1	Hardwood	18	High Quality Hardwood	2.1	Commercial Thin	Fall/Winter
42	41-27	Mixedwood	5	Increase softwood component	2.1	Single Tree Selection	Fall/Winter

C-Std - Compartment and Stand where the unit is located

Forest Type – represents the primary species composition of the unit

Rx objective –the proposed prescriptions are designed to meet the Purpose and Need for treatment, in each unit.

MA - Management Area

Operating Season - Time of year when harvest activities are scheduled to occur. Activities may occasionally occur outside these periods when soil conditions and other resource considerations allow.

Figure 7

Alternative 4

Issues Influencing Development of the Alternative

Alternative 4 was developed to blend all the issues and reach a compromise while addressing the Purpose and Need stated in Chapter 1.

In order to respond to these specific issues, **Alternative 4** would:

1. Promote desired vegetation and habitat conditions outlined in the Forest Plan, and produce forest products to benefit the local economy.
 - Increase early successional habitat by creating approximately 51 acres of hardwood regeneration habitat through clearcutting
 - Enhance softwood habitat through approximately 56 acres of single-tree selection in mixedwood, softwood and northern hardwood stand.
 - Improve timber quality and species composition in northern hardwood stands through approximately 348 acres of commercial thinning
 - Implement a group selection harvest in a 22 acre stand
2. Provide safe access to the planning area and manage National Forest lands, resources and facilities in accordance with the White Mountain National Forest Plan
 - Replace bridge deck (horizontal section) on FR34 bridge at Whiteface Brook
 - Reconstruct approximately 1.4 miles of Forest Road 513 to access Units 30-34
 - Reconstruct approximately one mile of existing Forest Road 85 and provide a temporary (log stringer) bridge across Carrigain Brook
 - Provide 0.74 miles of temporary road to access Units 1 and 2
 - Perform pre-haul maintenance on Forest Road 34B to Unit 22 (0.2 miles)
 - Provide 700 feet of temporary access into units 28, 40, and 41
3. Improve recreation, fisheries and other resources for multiple use objectives
 - Address parking issues at Sawyer River Snowmobile Trailhead by plowing Fourth Iron parking lot if needed
 - Upgrade only the second footbridge on the Sawyer Pond Trail, including clearing of up to ten trees if needed to get the single-span bridge to the site
 - Relocate the first quarter mile of Signal Ridge Trail
 - Upgrade sanitary facilities at Fourth Iron Campground to an improved composting toilet with no upgraded access

Estimated Outputs

Alternative 4 would create approximately 51 acres of early successional habitat, promote softwood development on approximately 56 acres, improve timber quality and species composition in northern hardwood stands with 348 acres of commercial thinning and implement a group selection harvest in a 22 acre stand hardwood stand to produce an estimated 2.2 million board feet of timber.

Units identified for clearcut harvest are designed to increase the percentage of early successional habitat (forest stands 0-9 years old) to benefit wildlife. Natural regeneration with paper birch, yellow birch, pin cherry, and aspen are expected in these areas.

Commercial thinning units address long-term forest management goals of producing high quality timber for the future. Commercial thinning reduces stand densities, improves species composition, and retains the healthiest trees. These treatments improve growth and vigor of the remaining trees and ultimately result in healthier forest conditions and higher quality timber for the future.

Single-tree selection is proposed in softwood stands to increase the softwood component by removing smaller softwoods and dominant competing hardwoods while maintaining an uneven-aged stand structure. The goal is to increase the uneven-aged softwood community type in this planning area. Single-tree selection may also be used in some hardwood stands where reduction in stand density while maintaining an uneven-aged stand structure is desirable.

Group selection method appears as a pattern of small openings throughout a stand, usually covering about one-fifth of the land area in the stand. The cuttings are repeated at intervals of 15-20 years. In practice, individual openings average one-half acre in size, though Forest Plan definition allows for openings up to two acres. Reproduction is a continuous process, with new generations of trees colonizing each new generation of openings.

An explanation of the harvest methods proposed are described in Appendix D, Management Systems and Harvest Methods.

Connected Actions for Alternative 4

Harvested trees from Units 34 - 38 would be skidded to an existing landing at the terminus of road reconstruction at Unit 34.

Pre-haul road maintenance would be required on Sawyer River Road (FR 34). Road restoration (spot rocking) may be needed on Forest Road 86 to allow for summer or fall log haul.

Table 4: County Line Project - Alternative 4

Unit	C-Std	Forest Type	Acres	Forest Type	Rx Objective	MA	Harvest Method	Operating Season
1	38-13	Hardwood	31	Hardwood	High Quality Hardwood	2.1	Commercial Thin	Winter
2	38-3	Hardwood	15	Hardwood	Regenerate Stand	3.1	Clearcut	Winter
3	38-6	Mixedwood	21	Mixedwood	Increase softwood component	2.1/3.1	Single-Tree Selection	Winter
9	28-2	Mixedwood	10	Mixedwood	Increase softwood component	2.1/3.1	Single-Tree Selection	Fall/Winter
11	28-25	Softwood	6	Softwood	Enhance Softwood	3.1	Single-Tree Selection	Fall/Winter
12	29-2	Hardwood	32	Hardwood	High Quality Hardwood	3.1	Commercial Thin	Fall/Winter
13	29-33	Softwood	14	Softwood	Enhance Softwood	3.1	Single-Tree Selection	Winter
14	29-2	Hardwood	22	Hardwood	Regenerate Stand	3.1	Group-Selection	Fall/Winter
21	25-15	Hardwood	24	Hardwood	High Quality Hardwood	2.1	Commercial Thin	Fall/Winter
22	25-15	Hardwood	15	Hardwood	High Quality Hardwood	2.1	Single-Tree Selection	Fall/Winter
24	25-10	Hardwood	11	Hardwood	High Quality Hardwood	2.1/3.1	Commercial Thin	Fall/Winter
28	40-3	Mixedwood	35	Mixedwood	Enhance pine and oak	2.1	Single-Tree Selection	Fall/Winter
30	40-12	Hardwood	27	Hardwood	High Quality Hardwood	2.1/3.1	Single-Tree Selection	Fall/Winter
31	39-2	Mixedwood	44	Mixedwood	High Quality Hardwood	2.1/3.1	Single-Tree Selection	Fall/Winter
32	40-5	Hardwood	13	Hardwood	High Quality Hardwood	2.1	Single-Tree Selection	Fall/Winter
33	40-5	Hardwood	7	Hardwood	Regenerate Stand	2.1	Clearcut	Summer/Fall/Winter
34	39-3	Hardwood	54	Hardwood	High Quality Hardwood	3.1	Commercial Thin	Fall/Winter
35	40-27	Hardwood	8	Hardwood	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
37	40-1	Hardwood	11	Hardwood	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
38	40-1	Hardwood	10	Hardwood	Regenerate Stand	3.1	Clearcut	Summer/Fall/Winter
40	40-4	Hardwood	22	Hardwood	High Quality Hardwood	2.1	Single-Tree Selection	Fall/Winter
41	41-1	Hardwood	18	Hardwood	High Quality Hardwood	2.1	Commercial Thin	Fall/Winter
42	41-27	Mixedwood	5	Mixedwood	Increase softwood component	2.1	Single Tree Selection	Fall/Winter

C-Std - Compartment and Stand where the unit is located

Forest Type – represents the primary species composition of the unit

Rx objective –the proposed prescriptions are designed to meet the Purpose and Need for treatment, in each unit.

MA - Management Area

Operating Season - Time of year when harvest activities are scheduled to occur. Activities may occasionally occur outside these periods when soil conditions and other resource considerations allow.

Figure 8

Connected Projects under ALL of the Action Alternatives

Approximately ten existing landings would be used and four new landings would be needed. A log landing is approximately one quarter to one-half acre where harvested trees are decked for loading onto log trucks and then transported to various mills.

Pre-haul maintenance is the routine work done by a timber sale purchaser to make an existing road ready and safe for hauling and may include work such as grading, cleaning or installing culverts and removal of downed trees, limbs or encroaching vegetation.

Road reconstruction is needed to bring Forest Road 85 and Forest Road 513 to current design standards as originally built. Road reconstruction for this project is planned to meet low maintenance - permanent road standards. Road reconstruction includes straightening a sharp corner on FR 85, installing and cleaning ditches, clearing brush, replacing culverts, spot rocking and shaping road surfaces. Temporary bridges and drainage structures are removed and the entrance made impassable to wheeled vehicles upon completion of the project. These two reconstructed roads would be designed for use on frozen or dry ground conditions.

A 0.2 mile section of existing road 513 would be relocated to use the existing approach onto Highway 302 that serves the sewerage facility at that location. The relocated section would leave the existing road prior to the facility, and circle around behind it to tie back in with the section that proceeds up into the landing at unit 34. The 0.2 miles of road relocation is on flat well drained soils prior to reaching unit 31. This location was chosen because it would require the least amount of soil disturbance over the shortest logical distance.

E. Mitigations for the Action Alternatives

In addition to the applicable Forest-wide and Management Area standards and guidelines listed in the Forest Plan (pages III-5 through III-29; III-36 through III-41 and Appendix VIIB; 18-22); the following specific mitigation and coordination measures are planned and apply to all action alternatives. Individual mitigations benefit several resources or mitigate several potential concerns.

Recreation and visuals

- A 50 foot slash disposal zone, where the slash from cutting trees would be removed to minimize potential adverse visual effects, would be established along the Sawyer River Road in Units 22 and 24, and along portions of Highway 302 (Units 21, 22, 32, and 40-42), and within fifty feet of the Conway Scenic Railway (Unit 28), where applicable for each alternative.
- A 50-foot slash removal zone would be implemented in Unit 13, along both sides of Hancock Notch Trail. Logging slash would be removed from the skid trail and the adjacent 50 feet, and the trail restored to a reasonable standard following implementation of the prescription.

- Unit 13 is proposed for winter logging to reduce impacts to Hancock Notch trail users.

Roads

- Road reconstruction of Forest Roads 513, and FR 85 would be to standards for dry surface and frozen ground conditions. Road reconstruction would include grading, drainage and brushing. Subsequent hauling on these roads would be dry surface or winter only. Following harvest activities, culverts would be removed and these roads waterbarred, seeded and closed.
- Borrow pits would not be permitted within foreground views of open roads or trails, or within the filter strip of a stream or pond. Excavation would not be allowed within the channels of live streams (Forest Plan, III-24).
- Appropriate safety signs would be placed along all Forest Roads and trails where activities are occurring to caution people about harvesting activities and provide for their safety. Signs warning hikers would be placed at Sawyer Pond Trailhead and Signal Ridge Trailhead parking lots to remind them when they return.
- Log trucks would come to a stop before crossing Carrigain and Whiteface Bridges, and then proceed slowly across these two bridges.

Cultural Resources

- Cultural resources are avoided in the project design. Known historic sites associated with the historic town of Livermore and an old rock quarry are protected from disturbance by project design. All known sites are to be avoided during harvest operations. Trees around Cobb cemetery to be removed would be felled away from the cemetery. However, if any cultural resources are uncovered or otherwise discovered during sale activities, immediate cessation of operations and notification of the Forest Service is required.

Water Quality and Sedimentation

- Harvest activities may be suspended during periods of seasonal thaw to protect soil and water resources. Harvest and haul operations would be prohibited during the approximate mud season dates of March 15 to May 15.
- The integrity of vernal pools would be maintained. Some partial harvesting of trees near the perimeter may occur where recommended by the biologist. No ground equipment would be allowed in designated vernal pools at any time of the year. Canopy cover would be maintained in the 50 foot zone around the perimeter of any pool, and disturbance to the forest floor would be minimized within that zone with removal of harvested trees away from the vernal pool.
- Trees whose roots support stream banks would not be removed in order to maintain riparian area stability.

- Trees that provide primary shade and leaf organic matter, or potentially would provide woody debris to the stream, would be retained along stream courses.
- Landings would not be created within 100 feet of a vernal pond or stream.
- Skidding within 100 feet of a pond or a flowing stream would be limited to dry or frozen ground conditions except on designated skid trails and at designated stream crossings. Exposed soil would be limited to less than 5% of the riparian area.
- Stream protection measures would be used wherever skid trails cross wet areas or streams (Forest Plan pages III-21, 22). Skidding patterns would minimize the number of stream crossings. Where appropriate, previously used stream crossings would be used again.
- All work at Whiteface Brook Bridge would be done in accordance with current Standard Specifications for Highway Bridge Construction, and with any required wetland permits.
- Skidding patterns would be laid out to minimize the number of stream crossings. Where appropriate, existing stream crossings would be used to minimize adverse cumulative effects to water quality.
- Waterbars and other cross drainage structures would be installed to direct water off skid trails, allowing it to disperse and infiltrate into soils, minimizing erosion and effects on water quality.
- Skid roads would be designated to minimize the area of soil compacted during skidding operations.
- Temporary crossing structures such as box culverts, pipes, or temporary bridges (such as the temporary bridge crossing north of Unit 21) would be installed where skid trails cross flowing water. Temporary crossing structures would be removed and channel banks restored as needed following logging activities. The intent is to keep machinery out of wet areas and streambeds to minimize potential direct and indirect effects to water quality or streambank stability. Where appropriate, sites previously used for crossings would be used again.
- Erosion control requirements including installation of water bars or other cross drainage structures on skid trails and temporary haul roads, removal of temporary culverts, weed-free erosion control seeding, fertilization or other soil stabilization activities would be implemented according to contractual requirements. Allow for natural regeneration of vegetation where possible.
- Within the units listed in Table 5 below, riparian areas would be the number of feet shown on either side of the streams within or adjacent to the stream in all action alternatives. Within these areas, no more than 50% of the basal area would be removed and trees larger than 18 inches DBH (diameter at breast height) would be retained as per Forest Plan standards and guidelines on page III-15d (as amended on 11/6/89).

Table 5: Riparian Areas

Riparian Type	Minimum Width	Units
10	50 ft. + (4 x % slope)	42
12, 15	50 ft. + (2 x % slope)	2,3,8,12,13,30,28
20	50 ft. or floodplain to the top of the first terrace	11

- On closeout or when stopping harvest for more than 1 season, waterbar skid trails as per contract specifications. Seed landings and skid trails only where slopes may cause soil erosion and use native seed determined to be non-invasive. Allow for natural regeneration of vegetation where possible.

Wildlife and Botanical

- Identification or discovery of any threatened, endangered or sensitive plant or animal species would be reported to the appropriate specialist and ground disturbing activities would immediately cease. Appropriate protective measures would be taken. This provision is required in all timber sales contracts and does not imply insufficient field surveys. All field surveys for threatened, endangered or sensitive plant or animal species have been completed.
- Wildlife trees, such as those suitable for cavity dwellers and mast production, would be reserved during layout and marking unless they pose a safety hazard to cutters or the public. For uneven-aged management, maintain a basal area no less than 1.25 to 2.5 square feet per acre in trees with a diameter of 18 inches or more and two or more major defects where attainable. Where possible reserve live trees with woodpecker cavities as they may provide roost sites for bats.
- Stands with a concentration of bear-clawed beech trees would have specific marking prescriptions to retain this habitat feature.
- Reserve Trees would be retained to meet the terms and conditions of the Biological Opinion for the Forest Plan Amendment, and for this project.
- Management prescriptions would encourage the recruitment and retention of wildlife trees a minimum of 18 inches DBH (diameter at breast height) as per Forest Plan standards on page III-15d.
- No whole tree harvesting would be allowed. Logging slash would be left near where it falls. To facilitate branch and top removal in winter or brushy conditions, tops and limbs may be removed on the skid trail, and used there to reduce compaction or rutting.
- During marking of the proposed units, protect raptor nest trees and report their presence to the District Biologist. The District Biologist would determine if further mitigation is needed.

- Detection of any threatened, endangered, or sensitive species during implementation of any of the alternatives would be reported to the District Biologist. Requirements to protect the species would be implemented.
- Bridge repair work would only occur between May and the end of September to avoid siltation during the eastern brook trout egg incubation period. Permanent culverts placed in fish-bearing streams shall be bottomless.
- Within clearcut units, reserve patches and reserve trees would be identified and protected to meet the terms and conditions of the Biological Opinion for the Indiana Bat (Environmental Assessment and Biological Evaluation) Forest Plan Amendment.
- Large (>18" DBH) live and dead hazard trees cut for safety reasons would be retained on site. In addition, trees found to be cull after cutting may be retained on site to increase large woody material.
- Harvest equipment would be washed to remove invasive plant material prior to being brought on National Forest.



F. Comparison of Alternatives

The following table compares the alternatives by measurement indicators (acres, percents, and effects). The environmental effects of each alternative are discussed in detail in Chapter 3, Environmental Consequences.

Table 6: Summary of Effects – County Line Project

Measurement Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres proposed for clearcut and partial cut in Units 1-15	0 CC/ 0 PC	117 CC/ 152 PC	0 CC/ 0 PC	20 CC/ 114 PC
Percent area treated in HMUs 512 & 513 in this project #	0% total and 0% in openings	2.9% total and 1.25% in openings	0% total and 0% in openings	1.6% total and 0.16% in openings
Miles of roads reopened for Units 1-15, and then closed ##	0 Miles	1.74 Miles	0 Miles	1.74 Miles
Degree of impact to Wilderness potential from units treated and roads reconstructed	None	Impact is 1.25 % new openings, 1.74 Miles of road reconstruction	None	Impact is 0.16 % new openings, 1.74 Miles of road reconstruction
Acres of early successional * habitat created (clearcut)	0	153	36	51
Acres of softwood habitat enhanced	0	75	5	56
Acres treated to improve timber quality and species composition	0	345	263	348
Total Acres Treated	0	573	304	455
Maximum Estimated Acres of openings viewed (middle & background) from key viewpoints**	0	34	13	13
Miles of trail (Hancock Notch) along which harvest activity would occur (foreground)	0	0.25	0	0.25
Miles of open road along which harvest activity would occur (foreground)	0	2.4	2.4	2.4
Comparison to ROS classification ***	Meets classification	Meets classification	Meets classification	Meets classification

CC = clearcut; PC = Partial cut (single-tree selection and thinning)

* Early successional refers to clearcuts. Single-tree selection and thinnings are not designed to create early successional openings.

Forest Service Handbook (FSH) 1909.12, Chapter 7, item 7.11b(7) establishes a criteria for roadless areas in the east at **20%** or less of the area harvested within the last ten years. There are **no** acres within HMUs 512 and 513 (9304 acres) that have been harvested within the last fifteen years. The number of acres and percents shown are for this project alone.

Another applicable criteria for qualifying an area for inventory as potential Wilderness as established in FSH 1909.12, Chapter 7, item 7.11a(9) allows for including timber harvest areas where logging and prior road construction are not evident or are substantially unrecognizable. Forest Road 85 is a system road that would be maintained at its current design level. Access to units 1 and 2 would be on an old unclassified road that was historically used to harvest timber.

** Acres shown represents the maximum total acres viewed from any one viewpoint. All other viewpoints would see fewer acres than the number shown for this alternative. The view location in Alternative 2 is from Mount Tremont. For Alternatives 3 and 4, the view is from Mount Crawford.

*** ROS classification (Recreation Opportunity Spectrum): identifies visual quality changes allowable under the White Mountain National Forest Plan. In general, these lands are categorized into background, middleground and foreground zones.

Table 7 summarizes the harvest method by alternative in County Line Project.

Table 7: Unit Harvest Method by Alternative

Unit	Alt. 1	Alternative 2	Alternative 3	Alternative 4
1	Defer	Commercial Thin	Defer	Commercial Thin
2	Defer	Clearcut	Defer	Clearcut
3	Defer	Single Tree Selection	Defer	Single Tree Selection
4	Defer	Clearcut	Defer	Defer
5	Defer	Clearcut	Defer	Defer
6	Defer	Clearcut	Defer	Defer
7	Defer	Clearcut	Defer	Defer
8	Defer	Commercial Thin	Defer	Defer
9	Defer	Single Tree Selection	Defer	Single Tree Selection
11	Defer	Single Tree Selection	Defer	Single Tree Selection
12	Defer	Commercial Thin	Defer	Commercial Thin
13	Defer	Single Tree Selection	Defer	Single Tree Selection
14	Defer	Clearcut	Defer	Group Selection
15	Defer	Single Tree Selection	Defer	Defer
21	Defer	Commercial Thin	Commercial Thin	Commercial Thin
22	Defer	Single Tree Selection	Single Tree Selection	Single Tree Selection
24	Defer	Commercial Thin	Commercial Thin	Commercial Thin
28	Defer	Single Tree Selection	Single Tree Selection	Single Tree Selection
30	Defer	Single Tree Selection	Single Tree Selection	Single Tree Selection
31	Defer	Single Tree Selection	Commercial Thin	Single Tree Selection
32	Defer	Single Tree Selection	Commercial Thin	Single Tree Selection
33	Defer	Clearcut	Clearcut	Clearcut
34	Defer	Commercial Thin	Commercial Thin	Commercial Thin
35	Defer	Clearcut	Clearcut	Clearcut
37	Defer	Clearcut	Clearcut	Clearcut
38	Defer	Clearcut	Clearcut	Clearcut
40	Defer	Single Tree Selection	Single Tree Selection	Single Tree Selection
41	Defer	Commercial Thin	Commercial Thin	Commercial Thin
42	Defer	Single Tree Selection	Single Tree Selection	Single Tree Selection

Chapter 3 – Affected Environment and Environmental Consequences

Introduction

The following resources are considered: Wildlife including Federal Threatened, Endangered, and Proposed Species, Regional Forester Sensitive Species, and other species of concern, fisheries, soil; water, recreation, visuals, economics, heritage resources, and environmental justice. Other Issues Brought Forward During Scoping are also discussed. Supplemental information is in the Appendix to this EA, or in the project file available at the Saco Ranger District Office. The affected environment and environmental effects are summarized for each resource or issue in this section.

3.1 Wilderness and Roadless Potential

Issue: *Effect that proposed logging and road building for Units 1-15 might have on the suitability of this area for inclusion in Wilderness or Roadless designation*

Affected Environment - Wilderness and Roadless

Background

Recreation goals within County Line analysis area are to maintain and enhance the quality of recreation opportunities that currently exist. These recreation opportunities are primarily Roded Natural opportunities for MA 2.1 lands, and Semi-primitive Motorized opportunities on MA 3.1 lands. Existing recreation opportunities within all management designations (2.1, 3.1, 6.1, 6.2, 6.3, 8.1 and 9.3) within the analysis area are considered in this analysis.

All proposed activities are in MA 2.1 and MA 3.1 lands within HMUs 511, 512 and 513. MA 2.1 lands are designated in the Forest Plan as being *Roded Natural*. Roded Natural is characterized by predominantly natural appearing environment with moderate evidence of the sights and sounds of human activity. Evidence of other users and uses are prevalent. Resource modification and utilization practices are evident although they harmonize with the natural environment. MA 3.1 lands are designated as *Semi-primitive Motorized* and are characterized by predominantly natural or natural appearing environment with a low degree of interaction between users. Evidence of motorized use and other users is present. A detailed description of these classifications can be found in the Forest Plan, pages VII-H-1 to H-7. Recreation goals for other MAs in the analysis area are described in the Forest Plan, Chapter - III, Management Direction.

Forest Service Handbook (FSH) 1909.12, Chapter 7 establishes several criteria for identifying and evaluating potential wilderness within the National Forest System. Applicable criteria for this project area include past and proposed acres of timber harvest and miles of improved roads within a given area.

The first applicable criteria specifies that no more than twenty percent of an area under consideration can show evidence of harvesting within the last ten years. There are **no** acres within HMUs 512 and 513 (9304 total acres) that have been harvested within the last fifteen years.

The second applicable criteria (Chapter 7, item 7.11a(9)) allows timber harvest areas to be included where logging and prior road construction are not evident or are substantially unrecognizable. Forest Road 85 is an existing Forest system road that would be maintained at its current design level under this project.

Peaks

Peaks within or adjacent to the analysis area include Mount Tremont, Mount Carrigain, The Captain, Mount Lowell, Duck Pond Mountain, Mount Hope, Hart Ledge, Owls Cliff, Greens Cliff, Mount Huntington, Mount Crawford, and Mount Hancock. Portions of some proposed units are visible from Mount Tremont, Mount Carrigain, Mount Crawford and Mount Hancock (the south peak). Views from these locations are discussed later in this document. Additional land features include four remote beaver ponds, Hancock Notch, Carrigain Notch, and Sawyer Ponds.

Trails

The analysis area includes Hancock Notch Trail, Sawyer Pond Trail, Carrigain Notch Trail, Mount Tremont Trail and Signal Ridge Trail. The only shelter within the planning area is at Sawyer Pond. Trailhead parking for these trails is on Forest Road 34, Highway 302 and on Kancamagus Highway. The greatest use of these trails is in the summer and early fall. The area of concern for this issue only includes those features north of Sawyer River Road (see enclosed maps in Chapters 1 and 2).

Sawyer River Road, Forest Road 86 and Sawyer Run Trail are a designated snowmobile trail as part of the Meadow Brook/Bear Notch trail system, and are maintained by the White Mountain Trails Snowmobile Club. Sawyer River Road is gated during winter, allowing public access on foot or snowmobile. Sawyer River Road is narrow with steep drop-offs and not wide enough to safely accommodate logging trucks and snowmobiles. There are no designated or maintained cross-country ski trails within County Line Analysis area, although intermittent use occurs.

Hancock Notch Trail is the only trail within a harvest unit. This trail bisects part of unit 13 on the old railroad grade/logging road and then proceeds through Hancock Notch.

Signal Ridge Trail comes within a quarter mile of thinning Unit 1 as it ascends Whiteface Brook. The trail is located on moderately steep topography near the brook in this section. The topography and the quarter mile of standing timber prevent unit 1 from being seen from the trail.

Wilderness

The Presidential Range – Dry River Wilderness lies northeast of the planning area across the Saco River. The Pemigewasset Wilderness lies to the north and northeast.

The Pemigewasset Wilderness is approximately one and a half miles north of proposed harvest Unit 15. Nancy Pond Scenic Area is nearly 1 1/2 miles north of proposed harvest Unit 21. Sawyer Pond Scenic Area is approximately 0.8 miles south or southeast of proposed harvest Units 1, 2, 3, 9 and 34, and is not within the area of concern for the issue of expansion of wilderness or roadless.

No river rafting or canoeing on Sawyer River is known to occur. A popular swimming hole is located below the historic town of Livermore, and it is not near any proposed activity.

3.1a Effects on Wilderness Potential - No Action

This issue responds to the comment that no logging or road building activities should occur northwest of Sawyer River Road (FR 34) above the confluence with Whiteface Brook until Forest Plan Revision is complete. This issue arises from disagreement over whether proposed harvesting and road reconstruction in Units 1-15 would prevent this area from being included in an expanded Wilderness or Roadless designation.

Under the No Action alternative, there would be no changes to the area northwest of Sawyer River Road above the confluence with Whiteface Brook (HMUs 512 and 513). Therefore, there would not be any effect on the suitability of this area for inclusion in Wilderness or roadless designation.

3.1b Effects on Wilderness Potential - Alternative 2

Alternative 2 includes Units 1-15 north of Sawyer River Road. Except for Units 1, 2, 3, and 15, these units are low on the slope in close proximity to Sawyer River, and are an average of 2.5 miles from the Pemigewasset Wilderness Boundary. The nearest unit (15) is one and a half miles from the Pemigewasset Wilderness.

The changes to the area northwest of Sawyer River Road above the confluence with Whiteface Brook (HMUs 512 and 513) would include 117 acres of clearcuts, 70 acres of single tree selection and 82 acres of thinning, totaling 269 acres. Alternative 2 includes the use of Forest Road 86, reconstruction of approximately one mile of Forest Road 85, a temporary log stringer bridge across Carrigain Brook, and 0.74 miles of temporary road located on an old unclassified road to access Units 1 and 2.

This alternative would treat 2.9 percent (269 acres) of the total acres within HMUs 512 and 513 (9304 acres). It would create 117 acres of temporary openings (clearcuts). This equates to 1.25 % of that area in temporary openings. This figure would be used as identified under the criteria in FSH 1909.12 Chapter 7, for evaluation of an area for Wilderness potential. There are no other changes (including road reconstruction) proposed in this project or cumulatively, to the area northwest of Sawyer River Road above the confluence with Whiteface Brook, that would effect consideration of this area for inclusion in Wilderness or roadless designation. This is because ongoing recreation uses, Signal Ridge trail improvement, and roads to be reconstructed in this portion of the project area already exist.

Therefore, the small percent (2.9 %) of the area (HMUs 512 and 513) to be treated, roads to be reconstructed, and temporary road needed under this alternative, would not have an effect on the suitability of this area for inclusion in Wilderness or roadless designation.

3.1c Effects on Wilderness Potential - Alternative 3

Alternative 3 is designed to respond to this issue. Alternative 3 does not propose to reconstruct Forest Road 85, does not harvest in Units 1 to 15, and does not provide a temporary bridge across Carrigain Brook or temporary access to units 1 and 2. There would be no changed conditions to the area northwest of Sawyer River Road above the confluence with Whiteface Brook. Therefore, there would not be any effect on the suitability of this area for inclusion in Wilderness or roadless designation.

3.1d Effects on Wilderness Potential - Alternative 4

Alternative 4 differs from Alternative 2 in that treatments are not proposed for Units 4, 5, 6, 7, 8 and 15. Unit 2 (a clearcut) is reduced from 25 acres to 15 acres. Unit 14 is changed from clearcut to group selection, thereby creating temporary openings on a total of about five acres of the 22-acre stand.

Changes that would occur under Alternative 2 within the area northwest of Sawyer River and Whiteface Brook) include a 15 acre opening, 51 acres of single-tree selection, 63 acres of thinning, and a 22 acre group selection partial harvest for a total of 151 acres. Reconstruction of one mile of FR 85 and 0.74

miles of temporary road (both existing) are needed to access the included units. Roads would be returned to their current closed status following implementation.

This alternative would treat 1.6 percent (151 acres) of the total acres within HMUs 512 and 513 (9304 acres). It would create 15 acres of temporary openings (clearcuts). This equates to 0.16 % of that area in temporary openings. This figure would be used as identified under the criteria in FSH 1909.12 Chapter 7, for evaluation of an area for Wilderness potential. There are no other changes (including road reconstruction) proposed in this project, or Federal actions cumulatively, to the area northwest of Sawyer River Road above the confluence with Whiteface Brook, that would effect consideration of this area for inclusion in Wilderness or roadless designation. This is because ongoing recreation uses, Signal Ridge trail improvement, and roads to be reconstructed in this portion of the project area already exist.

Therefore, the small percent (1.6 %) of the area (HMUs 512 and 513) to be treated, roads to be reconstructed, and temporary road needed under this alternative, would not have an effect on the suitability of this area for inclusion in Wilderness or roadless designation.

3.1e Cumulative Effect on Wilderness Potential

There are no other changes or proposed Federal actions in addition to those identified in this analysis that would affect the area northwest of Sawyer River Road above the confluence with Whiteface Brook. The character of this area would not be affected by this project in combination with other ongoing recreation and maintenance activities to the extent that its suitability for inclusion in Wilderness or roadless designation would be jeopardized. This is because these ongoing recreation uses and maintenance activities, combined with the proposed action or alternatives, and in consideration of the low level of recent past and potential future management activities in this portion of the project area, would maintain this area in a similar condition as is found currently (see Wildlife section 3.2b).

The small percent of change within HMUs 512 and 513 that would occur under the action alternatives regarding the issue of wilderness potential, would not affect the suitability of this area for inclusion in Wilderness or roadless designation.

3.2 Wildlife and Wildlife Habitat

Issue: Creating early successional habitat, enhancing conifer stands to maintain softwood community types, and enhancing timber resources within this area may effect some wildlife species

This issue is directly related to the purpose and need for action. The purpose and need for action is represented with the Proposed Action alternative.

The wildlife biologist analyzed vegetation types and wildlife habitat in the planning area, and with the silviculturist, has proposed harvest treatments that respond to the purpose and need for action. The biologist provided specific analysis of the proposed treatments and their effect on wildlife and wildlife habitat as documented in the discussions below and in the Biological Evaluation in Appendix A.

Forest Plan objectives for wildlife habitat are identified in Forest Plan Appendix B. The purpose and need identified in Chapter 1 of this document is based on those Forest Plan objectives, as summarized for each Management Area in the Forest Plan, Chapter III, Management Direction. To varying degrees, each of the action alternatives meets the purpose and need for this action. How each alternative meets Forest Plan objectives, and the environmental effects of those alternatives is presented in the discussions below.

3.2a Background - Forest Plan direction for Wildlife Habitat Management

Management for wildlife species diversity can be achieved by providing a broad spectrum of habitat diversity. To meet the goals of the National Forest Management Act, the Forest developed a wildlife strategy based on Habitat Management Units (HMUs). HMUs provide necessary habitat diversity to maintain wildlife populations on the Forest (Forest Plan, Appendix B, page VII-B 1-28). An HMU is a unit of land large enough to provide habitat requirements of native wildlife species and may include upland vegetated areas, non-forested areas, wetlands, riparian zones, and areas of ecological significance.

Management of HMUs involves two major habitat parameters: the spatial distribution of community or vegetative types over the landscape and the relative proportions of successional stages, or age classes, within the vegetative or community types. Changes in community types occurs either through natural succession over a long period of time or through catastrophic actions that may be either natural or man-created. Working with this understanding provides the foundation used to work towards achieving the desired conditions within each HMU.

Forest wide within Management Areas 2.1 and 3.1 the lands are divided into uneven-aged or even-aged management systems. Within the even-aged portion the lands are further divided into age classes: regeneration, young, mature and overmature. The mature and overmature age classes (on average greater than 60 years and 120 years respectively) typically comprise between 75% and 100% of the even-aged lands. Regeneration-aged habitat (0-9 years) typically makes up less than six percent.

Management Area direction is to create and maintain a diversity of habitat for both game and non-game species. In addition, management would consider and blend with natural ecosystem processes and tendencies.

The Forest Plan (page III-13) provides an “ideal” desired condition for both community type and age/successional stage distribution within HMUs. An ideal situation would contain these percentages; however, land conditions determine the actual percentages that can be achieved. For this reason HMUs based on soil capability or ecological land types (ELTs) were developed to consider actual potential within the County Line Analysis area. These became the “desired acres” listed in each HMU analyzed for this project. Individual tables developed for HMUs 511, 512 and 513 for each alternative can be found in the Project File.

3.2b Affected Environment - Recent Harvest History in County Line Analysis Area

The most recent timber sale sold and harvested within the analysis area was sold in 1981 and completed in the mid 1980's. Previous to that was the Livermore sale, which sold 1,035 MBF. Regeneration harvest units within that sale, and others that preceded it, are restocked. The most recent clearcut harvest within the analysis area is now a fifteen year old sapling stand. Most former openings are well into sapling size and many into pole size stands. These former openings do not add to cumulative effects for soil or water impacts. The changed stand conditions resulting from past sales are accounted

for in the vegetation database (HMU tables). Therefore, the wildlife habitat (HMU) analysis considered all of these previous harvests and their cumulative effects. This is because all stands are classified according to their current age group and community type.

Historically, logging played an important role in the Sawyer River Area. The historic town of Livermore, located within the planning area, is a former logging town built during the 1870's and abandoned in the 1930's. During this time logging via horses to railroad haul routes, then to the mill in Livermore was responsible for the existence of the town, and resulted in the harvest of most of the merchantable timber within Sawyer drainage. The present vegetative condition is a result of that past logging, the subsequent growth of dense stands of natural regeneration, natural processes of succession, and timber management actions by the Forest Service beginning in the 1950's. The earliest recorded Forest Service activity in the area was the Sawyer River sale in 1951. Sawyer River sale thinned much of the operable land in the present planning area and built roads every 300 to 400 feet (on contours) to support horse logging. A logging camp was established at what is now the Sawyer River trailhead. Many of the old roads are in good shape, and are logical locations for current or future use.

Past timber harvesting reduced the amount of down large woody material, standing snags, and provided for the current even-aged condition. Forest canopy is generally fully occupied except for a few clearcuts established in the early 1980's. Forest canopy tends to be of uniform height.

A blowdown event and subsequent salvage sale occurred in the early 1980's in the broad valley in the vicinity of Greens Cliff and the upper Sawyer River. Existing low standard logging roads remain throughout these areas, although they have not been open for vehicular use and are not maintained to today's standards. Clearcuts and partial cuts have been limited in number and size within the analysis area in the recent twenty years. The last timber sale, sold in 1981, was completed about 1985. Existing clearcuts represent a small percentage of the analysis area, and are regenerating into thick stands of advanced regeneration, sapling and pole stands.

Past management activities have resulted in a mosaic of stand ages and vegetation structure and composition. This condition has provided some opportunity for wildlife species that favor younger stands and extensive opportunity for interior species and species preferring non-fragmented mature stands. There are no newly created regeneration aged stands less than ten years old.

There is only one parcel of private land within the analysis area. It is within the historic town-site of Livermore. Logging on private land near Route 302 appears to be very limited, and would be primarily hazard tree removal from existing openings near private homes and from the ongoing State Highway 302 widening project.

The ice storm of January 1998 did not damage many of the hardwood stands enough to warrant any action currently. Unit 1 and 2 are the only stands with noticeable damage from this storm.

The forest throughout the analysis area is predominantly made up of northern hardwoods with a small component of scattered softwoods within them. Some softwoods are on soils indicating natural processes would lead towards a purer softwood stand. Softwood natural regeneration is prolific in the understory of some stands, especially those near drainage bottoms. Pure stands of hardwood are on soils that would always have a large percentage of hardwoods. Red spruce, balsam fir and hemlock are the primary softwoods. Strips of softwoods are present in many of the drainages and pockets of softwood

are found on poor or wet soils. Pure stands of spruce and fir are usually found on high elevation peaks and ridges where soils are thin and conditions are harsh.

3.2c Affected Environment – Wildlife and Wildlife Habitat

Each wildlife species requires a particular habitat in which to exist and reproduce. Some species are permanent residents of an area while others migrate to and from various places. Some species are generalists and utilize many types of habitat while others may require or remain in one specific habitat type. The Wildlife Strategy for the White Mountain National forest states a diversity of habitats will be established to provide habitat for all native and desired non-native species. Since wildlife is directly related to the habitat it requires, wildlife management deals primarily with providing a diversity of habitat types to meet this objective.

The direction of the National Forest Management Act is to manage habitat to maintain viable populations of existing native and desired non-native vertebrate species (36 CFR 219.19). Through field reconnaissance and literature review (DeGraaf and Yamasaki 2001) it is known a wide array of wildlife species inhabit the White Mountain National Forest throughout all or part of the year including approximately 31 species of reptiles and amphibians, 190 species of birds, and 56 species of mammals. These species use a variety of habitat types and age classes to meet their needs. In forested habitat, approximately 70% of the species use mature and overmature habitats while 66% use early-successional habitats for all or part of their life cycle (DeGraaf and Yamasaki 2001, DeGraaf et al. 1992).

Over 416,000 acres (approximately 54 percent) of the 771,000-acre landbase of the White Mountain National Forest are not actively managed (Management Areas 5.1, 6.1, 6.2, 6.3, 8.1, 9.1 and 9.3). Habitat changes occur through natural processes, including occasional natural disturbances by wind, ice and insects. These reserved management areas are highly interconnected throughout the Forest. This provides areas of interior forest habitat for species dependent on this characteristic.

3.2d Definition of the Analysis Area, and the Project Area, for Wildlife Effects Analysis

The Habitat Management Units (HMUs) that make up the Analysis Area contain a total of 16, 844 acres. Of this acreage, only 4,904 acres lie within Management Areas 2.1 or 3.1 that allow vegetative management. The Analysis Area lies on the south side of Carrigain Ridge within the Sawyer and Saco River watersheds. Other streams within the area are Carrigain Brook, Whiteface Brook, Nancy Brook, Halfway Brook and Stony Brook.

For discussions concerning wildlife, fish and TES on direct, indirect, and cumulative effects for the County Line Project, the analysis area is HMU 511 with compartments 24, 25, 39, 40, and 41; HMU 512 with compartments 26, 27, 28 and 38 and HMU 513 with compartments 29 and 20 exclusive of designated Wilderness lands (MA 5.1) within these compartments. The project area for wildlife, fish and TES discussions encompasses portions of compartments 25, 39, 40 and 41 in HMU 511, compartments 28 and 38 in HMU 512 and compartment 29 in HMU 513.

The land outside of Management Area 2.1 and 3.1 in these HMUs is not being considered for any harvest or management activity. These lands encompass 11,975 acres or 71% of the analysis area and provide a large, contiguous area of uneven-age, interior forest habitat for species dependent on expansive areas of forest.

The HMU Summary Tables give a synopsis of the current habitat within this area. Detailed HMU tables

for each alternative are found in the Project File. The primary community type is northern hardwood totaling 4,448 acres. The only other community is approximately 400 acres of spruce/fir. No stands of paper birch, aspen, hemlock, or oak/pine currently exist on the managed lands in this area. Individual trees of these species may be found, but nothing that would be classified as a habitat community of these species.

Approximately two thirds of the northern hardwood community is currently under evenage management designation. The breakdown of the northern hardwood evenage classes is shown in Table 8.

Table 8: Northern hardwood evenage classes

Northern Hardwoods	Regeneration Age 0-9 years 0 Acres	Young Age Class 10-59 years 1385 Acres	Mature Age Class 60-119 years 1254 Acres	Overmature Age Class 120 years + 162 Acres

Of the spruce/fir community type, 305 acres are managed using uneven-age methods with 93 acres managed using even-age methods. The softwoods primarily line the streams and rivers within the Analysis area.

Soils that would allow a more diversified mix of community types are lacking within the analysis area. The Ecological Land Types (ELTs) that would promote stands of oak and hemlock are lacking although individuals of these species are found scattered within the analysis area. ELTs that are present promote northern hardwoods, particularly sugar maple and beech. Softwoods line the drainages. Spruce, fir and white pine are the primary softwoods with small pockets of hemlock. Several of these stands have scattered dominant hardwoods with a heavy softwood understory.

Within the area of the historic town of Livermore are scattered apple trees. Some are clustered in what is classed as an orchard. Others remain overtopped by surrounding large hardwoods.

A wetland area exists along FR 86 soon after leaving forest Road 34. On occasion waterfowl have visited this site although there has been no documentation of breeding. Amphibians and reptiles along with other wildlife are often seen in the vicinity of this area. Other vernal pools have been reported within the analysis area. Wet soils were observed during field excursions in compartment 39, but the area was not a wetland and no vernal pools were noted.

The land between Highway 302 and the Saco River (Unit 28) has some red oak and white pine scattered throughout the stand. Expectations are this would never become an oak/pine stand but remain a mixed type forest. Sections of this area have what appear to be old river channels where perhaps the Saco River previously flowed. They now retain water and act much like vernal pools. Beaver activity has been observed in the stand.

White-tailed deer, moose, black bear, fox, coyotes, fisher, otter, bob cats, snowshoe hare, red squirrels, numerous rodents, amphibians, reptiles and many species of birds both resident and migratory have been observed within the analysis area. Forest Service Research has conducted 5 years of bird surveys in two different stands on Sawyer River Road. Salamander surveys have also been conducted within the analysis area. No rare species have been recorded during these surveys.

3.2e Affected Environment - Threatened, Endangered and Sensitive Species

The New Hampshire Natural Heritage Inventory (NHNHI), a division of the State Department of Resources and Economic Development, in conjunction with The Nature Conservancy, conducted floral field surveys of the analysis area for threatened, endangered and sensitive species in 1993 and 1996.

American ginseng, a Regional Forester's sensitive species was documented on a south-facing slope above FR 34 on the lower reaches of Sawyer River in 1993. Surveys done in 2000 to relocate this plant were not successful. No areas of calcareous soils have been determined to exist within the analysis area (Fay 2003. Personal communication).

A Biological Evaluation as required by Forest Service Manual 2673.4 and Section 7 of the Endangered Species Act, was prepared for all Alternatives and is located in the project file. It deals with Federally Listed Species as well as species contained on the Regional Forester's Sensitive Species List. Determination through the Biological Evaluation is that Indiana bats, eastern small-footed bats, northern bog lemmings and American ginseng may be present in the analysis area. Potential habitat for gray wolf, eastern cougar, and Canada lynx is present in the analysis area however the species are considered extirpated from the area. The BE also analyzes the effects of the action alternatives and whether they comply with the Canada Lynx Conservation Assessment and Strategy.

None of the Action Alternatives would affect Canada lynx since it is considered extirpated from the WMNF. It was determined all alternatives are consistent with the Terms and Conditions of the Canada lynx Conservation Assessment and Strategy. Any of the action alternatives may affect but would not likely adversely affect the Indiana bat. In addition any of the Action Alternatives may impact individual eastern small-footed myotis, northern bog lemmings and/or American ginseng but would not likely cause a trend toward federal listing or loss of viability

3.2f Affected Environment - Other Species of Concern

NHNHI had identified several areas of interest within Analysis Area (Engstrom 1994, Nichols and Sperduto 1998). A Boreal/transitional shrub bog (State Rank S2) exists between FR 86 and the Sawyer River. A semi-rich sugar maple/beechn forest (State Rank S3S4) of about 12 acres occurs on the slope above FR 34. No harvest activity is proposed in or near either of these areas.

There are species identified as being at risk for loss of population viability on the Forest such as State listed species that do not occur on the Federal list or Region 9 Forester's list (see Project File). Of these known species the American marten (*Martes americana*), Satin willow (*Salix pellita*) and ciliated aster (*Symphotrichum ciliolatum*) may be present in the analysis area (USFS 2003). The affects of the alternatives on American marten will be found under the Management Indicator Species section as it is also listed as an MIS species.

Ciliated Aster (*Symphotrichum ciliolatum*)

This is a perennial that blooms from August to September with seeds that are wind-dispersed. Indications are this species is governed by disturbance that creates small to large openings in the forest canopy. This species grows in woods as well as in thickets, clearings, and along shores. It has been found on roadsides which implies use of some edges. It also appears in scattered small or large canopy openings in matrix forest. This species is recorded as growing in early successional habitats,

such as clearings, as well as later successional habitats, such as woods. Appears to need openings even within woods habitat.

There is one historic report from Franconia, New Hampshire in the WMNF from 1896.

The probability of this species occurring within the project area is extremely low. The most likely habitat under all alternatives would be the open areas along Highway 302, the areas around the parking lots for Fourth Iron and Signal Ridge, the area around the private inholding, and the ditches along FR 34 and FR 86. These areas are all maintained through mowing, brushing, grading, reshaping, etc. and have been over many years. The level of maintenance is not expected to change regardless of what alternative is selected. Alternatives that create openings in the forest canopy are expected to provide habitat for this species. Therefore, implementation of any alternative would continue actions that may be making the areas suitable for this plant while implementation of any of the action alternatives may increase suitable habitat for this species.

Satin Willow (*Salix pellita*)

This is an obligate wetland species found in both nutrient rich and poor sites. It is found on the thicketed banks of streams, shores, and swamps that are inundated for a period of time. Soil conditions and water chemistry is also important for this perennial. It is known to flower from May to June.

The WMNF is on the southern edge of the species' range. All historical reports in New Hampshire are north of the notches.

The probability of this species occurring within the project area is extremely low. The most likely habitat would be streamside areas that may be flooded during ice out in harvest units 3, 11, 12, and 13. No harvest or harvest actions would occur within the floodplain of any of these streams under any of the alternatives. The Carrigain Brook temporary bridge-crossing site would be the only wetland area where activity would occur within the stream. Installation of the temporary bridge would require heavy machinery to ford the brook in order to set the abutments and bridge deck on the opposite shore. This location is not considered "thicketed" but open, previously disturbed and relatively compacted because this is the site of a previous bridge crossing. Descriptions of preferred habitat indicate this site would not be acceptable. Therefore no effects would occur to this species under any of the alternatives.

3.2g Affected Environment - Management Indicator Species

The direction of the National Forest Management Act is to manage fish and wildlife habitat to maintain viable populations of existing native and non-native vertebrate species (36 CFR 219.19). Viable populations of these species are to be maintained by providing suitable habitat that is well distributed (CFR 219.19). Management Indicator Species (MIS) associated with various habitats were selected to assess the effects of various management activities of the Forest Plan (as directed in 36 CFR 219.19 and documented in LRMP WMNF, VII B-5-10 (see Table 9). MIS may exist and be affected by project actions however viable populations of these species encompass a much larger land base than the project area. MIS are monitored forest-wide because they represent affects of the Forest Plan.

Suitable habitat for several MIS species exists within the analysis area but lies outside of the project area. Affects of the project are not expected to effect these MIS.

The following habitats have been determined to exist, have the potential to exist, and may be affected by this project proposal within the project area. Based on soil types, the pine community has potential in Unit 28 however other issues such as visuals and recreation preclude pursuing this community at this time. Representative wildlife species (Management Indicator) for these community types are also listed. Other habitats not found within the project area and their representative management indicators will not be discussed further in this document. Individuals of these species may be present in the analysis and project area as some species utilize habitats other than that which they represent as a management indicator.

Table 9: Management Indicator Species (MIS)

<i>Habitat or Potential Habitat within the County Line Analysis Area</i>	<i>Management Indicator</i>
<i>Mature and overmature northern hardwoods</i>	<i>Northern goshawk</i>
<i>Regeneration and young northern hardwoods</i>	<i>Chestnut-sided warblers</i>
<i>Mature and overmature paper birch and aspen</i>	<i>Broad-winged hawk</i>
<i>All ages of aspen and regeneration and young paper birch</i>	<i>Ruffed grouse</i>
<i>Regeneration of young spruce, spruce/fir and fir</i>	<i>Snowshoe hare</i>
<i>Mature and overmature spruce, spruce/fir and fir</i>	<i>Cape May warbler</i>
<i>Upland openings- grass, forb, orchard</i>	<i>Eastern kingbird and eastern bluebird</i>
<i>Upland openings-shrub</i>	<i>Mourning warbler</i>
<i>Wetlands and water</i>	<i>Black ducks</i>
<i>Permanent lakes, ponds, streams</i>	<i>Brook trout</i>
<i>Forest that is 30+' tall with at least 80ft² of basal area</i>	<i>American marten</i>
<i>Dense softwoods</i>	<i>Canada lynx</i>

Each alternative will be analyzed for effects on MIS that have suitable habitat within the described project area. **Appendix B** summarizes the MIS that are known to exist or have potential habitat within this analysis area, their population trends, as well as how the project is expected to affect those species within the project area. More detailed information on MIS of this project is located in the project file.

3.2h General Effects on Wildlife under all Action Alternatives

Any of the alternatives, including the No Action alternative, would have an effect on wildlife species. Each alternative would benefit some species and have an adverse effect on others. In analyzing alternatives, the needs of all vertebrate species that inhabit the Forest are considered. Species noted to have particular affinity to certain habitat types or age classes (**MIS species**) are mentioned as examples of expected response to actions mentioned in the proposed alternatives. MIS species are highlighted throughout the wildlife section to bring attention to their use in the analysis.

The direct effects on wildlife are related to habitat alteration, including potential benefits of vegetative change for some species and losses of habitat for others. Each of the action alternatives would be expected to produce the mechanisms for these effects. In the short term, the No Action Alternative would not produce any changes in habitat, or the corresponding adverse or beneficial results expected with the action alternatives. For the long term, all of the alternatives, including the No Action would have effects on certain habitats and species.

During harvest it is anticipated individuals of a species inhabiting these areas may experience displacement due to implementation that includes localized noise, human presence, change and/or elimination of habitat. Some species, such as deer and moose may change their foraging habits from day to night when harvesting activity has ceased. It is not unusual for tracks of these animals to be seen in areas freshly cut searching for the tops of cut trees to browse on. Other individuals such as nesting birds, amphibians, and rodents may have their mobility temporarily altered or would not be able to disperse to other areas and it is anticipated individuals may be eliminated due to harvest activity.

Removal of trees in which nests or dens have been constructed would be a direct effect on the individuals living there. Indirect effects would be from removing foraging habitat with unit prescriptions, human presence, increased disturbance from competitors, or predation.

The public has previously indicated a concern regarding the creation of "edge" habitat and fragmentation as a result of even-age harvest methods. Clear-cutting would create an edge along boundaries of the clear-cut units. Research has shown this edge is not present long in New England forests as the "edge" created is ephemeral, lasting only a few years until the clearcut attains some vertical height. No distinct bird communities are associated with these edges. (DeGraaf. 1991).

Fragmentation occurs when large blocks of habitat are broken or separated by different habitat and species associated with the mature interior forests such as wood thrush would be negatively impacted. The White Mountain National Forest and most surrounding private land are well forested. There would be what some call a form of fragmentation over time, as regeneration harvests occur in different stands. 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). Less than half of the WMNF is open to timber harvesting and within this area a maximum of 10% could be clearcut with a ten-year period. Under the Forest Plan and resulting from this project proposal, suitable habitat for forest interior wildlife species such as wood thrush is expected to be maintained.

Skid trails would be located to minimize rutting and siltation however implementation may have negative effects on some individual ground dwelling species such as voles, shrews, mice, and amphibians via some soil disturbance and compaction. This in turn may impact those species that feed on soil and ground-dwelling species such as red squirrels, thrushes, fox, and others.

The season in which a unit is harvested may directly affect wildlife, especially during critical times of the species' life cycle. Breeding, young rearing, feeding, and winter survival are common critical times for most species. Individuals could be displaced, harassed or mortally affected during any season of operation. Summer harvest (June through August) could affect species that utilize trees for nesting, cover, and foraging (such as breeding birds) and ground dwelling species (mammals, amphibians and reptiles). Fall harvest (September through November) would affect fewer nesting species but potentially could affect autumn breeding species including some amphibians, mast feeding species such as black bear, and small ground-dwelling mammals. Certain species could be affected by winter harvest (December through March). Certain species breed in winter including owls. Species, which utilize cavities such as chickadees and nuthatches or species which den such as squirrels, fisher, raccoons, and bear could be affected if roost or cavity trees were harvested. Expectation is no species would be affected to the point the viability of that species would become a concern.

The effect of vegetative stands being managed under an even-age or uneven-age method does affect wildlife. Even-age management allows clear-cutting which can provide various community types as well as various age classes over the landscape. Immediate effects would be the creation of regeneration-age (0-9 years) stands and removal of mature stands, or long term as in creation of different communities such as paper birch or aspen and initiation of successional age classes. Uneven-age management maintains a forested stand at all times. It may convert the community type, but once established that community type is expected to be retained. Potential for these areas to provide shade intolerant communities would be minimal. For wildlife a mix of both even and uneven-age habitat over the landscape would allow for management of the greatest diversity.

Some species, especially browsing mammals such as deer and moose and low-canopy foliage gleaners such as chestnut-sided warblers and snow-shoe hare, would be positively affected by vegetative management that promotes the regeneration of herbs, shrubs and trees, both in openings and in forested understories.

Construction, restoration or relocation of roads, trails, bridges and skid trails cause temporary soil disturbance where the activity is implemented. Soil and snow compaction may cause some elimination or dispersal of individuals of below ground-dwelling species. This may cause a minor, local, temporary reduction in the population of some faunal species.

The Forest Plan (LRMP) describes Standards and Guidelines (S&G) which must be adhered to during project implementation. Many of the S&Gs for wildlife provide a method of retaining specific habitat elements such as den trees, groups of leave trees in clearcut units, retaining trees in riparian areas, providing down woody material, etc. These S&Gs would be followed under any of the alternatives selected.

The general effects of vegetative management on wildlife are outlined in the WMNF FEIS in Chapter IV, sections 9 and 11. This assessment addresses the direct and indirect as well as cumulative effects of all of the alternatives as they relate to anticipated species' response to vegetative change.

3.2i Issues Raised Through Scoping

Issues raised through scoping concerning wildlife include the following:

- Effects of the proposed actions on wildlife habitat and on wildlife species
- Maintain the viability of wildlife and fish species within the planning area

- Impacts to Canada lynx

The effects of the proposed action and all alternatives on wildlife habitat are addressed in the HMU analysis under each alternative. The effects on wildlife species and population viability are addressed via Management Indicator Species. Impacts to Canada lynx is addressed in detail in the Biological Evaluation (Appendix A).

3.2j Effects on Wildlife - No Action Alternative

The No Action Alternative would allow the current forest conditions to progress in a natural succession until another project is proposed or approximately the next 20 years. The forest within the project area would continue to evolve. Over the short term (15-20 years), few if any changes would be visible to the untrained eye, unless catastrophic natural disturbances such as wind-throw, fire, flooding, etc. occurred. The long term, cumulative effects would maintain the current stage of succession in the analysis area including natural disturbances. Natural succession of mature stands includes dying trees providing gaps in the overstory, which in turn allows for regeneration on a small scale. In the long term (well beyond 2023), an uneven-aged forest would prevail provided no other harvest activities are implemented. This alternative does maintain interior forest habitat at this time for species such as the **American marten**.

Horizontal diversity (the distribution of various communities and age classes over a landscape) would decline with this alternative. (Forest Plan VII-B-5-13). Presently northern hardwoods dominate the project area and would continue to do so. Within the next 20 years 1060 acres of young northern hardwood moves into the mature age class. For spruce/fir, 18 acres move from young to mature. During the same period 112 acres move from the mature age class to the overmature age class. This results in a distribution with the majority of acres in the mature age class and little age-class diversity throughout the analysis area (10).

Table 10: Age Distribution as Seen in the year 2023 for HMUs 511, 512, and 513.

Community	Regeneration Age	Young Age Class	Mature Age Class	Overmature Age Class
Northern Hardwoods	0 Acres	203 Acres	2374 Acres	274 Acres
Spruce/Fir	0 Acres	0Acres	50Acres	43Acres

No other community types such as paper birch or aspen would be attained over the next 20 years unless a natural disturbance occurs. Overall diversity within the HMUs would decline. Wildlife species desiring these community types and/or age classes would not find suitable habitat in this area. No stands of regeneration-age habitat would be expected. This in turn delays attainment of successional age classes (such as young-aged stands) over the long term. Individuals of a species may still be found in the area but would most likely be just passing through.

This proposal would provide habitat for those species requiring mature and overmature interior, forested northern hardwood habitat to the detriment of those species requiring regeneration-age habitat, young-age habitat, and community types such as paper birch or aspen or increasing the softwood communities. The project area would acquire characteristics similar of the surrounding non-managed lands. Expectation is interior forest-dwelling species would increase in numbers barring other circumstances

while early successional or disturbance species would decline. No species as a whole however is expected to be extirpated or have its viability jeopardized under this alternative.

Since no harvesting would occur under this alternative, there would be no negative impacts due to harvesting activities on species currently inhabiting the area. Trees would not be felled thereby eliminating human-caused destruction of potential nests, dens, roosting sites, etc. Soil compaction from logging trucks, skidders and other machines would not occur. There would be no additional human-caused disruption of the interior forest, as it exists. No new road construction or restoration would occur under this alternative, eliminating possible negative impacts on ground dwelling species. No impacts are expected from this alternative on species utilizing intermittent streams or vernal pools.

This alternative does not meet the objectives of the Forest Plan for MA 3.1, which is to provide habitat especially for those species requiring early successional habitat or MA 2.1 that is to provide a mix of habitats, including the regeneration-age class.

3.2k Effects on Wildlife – No Action Alternative - Management Indicator Species

Appendix B indicates MIS species affected by this alternative and states the expected affect on their preferred habitat. The presence of suitable habitat does not guarantee the presence of a listed species nor does the lack of suitable habitat foreclose a species from being present. The individual could be passing through or surviving in marginal habitat, or utilizing other habitat than it represents. For this analysis however, presence of habitat is used to as an expectation of a species' presence and affect on population trend.

This alternative makes no changes to the current habitat other than natural succession or a natural disturbance event. No disturbance habitat (early succession in the 0-9 year age class) currently exists in the analysis area. Therefore, there would continue to be no habitat for **chestnut-sided warblers** and **mourning warblers**. Expectation is populations of these species would continue to be absent within the project area. The population trend for chestnut-sided warblers is declining in the region while **mourning warblers** are considered stable (USFS 2001). Habitat for both species has been declining on the forest and in the New England region (USFS 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000 Monitoring Reports; USFS 2003 Habitat trend analysis; Trani et al. 2001). Implementation of this alternative may contribute to the continued low quantity of habitat for these species and the population trends would not be expected to change.

Currently there is no paper birch or aspen in the analysis area though soils indicate a potential for it to occur. There would continue to be no acres of this community type under this alternative without a natural disturbance. Expectations are **broad-winged hawk** and **ruffed grouse** populations within the project area would remain low to non-existent. **Broad-winged hawk** populations have been stable on the WMNF and in the region while **ruffed grouse** population trends are somewhat uncertain as they have fluctuated on the WMNF making a trend unclear (USFS 2001). Regeneration-age habitat of both aspen and paper birch are declining on the WMNF with mature and overmature paper birch and aspen starting to decline in recent years (USFS 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000 Monitoring Reports; Habitat Trend Analysis 2003, Trani et al. 2001). Implementation of this alternative is expected to continue to add to the current habitat trends for these species. No changes to the populations are expected under this alternative.

Currently habitat is present for **American marten** and **northern goshawk** throughout the project area. Mature and overmature northern hardwood habitat and uneven-age spruce/fir habitat has been increasing on the WMNF (USFS 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000 Monitoring Reports; USFS 2003

Habitat trend analysis). **Northern goshawks** have a relatively stable population on the WMNF though it is uncommon (USFS 2001). **American marten** are slowly increasing on the WMNF, particularly in the northern section (USFS 2001). Implementation of this alternative would result in a conversion of 1,160 acres of young northern hardwood habitat to mature northern hardwood habitat via succession by the year 2023. This would increase the amount of suitable habitat for **northern goshawk** but not make it any more suitable for **American marten** than what is currently present. Implementation of this alternative is not expected to cause a change in the population trend of either **goshawk** or **marten** as the project area is not large enough to affect populations on a large scale.

This alternative causes no change in the amount of spruce/fir regeneration and therefore would cause no change in habitat for **snowshoe hare**, **Canada lynx**, and in the future **Cape May warblers**.

Implementation of this alternative would cause no change in the amount of grassy openings that currently exist in the area of the old town of Livermore. Therefore there would be no increase in suitable habitat for **eastern kingbirds** or **eastern bluebirds**.

For all of the other MIS, this alternative would cause no change in habitat and therefore no expectation of change in population trend.

3.21 Cumulative Effects on Wildlife under all Alternatives

It is assumed wildlife species in the Sawyer River valley changed as the land cover-types changed through the decades. After the town of Livermore was abandoned species such as **chestnut-sided** and **mourning warblers** were probably at a peak while **northern goshawks** and **American marten** were almost non-existent because of the lack of large tree cover.

A few timber sales were implemented in the mid 1960s and again in the mid 1980's. Other than that, no other vegetative management actions have occurred in the project areas for approximately 20 years.

The only effect from this alternative would be the indirect effect of allowing the forest to succeed into a more climax forest. This alternative would not add to the effects of past harvests. There would be retention of large areas of interior habitat throughout the three HMUs in conjunction with the MA 6.1 and 6.2 lands surrounding them.

No private land is within the project boundary other than the small private inholding of 9 acres on FR 34 and the railroad. The 9 acres of private land was clearcut approximately 12-15 years ago. This contributed to disturbance habitat within the project area however it has since grown out of that age class and is no longer suitable for species dependent on that type of habitat.

This alternative does not preclude future options for creating early successional habitat or diversifying community types through future stand entries to change stand structure and age class distribution. However, the ability to meet the Habitat Management Goals outlined in the Forest Plan in the reasonably foreseeable future for age class and habitat is somewhat uncertain. For age class diversity the ten-year monitoring summary indicates the forest fell below desired levels for regeneration age class while exceeding overmature age class for all habitat types within MA 2.1 and 3.1 (USDA Forest Service 1996). The annual amount of clearcutting (the primary management tool used to create northern hardwoods regeneration) has declined from 3308 acres in 1970 to 242 acres in 2000 (USDA Forest Service 1998). For habitat diversity, the forest continues to have far more acres of northern hardwood community type than desired and less of all other community types, such as spruce/fir and hemlock (USDA Forest Service 1996).

The success of vegetation management to achieve certain habitat diversity goals are measured by monitoring certain Management Indicator Species associated with habitats where active vegetative management occurs and determining if species viability is being maintained. This type of monitoring is conducted at the forestwide level. A recent report summarized information on known populations of Management Indicator Species on the forest and assessed viability (USDA Forest Service 2001). Most species associated with lands where vegetative management occurs are considered viable. However the results eight years of bird monitoring on the forest indicate five bird species (two are Management Indicator Species) associated with early successional habitats had significant declines in abundance. This was at least partly attributed to forest succession within the study area (MacFaden and Capen 2000). However this trend is evident outside the bounds of the forest too. The downward trend of wildlife species associated with regeneration and early successional habitats is well recognized across New England (Askins 1993, Smith et al. 1992, Hagan 1993, Litvaitis 1993, Litvaitis et al. 1999, Rosenberg and Hodgman 2000). 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.

This alternative primarily retains habitat for species such as **northern goshawks** and **American marten** that prefer large areas of mature forest. While this alternative does not create or increase other community types or age classes, expectation is no species would be affected to the point the viability of that species would become a concern.

In the future, it is expected that human activities currently occurring in the area would continue and most probably increase.

3.2m Effects on Wildlife - Alternative 2

Softwood habitat

Singletree selection is the proposed method of harvest in Units 3, 9 and 42. The objective under singletree selection is for perpetual canopy cover along with softwood regeneration. These stands currently have both northern hardwoods and softwoods. Under this harvest method the expectation is red spruce, balsam fir and hemlock would increase and the stands would eventually provide softwood habitat. Converting 36 acres from northern hardwood (includes mixedwood) to softwood habitat would benefit **snowshoe hare** and eventually **Cape May warblers** and **Canada lynx**.

Currently the area is providing habitat for species such as **northern goshawks** and **American marten** that prefer interior forest habitat.

Compared to the No Action Alternative, singletree selection harvest would remove individual trees, but retain a canopied, interior forest condition. Basal area would most likely remain above 100ft². This management system requires entries on a 15-year average and results in a more frequent level of disturbance such as soil compaction, human presence, etc. that may have impacts on individuals of ground-dwelling species. Tops left on the ground would provide immediate forage for browse-eating species while stump sprouting would provide browse for several years after harvest.

Conducting singletree selection in these units converts 36 acres of northern hardwood acres to spruce/fir acres. This moves in the direction of the desired condition of increasing the amount of softwood habitat, increasing diversity by reducing the amount of northern hardwood habitat. Uneven-age management

maintains a forested habitat now and into the future that would benefit species such as **marten** and **northern goshawks**. No edge habitat or fragmentation of the forest is created in these units under this alternative. Species such as black bear and deer would utilize this habitat in addition to many other habitat types. Certain neo-tropical migrant birds would utilize this habitat as interior forested habitat.

Units 11, 13, and 15 are already functioning as softwoods stands. Singletree selection harvest would encourage more softwood regeneration and perpetuate this habitat type. Red spruce and balsam fir are the most common species with hemlock, red maple, and beech present. An objective for all of the HMUs involved in the project is to increase or enhance softwood habitat. Single-tree selection would promote softwood regeneration on 39 acres and reduce competition from existing hardwoods such as red maple and beech.

Maintaining and promoting softwood habitat benefits snowshoe hare, Cape May warblers and implements the Canada lynx conservation strategy. In addition, a forested habitat is maintained for species such as American marten.

3.2n Northern Hardwood, Aspen and Paper Birch Regeneration

Under this alternative clearcuts are proposed on Units 2, 4, 5, 6, 7, 14, 33, 35, 37, and 38. This would result in a total of 153 acres of regeneration-age habitat that would benefit species such as **chestnut-sided** and **mourning warblers**. Roughly 85% of the Neotropical migratory birds that breed in the White Mountain National Forest utilize early successional habitat. (DeGraaf et al 1989). U.S. Fish and Wildlife Service Breeding Bird Surveys indicate many of these Neotropical birds have declined in numbers in recent years.

Units 4, 5, 6, and 7 already have some aspen and paper birch present. Expectation is the entire units would not be covered in aspen or paper birch but that for this rotation there would be an increase of these species and future harvests would continue this increase. Currently the aspen and paper birch communities are non-existent in these HMUs and this alternative could increase these communities by 19 acres this entry with future management actions potentially increasing it to 394 acres.

Clear-cutting has been shown to be the best method to regenerate and establish paper birch and aspen (Perala, D. and J. Russell. 1983; L. Safford and R. Jacobs. 1983; DeGraaf, et al. 1989). If some disturbance action such as a blowdown or clear-cutting does not occur, these species would continue to decline in the area. Regeneration-age habitat would have beneficial effects on species such as **ruffed grouse**, **snowshoe hare**, deer, moose, **chestnut-sided warblers**, **mourning warblers** and all other wildlife that utilize regeneration-age habitat.

Unit 14 is located between two softwood stands. Clearcutting this stand would meet Forest Plan objectives of placing regeneration-age habitat adjacent to softwood that provide winter cover for deer. The Lynx Conservation Strategy also approves of increasing forage for snowshoe hare near areas of softwood cover.

In proposed clearcuts 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 would in part mitigate these effects for wildlife trees as well as mitigation measures outlined in Appendix B. to maintain and provide for future recruitment of large cavity trees and down wood in these HMUs. This, in conjunction, with the abundance of mature habitat within the managed and unmanaged portions of these Habitat Management Units should ensure that an adequate

amount of cavity trees and dead and down wood is available for wildlife associated with this habitat features.

This alternative would decrease potential nesting habitat for northern goshawks by 153 acres. Northern goshawks prefer nest sites with high tree density, large trees, and an open understory (Reynolds and Hamre 1996). Many goshawk nests have been found near roads, trails, or clearings in New Hampshire (Foss 1994). Foraging usually occurs in mature and over mature stands with avoidance of younger stands and openings (Reynolds and Hamre 1996). Goshawk nests that have been monitored on the forest have been in habitats below 2000' with less than 15% slope (Yamasaki et al. 1999).

American marten would not find the removal of 153 acres of canopied forest as preferred habitat. While these acres would not be preferred habitat, marten have been known to utilize them if they comprise a portion of their home range and not the majority of acres (DeGraaf and Yamasaki 2001).

3.2o Northern Hardwood Mature Habitat

Under this Alternative Units 1, 8, 12, 21, 24, 34, and 41 would be commercially thinned. These units are currently classed as northern hardwoods. Presently they provide habitat for species such as **northern goshawk**, **American marten**, and species requiring interior forest habitat. Thinning these units for a total of 189 acres would open up the understory and reduce the canopy cover. The resulting basal area is usually between 70ft² and 90ft². For the short-term, an interior forest would remain for **northern goshawks** and other interior-forest dwelling species. **Marten**, however may find the resulting habitat less suitable if the basal area goes below 80ft². This does not mean **marten** would totally avoid the area as they utilize a variety of habitats. No edge habitat is created in these units under this alternative. Mast trees such as beech would be able to develop larger crowns thereby potentially providing more mast. Residual stumps would sprout providing additional browse.

Units 22, 30, 31 and 32 would receive a single tree selection harvests. These northern hardwood stands would retain a canopy cover and continue to provide habitat for **northern goshawks** and **American marten**.

During field reviews it was noted there existed inclusions of softwoods within some of these units. These softwood inclusions would be left uncut or managed to retain the softwood component. Field reviews and compartment data indicate little softwood habitat within these three HMUs. Therefore promoting this habitat type where possible would be a beneficial effect to species such as snowshoe hare that utilize softwoods.

3.2p Mixedwood Habitat

Unit 28 is currently classed as a mixedwood stand. ELTs indicate it would not convert to what could be defined as a softwood stand. A portion of this unit has a presence of red oak/white pine. These species would be retained during marking as desired species for wildlife purposes. Red oak produces hard mast utilized by many species. White pine along the Saco River also provides many wildlife species a food source (cone seeds) as well as roost perches and nesting sites. While these species are present, there is no proposal to pursue pine in this stand at this time. To initiate pine regeneration the best method would be through evenage management as in a clearcut. Clearcutting this stand would not meet other Forest Plan objectives due to the proximity of this area to Fourth Iron camp site, Route 302 and the Saco River. This unit is expected to continue to provide habitat for **northern goshawk** and **marten**.

3.2q Upland Openings

Implementation of this alternative would cause no change in the amount of grassy openings that currently exist in the area of the old town of Livermore. Therefore there would be no increase in suitable habitat for eastern kingbirds or eastern bluebirds. Maintenance of this orchard would continue and release of individual apple trees in the Livermore area would continue. No change in the population trends of eastern kingbird or eastern bluebird are expected.

3.2r Effects resulting from associated Recreation Projects

This alternative proposes improvement to the Sawyer River Snowmobile Trailhead to safely accommodate vehicles with trailers. This would require expansion of the lot by approximately $\frac{1}{4}$ acre. This would result in removal all vegetation and compaction of soils on this ground. There are no listed species currently residing in this area. Expectation is wildlife currently inhabiting the site would be displaced permanently.

Currently this area is regularly visited by people so species residing near the area have become acclimated to human presence. Expansion of the parking area may cause an increase in the number of snowmobilers utilizing the area, though an additional $\frac{1}{4}$ acre is not expected to allow a large incremental increase. There is currently little information on when the affects of recreational use reach a threshold for certain species of wildlife. Therefore, based on current information, expansion of this parking area would have an immeasurable effect on wildlife along the snowmobile trail.

The upgrading of two footbridges on the Sawyer Pond Brook Trail is expected to have some impacts to ground dwelling species in the very localized area. This project is not expected to alter habitat to an extent larger species would be affected. Relocation of a $\frac{1}{4}$ mile of the Signal Ridge Trail would improve the riparian habitat where the trail currently is located. Expectations are **snowshoe hare** and **Cape May warblers** would benefit from this action.

Upgrading the toilets at Fourth Iron would not have an effect on wildlife however the permanent access into the site for servicing would have a detrimental effect on species inhabiting this proposed road. No MIS is expected to be directly effected by construction of this road however ground-dwelling species such as rodents, salamanders, snakes, frogs, etc. may be displaced or mortally impacted during construction. Implementation however would not lead to extirpation of any species or cause a concern for viability of any species.

3.2s Summary of the Proposed Action (Alternative 2) on HMUs 511, 512 and 513

This Alternative, best meets the objectives of the Forest Plan for wildlife habitat within HMUs 511, 512, and 513. The number of northern hardwood regeneration-age acres is increased, though not to the extent desired, the paper birch and aspen community types are initiated, and softwood habitat is increased. There is a reduction in young and mature age classes as desired and an increase in the overmature age class. Northern hardwood uneven-age acres are also reduced.

Table 11: Summary of Alternative 2 for HMUs 511, 512 and 513

Community	Regeneration			Young			Mature			Overmature			Uneven Age		
	Exist	Desire	Alt 2	Exist	Desire	Alt 2	Exist	Desire	Alt 2	Exist	Desire	Alt 2	Exist	Desire	Alt 2
NH	0	260	134	1385	899	1315	1254	1136	1208	162	257	274	164'	27'	57'
PB	0	34	13	0	153	0	0	117	0	0	35	0			
Aspen	0	8	6	0	24	0	0	17	0	0	6	0			
S/F	0	5♣	0	18	13	0	32	27	50	43	5	24	305	770	360

*NH = Northern Hardwood

*S/F = Spruce/Fir

*PB= Paper Birch

♣= Would manage under Uneven-Age system during this rotation

3.2t Cumulative Effects on Wildlife under Alternative 2

Past Actions would be similar to those described under Alternative 1. This Alternative would best achieve the desired future habitat condition for this Habitat Management Unit as described in the Forest Plan (III-15) by creating northern hardwoods and paper birch regeneration in the short term and converting northern hardwoods to paper birch, and maintaining and enhancing softwood habitat in the long term. It would benefit wildlife species requiring mature northern hardwoods, softwood cover, interior forest conditions, and localized habitat features such as riparian areas.

This Alternative would benefit Management Indicator Species associated with regeneration or open habitat including **ruffed grouse**, **chestnut-sided warbler**, **mourning warbler**, and **snowshoe hare**. Regeneration-age habitat would provide benefits for approximately 10 years before it moves into the next age class. This Alternative would also benefit Management Indicator Species such as **broad-winged hawks** and **Cape May warblers** associated with later stages of community types created or enhanced.

Suitable habitat for other Management Indicator Species (**northern goshawks**, **American marten**, **Canada lynx**, **eastern kingbirds** and **bluebirds** and **black ducks**) would continue to be present under this Alternative. Habitat would remain stable for some MIS, decrease for some, and increase for others, however expectation is no species would be affected to the point the viability of that species would become a concern. There is no expectation implementation of this Alternative would alter any current population trend because the project area is such a small portion of the overall ranges of these species.

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 2001). In each season of harvest a certain number of individual wildlife species would be affected during harvest activities. Under all seasons, the long-term benefits of habitat management are weighed against this impact.

The current Forest Plan Standards and Guidelines to provide habitat diversity should maintain viable populations of wildlife on the forest now and in the reasonably foreseeable future (Forest Plan Chapter III 11-14). It is expected timber harvesting would occur again in another 15 or 20 years to retain a diversity of habitat types within these HMUs. Forest Plan Standards and Guidelines for desired habitat conditions would be followed. Any future projects would have similar effects to wildlife described for this project.

The recreational projects proposed under this alternative would cumulatively result in minimal effects to wildlife. In the future, it is expected that human activities presently occurring in the area would continue with similar effects to wildlife. The Sawyer River Road would remain open to motorized vehicles up to the footbridge across the Sawyer River. This would also remain a snowmobile trail in the winter. No new hiking trails are foreseen. Fourth Iron would continue as a camping area. Based on an increase of human visitor days across the forest over the past several years, expectation for the future is recreational activities to increase within the Sawyer River area.



3.2u Effects on Wildlife under Alternative 3

This alternative defers harvest in HMUs 512 and 513. No actions would take place in Units 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, and 15. Effects would be similar to that described under the No Action Alternative (Alternative 1). The following effects are only for HMU 511.

3.2v Softwood habitat

Under this alternative 5 acres (Unit 42) of what is now mixedwood habitat would be converted to softwood and move in a desired direction of the Forest Plan.

Maintaining and promoting softwood habitat benefits snowshoe hare, **Cape May warblers** and implements the **Canada lynx** conservation strategy. In addition, a forested habitat is maintained for species such as **American marten**.

3.2w Northern Hardwood, Aspen and Paper Birch Regeneration

Clearcuts are proposed in this Alternative on Units 33, 35, 37, and 38. This would result in a total of 36 acres of regeneration-age habitat that would benefit species such as **chestnut-sided** and **mourning warblers**. Expectations are these areas would regenerate primarily with northern hardwoods. Paper birch and aspen may be present but not to the extent as would be in Units 4, 5, 6, and 7. Therefore, under this alternative the aspen and paper birch community types would not be created. **Ruffed grouse** and in the future **broad-winged hawks** would find limited preferred habitat in this HMU.

None of these clearcuts lie adjacent to softwood stands and would therefore not provide forage for deer or snowshoe hare close to wintering areas. This alternative does not meet the intent of the Forest Plan or Lynx Conservation Strategy of improving foraging areas adjacent to softwood winter cover areas.

This alternative would decrease potential nesting habitat for **northern goshawks** by the same 36 acres as above. Northern goshawks prefer nest sites with high tree density, large trees, and an open understory (Reynolds and Hamre 1996).

American marten would not find the removal of 36 acres of canopied forest as preferred habitat. While these acres would not be preferred habitat, marten have been known to utilize them if they comprise a portion of their home range and not the majority of acres (DeGraaf and Yamasaki 2001).

3.2x Northern Hardwood Mature Habitats

Under this Alternative Units 21, 24, 31, 32, 34, and 41 would be commercially thinned. These units are currently classed as northern hardwoods. Presently they provide habitat for species such as **northern goshawk**, **American marten**, and species requiring interior forest habitat. Thinning these units for a total of 164 acres would open up the understory and reduce the canopy cover. The resulting basal area is usually between 70ft² and 90ft². For the short-term, an interior forest would remain for **northern goshawks** and other interior-forest dwelling species. **Marten**, however may find the resulting habitat less suitable if the basal area goes below 80ft². This does not mean **marten** would totally avoid the area as they utilize a variety of habitats. No edge habitat is created in these units under this alternative. Mast trees such as beech would be able to develop larger crowns thereby potentially providing more mast. Residual stumps would sprout providing additional browse.

Units 22, 30, and 40 would receive single tree selection harvests. These northern hardwood stands would retain a canopy cover and continue to provide habitat for **northern goshawks** and **American marten**.

As described under Alternative 2, softwood inclusions would be retained or enhanced for the benefit of species such as **snowshoe hare**.

3.2y Mixedwood Habitat

Unit 28 would receive the same treatment under this alternative as proposed in Alternative 2 with the same effects as described under that alternative. Suitable habitat is retained for **northern goshawk** and **marten**.

3.2z Upland Openings

Implementation of this alternative would cause no change in the amount of grassy openings that currently exist in the area of the old town of Livermore. Therefore there would be no increase in suitable habitat for **eastern kingbirds** or **eastern bluebirds**. Maintenance of this orchard would continue and release of individual apple trees in the Livermore area would continue. No changes in population trends of eastern kingbirds or eastern bluebirds are expected.

3.2aa Effects on Wildlife resulting from the Associated Recreation Projects

This alternative proposes improvement to the Sawyer River Snowmobile Trailhead and upgrading the toilets at Fourth Iron with effects similar to those described in Alternative 2.

The upgrading of two footbridges on the Sawyer Pond Brook Trail and the relocation of a ¼ mile of the Signal Ridge Trail would not occur. This would result in continued deterioration of the riparian habitat in these areas. **Snowshoe hare** and **Cape May warblers** would not benefit from this action.

3.2bb Summary of Effects under Alternative 3 on HMUs 511, 512 and 513

This Alternative defers harvest in both HMU 512 and HMU 513. This action does not meet Forest Plan objectives to provide habitat diversity within these Habitat Management Units. For now these areas would continue to provide habitat to species preferring interior, forested habitats such as American marten and northern goshawk. Softwood habitat would not be increased but would continue to exist where present. HMUs 512 and 513 have some softwood habitat, but not the desired amount or what the land is capable of producing.

For HMU 511 this alternative moves in the desired direction in only two areas: that of creating 36 acres of regeneration age habitat (161 acres are desired) and decreasing the amount of uneven-age northern hardwoods. Neither the paper birch nor aspen community type is created.

Table 12: Summary of Alternative 3 for HMUs 511, 512 and 513

Community	Regeneration						Mature			Overmature			Uneven Age		
	Existing	Desirec	Alt 3	Existing	Desirec	Alt 3	Existing	Desirec	Alt 3	Existing	Desirec	Alt 3	Existing	Desirec	Alt 3
NH	0	260	36	1385	899	1385	1254	1136	1312	162	257	162	164	27	55
PB	0	34	0	0	153	0	0	117	0	0	35	0			
Aspen	0	8	0	0	24	0	0	17	0	0	6	0			
S/F	0	5♠	0	18	13	0	32	27	50	43	5	43	305	770	305

*NH = Northern Hardwood

*S/F = Spruce/Fir

*PB= Paper Birch

♠= Would manage under Uneven-Age system during this rotation

Table 13: Summary of Alternative 3 considering only HMU 511

Community	Even Age												Uneven Age		
	Regeneration			Young			Mature			Overmature					
	Existing	Desirec	Alt 3	Existing	Desirec	Alt 3	Existing	Desirec	Alt 3	Existing	Desirec	Alt 3	Existing	Desirec	Alt 3
NH	0	161	36	499	559	499	839	705	705	162	159	162	142	921	33

*NH = Northern Hardwood

3.2cc Cumulative Effects on Wildlife – Alternative 3

Past Actions would be similar to those described under Alternative 1.

This alternative greatly reduces the area proposed for change described in Alternative 2. No activity would occur in either HMU 512 or 513 thereby deferring an increase of diversity and having similar effects as described in Alternative 1. Within HMU 511 the present, and reasonably foreseeable future cumulative effects of Alternative 3 for harvesting would be similar to Alternative 2. This alternative would affect the same Management Indicator Species as described for Alternative 2. The major difference would be that this Alternative occurs a greatly reduced area and would create less overall diversity. There is almost no increase of community diversity as only 5 acres of spruce/fir are promoted.

Regeneration-age habitat is created on 36 acres but no acres of the aspen or paper birch community types are created.

Management Indicator Species affected are similar to those discussed under Alternative 2 except for **ruffed grouse** and in the future **broad-winged hawks**. These species would not find their representative habitat of aspen or paper birch under this alternative. Expectations are populations of these species would remain low in this area. Implementation of this alternative may contribute to the low abundance of habitat for these species however direct changes to the population are not expected to be measurable because the project area is such a small part of the overall range of these species.

Suitable habitat (northern hardwood mature, spruce/fir regeneration and mature, upland openings, wetlands and streams) for other Management Indicator Species would continue to be present under this Alternative. Habitat would remain stable for some MIS, decrease for some, and increase for others, however expectation is no species would be affected to the point the viability of that species would become a concern. There is no expectation implementation of this Alternative would alter any current population trend because the project area is such a small portion of the overall ranges of these species.

As with Alternative 1, this alternative does not preclude future options in HMU 512 and 513 for creating early successional habitat or diversifying community types through future stand entries to change stand structure and age class distribution. However, the ability to meet the Habitat Management Goals outlined in the Forest Plan in the reasonably foreseeable future for age class and habitat is somewhat uncertain. This alternative limits habitat diversity to HMU 511 where habitat for **northern goshawks**, and **marten**, is retained and some habitat is created for **chestnut-sided warblers**.

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 2001). In each season of harvest a certain number of individual wildlife species would be affected during harvest activities. Under all seasons, the long-term benefits of habitat management are weighed against this impact.

The current Forest Plan Standards and Guidelines to provide habitat diversity should maintain viable populations of wildlife on the forest now and in the reasonably foreseeable future (Forest Plan Chapter III 11-14). It is expected timber harvesting would occur again in another 15 or 20 years. Forest Plan Standards and Guidelines for desired habitat conditions would be followed. Any future projects would have similar effects to wildlife described for this project.

In the future, it is expected that human activities presently occurring in the area would continue with similar effects to wildlife. The Sawyer River Road would remain open to motorized vehicles up to the footbridge across the Sawyer River. This would also remain a snowmobile trail in the winter. No new hiking trails are foreseen. Fourth Iron would continue as a camping area. Based on an increase of human visitor days across the forest over the past several years, expectations are human utilization of the Sawyer River area to increase in the future.

3.2dd Effects on Wildlife - Alternative 4

Softwood habitat

Maintaining and promoting softwood habitat benefits **snowshoe hare**, **Cape May warblers** and implements the **Canada lynx** conservation strategy. In addition, a forested habitat is maintained for species such as **American marten**.

This alternative accomplishes the project objectives in a similar fashion as Alternative 2 but on 19 fewer acres due to the deferment of Unit 15. Effects are similar to that described under Alternative 2.

3.2ee Northern Hardwood, Aspen and Paper Birch Regeneration

Under this alternative clearcuts are proposed on Units 2, 33, 35, 37, and 38. This would result in a total of 51 acres of regeneration-age habitat that would benefit species such as **chestnut-sided** and **mourning warblers**.

This alternative defers harvest in Units 4, 5, 6, and 7 that have the best potential for aspen and paper birch development. These species may be present in the other clearcut units, but not to the level as expected in these units because aspen is currently present to some degree in these units. This alternative would not benefit **ruffed grouse**, **chestnut-sided warblers**, **mourning warblers** and in the future **broad-winged hawks** to the extent Alternative 2 does. No new community types are created to better diversify the habitats of this area.

For all other harvest units for the effects would similar to that discussed under Alternative 2. Effects on the representative MIS would also be similar.

3.2ff Mixedwood Habitat

Unit 28 would receive the same treatment under this alternative as proposed in Alternative 2 with the same effects as described under that alternative. Suitable habitat is retained for **northern goshawk** and **marten**.

3.2gg Upland Openings

Implementation of this alternative would cause no change in the amount of grassy openings that currently exist in the area of the old town of Livermore. Therefore there would be no increase in suitable habitat for **eastern kingbirds** or **eastern bluebirds**. Maintenance of this orchard would continue and release of individual apple trees in the Livermore area would continue. No changes in population trends of eastern kingbirds or eastern bluebirds are expected.

3.2hh Effects on Wildlife resulting from Associated Recreation Projects

This alternative proposes no improvement to the Sawyer River Snowmobile Trailhead but would consider use of the Fourth Iron parking lot if needed. This eliminates any effects to wildlife in the area of the existing Sawyer River Snowmobile Trailhead. Use of the Fourth Iron lot has the potential to allow many more snowmobilers to use this area because the Fourth Iron lot is much larger than what was proposed for expansion at the other site. This could be mitigated by plowing only a portion of the Fourth Iron parking area. While snowmobiles in the Sawyer River area have been presents for many years, it is unknown what a large increase in the number of users would have on wildlife populations in the area.

This alternative would only upgrade one footbridge on Sawyer Pond Brook Trail at this time. As described under Alternative 2 this would have effects on ground-dwelling species within the localized area.

Relocation of a ¼ mile of the Signal Ridge Trail would occur under this alternative with similar effects as described under Alternative 2.

This alternative would upgrade the sanitary facilities at Fourth Iron to an improved composting toilet. This would eliminate the need for permanent road access to the site and its effects to wildlife along that route.

3.2ii Summary of Effects under Alternative 4 on HMUs 511, 512 and 513

This Alternative reduces the amount of harvest in HMU 512 and 513. This alternative moves in the desired direction of creating more habitat diversity, but not to the extent of Alternative 2.

Table 14. Summary of Alternative 4 for HMUs 511, 512 and 513

Community	Regeneration			Young			Mature			Overmature			Uneven Age		
	Exist	Desire	Alt 3	Exist	Desire	Alt 3	Exist	Desire	Alt 3	Exist	Desire	Alt 3	Exist	Desire	Alt 3
NH	0	260	51	1385	899	1385	1254	1136	1209	162	257	162	164'	27'	60'
PB	0	34	0	0	153	0	0	117	0	0	35	0			
Aspen	0	8	0	0	24	0	0	17	0	0	6	0			
S/F	0	5♣	0	18	13	0	32	27	50	43	5	43	305	770	341

NH = Northern Hardwood

*S/F = Spruce/Fir

*PB= Paper Birch

♣= Would manage under Uneven-Age system during this rotation

3.2jj Cumulative Effects on Wildlife under Alternative 4

Past Actions would be similar to those described under Alternative 1. This alternative moves in the direction outlined in the Forest Plan but to a lesser extent than Alternative 2 and more than Alternatives 1 and 3. Within HMU 511 however, the effects are almost identical to Alternative 2. Regeneration-age habitat is created on 51 acres but no acres of the aspen or paper birch community types are created. Softwood habitat is enhanced on more acres than Alternative 1 and 3 but less than under Alternative 2.

Management Indicator Species affected are similar to those discussed under Alternative 2 except for **ruffed grouse** and in the future **broad-winged hawks**. These species would not find their

representative habitat of aspen or paper birch under this alternative. Expectations are populations of these species would remain low in this area.

Suitable habitat (northern hardwood mature, spruce/fir regeneration and mature, upland openings, wetlands and streams) for other Management Indicator Species would continue to be present under this Alternative. While habitat would remain stable for some MIS, decrease for some and increase for others there is no expectation implementation of this Alternative would alter any population trend because the project area is such a small portion of the overall ranges of these species.

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 2001). In each season of harvest a certain number of individual wildlife species would be affected during harvest activities. Under all seasons, the long-term benefits of habitat management are weighed against this impact.

The current Forest Plan Standards and Guidelines to provide habitat diversity should maintain viable populations of wildlife on the forest now and in the reasonably foreseeable future (Forest Plan Chapter III 11-14). It is expected timber harvesting would occur again in another 15 or 20 years to retain a diversity of habitat types within these HMUs. Forest Plan Standards and Guidelines for desired habitat conditions would be followed. Any future projects would have similar effects to wildlife described for this project.

The recreational projects proposed under this alternative would improve some areas where resource damage is occurring but cumulatively result in minimal effects to wildlife. In the future, it is expected that human activities presently occurring in the area would continue. The Sawyer River Road would remain open to motorized vehicles up to the footbridge across the Sawyer River. This would also remain a snowmobile trail in the winter. No new hiking trails are foreseen. Fourth Iron would continue as a camping area. Based on an increase of human visitor days across the forest over the past several years, expectations are human utilization of the Sawyer River area to increase in the future.

3.3 Fisheries

Affected Environment - Fisheries

The Saco River and the Sawyer River are the main watersheds of the analysis area (HMUs 511, 512, and 513). HMUs 512 and 513 are within the Sawyer River watershed (3rd to 4th order stream) of which there are two named tributaries; Carrigain Brook and Whiteface Brook and unnamed tributaries, vernal pools, and seeps. HMU 511 lies in both the Sawyer River watershed and the Saco River watershed. Nancy Brook, Halfway Brook and Stony Brook are named tributaries within HMU 511. Unnamed tributaries, seeps, vernal pools and a beaver area also exist within this HMU.

The Saco River and Sawyer River were inventoried for stream habitat conditions in 1988 and 1989 using the transect method. The Saco River in the area of the confluence of the Sawyer River has a mix of ledge, boulders, cobble and gravels. The Sawyer River has a higher gradient with more ledge and boulders.

Portions of the Sawyer River were inventoried for stream habitat conditions in 1988 using a transect method. None of the other named brooks in the Analysis area have been inventoried. New Hampshire Fish and Game stocking records indicate the Saco River has been stocked with **brook trout** (*Salvelinus fontinalis*) regularly over the past 50 years and probably longer. Brown trout (*Salmo trutta*) have been stocked in the Saco River sporadically over the past 50 years. None of the other mentioned brooks have been stocked according to these records. Sawyer River has been surveyed for fish with **brook trout** the Management Indicator Species for permanent streams and ponds being the only species recorded. None of the other brooks have had fish surveys but all are suspected to have **brook trout** present.

During other field visits American toads, wood frogs, green frogs, 3 species of salamanders, and numerous macroinvertebrates were observed.

Factors that are important to maintain quality habitat for **brook trout** include cool continuous flowing water, unimpeded travel upstream and downstream, clean gravels for spawning and egg incubation, clear water during the growing season, instream cover, adequate food supply (usually macroinvertebrates), high quality headwater streams, and suitable riparian habitat.

The desired condition for fisheries/aquatic resources of these streams is to meet standards and guidelines identified in the Forest Plan for water quality, riparian, fisheries, and aquatic habitat management (Forest Plan III, 15 a-d, 16, 19, 20).

3.3a Effects on Fisheries - No Action Alternative

There would be no direct, effects on **brook trout** or aquatic habitat from the No Action Alternative. Indirect effects may continue to occur if the quarter mile of the Signal Ridge Trail is not relocated away from Whiteface Brook and if the footbridges across Sawyer Pond Brook Trail are not retained. If allowed to deteriorate expectation is sedimentation, soil compaction and de-vegetation at these brook crossings may increase.

3.3b Effects on Fisheries - Alternative 2: The Proposed Action

Proposed harvest areas that occur near perennial streams are Units 3, 11, 12, 13, 28, 30, and 42. None of these units straddle the adjacent streams. Harvest would not occur directly on stream banks mitigating potential sedimentation. Logging equipment would not enter stream courses. All of the units listed above are proposed for singletree selection harvest except Unit 12 that is proposed for commercial thinning. The resulting basal area of this unit would be approximately 70²ft with the other units retaining approximately 110²ft. These harvest directions ensure stream canopy would remain close to what currently exists and continue to provide shade for stream temperatures to remain below 75°F that is suitable for brook trout. Harvest prescriptions in the riparian area would promote trees providing canopy cover, future large woody debris recruitment, and bank stabilization.

Roads currently within the Project area are distanced from perennial streams. Reconstruction of FR 85 would consist of grading, placing culverts, and ditches where needed, brushing and re-aligning one corner at the south end. No road surfacing would be required since Units 1, 2, and 3 are only proposed for winter logging. Areas of potential concern on this road are where the road comes close to Carrigain Brook at the lower harvest area and where it crosses Carrigain Brook. Ditches and culverts at the lower corner would direct runoff away from Carrigain Brook. Installation of the temporary bridge would require heavy equipment to ford the stream at least once in order to install the bridge. This could cause direct effects to any **brook trout** in the stream at this site when the crossing occurs. The location of the temporary bridge site is relatively flat. Temporary abutments comprised of native material (logs) and gravel would be used to build-up the stream bank to protect the bridge from possible high water that may occur from large rain events. This is also expected to mitigate channel constriction that often occurs at stream crossings. Measures would be taken during installation to prevent sedimentation and this activity would occur between May and October to further avoid potential of sedimentation during **brook trout** egg deposition. The bridge, abutments and fill would be removed upon completion of the sale. Based on experience from other stream crossings and implementation of Forest Plan Standards and Guidelines, sedimentation would be minimal.

All other road reconstruction under this proposal does not cross perennial streams and therefore would have no impacts to **brook trout** or the fisheries resource.

Alternative 2 proposes replacing existing decks on the bridges over Carrigain Brook and Whiteface Brook. This activity occurs outside the stream channel and would have no impact on **brook trout**.

This alternative would upgrade two footbridges on the Sawyer Pond Brook Trail. The footbridges currently protect the streambanks from compaction and devegetation, and the stream from siltation caused by hiking traffic. This alternative would either 42 foot long I-beams or comparable native spruce. A helicopter would be needed to get either of these to site and position. This would require cutting a small clearing near each of these stream crossings for the helicopter to conduct this safely. Potential for some sedimentation into Sawyer Pond Brook is possible during this action. Sedimentation is expected to be minor with minimal effects to **brook trout** of Sawyer Pond Brook.

A quarter mile section of the Signal Ridge Trail would be relocated away from Whiteface Brook under this alternative. This would improve the riparian habitat within this area. Currently the trail promotes continued soil compaction, devegetation, and water diversion. Relocation of the trail away from Whiteface Brook would eliminate the continuation of these deteriorating impacts. Some soil disturbance is expected at the new location however no sedimentation is expected from this activity into Whiteface Brook. Some minor soil disturbance may occur on the existing location during obliteration of the old trail however the resulting condition outweighs any minor amount of sedimentation that may occur. Expectations are **brook trout** would benefit from this action.

3.3c Effects on Fisheries - Alternative 3

Under this alternative no harvest would occur on the upper portions of the Sawyer River watershed. Harvest units bordering streams would be 28, 30, and 42. Harvest would not occur directly on stream banks mitigating potential sedimentation. Logging equipment would not enter stream courses. All of the units listed above are proposed for singletree selection harvest.

Under this alternative there would be no need to cross Carrigain Brook with a temporary bridge. This would retain the stream in its current condition with no effects to **brook trout**. Roads needing reconstruction to harvest under this alternative are not adjacent to any streams and would therefore have no effect on **brook trout**.

A new deck for the bridge over Whiteface Brook is still proposed in this alternative. This would have no effect on the fishery for the same reason as discussed in Alternative 2.

No footbridge replacement would occur under this alternative. This would result in continued deterioration of the existing footbridges with the potential they would fall into the brook. This could increase the large wood component of Sawyer Pond Brook improving habitat for **brook trout**, however some sedimentation, soil compaction and de-vegetation from hiker traffic is expected to increase, though minutely.

The first quarter mile of the Signal Ridge Trail would not be upgraded under this proposal. This would allow for the continuation of compaction and devegetation to occur along Whiteface Brook. This may continue to allow some sedimentation to occur in Whiteface Brook. Expectation is the amount of sedimentation would be small but continuous over the years with some, though minimal effects to **brook trout**.

3.3d Effects on Fisheries - Alternative 4

Under this alternative some harvest would occur on the upper portions of the Sawyer River watershed. Harvest units bordering streams would be the same as in Alternative 2 with similar placement and effects. This alternative differs from the other alternatives in regards to the fishery resource in that only White face Brook bridge decking would be replaced with no effects to **brook trout**.

Under this alternative only the second footbridge on the Sawyer Brook Pond Trail would be replaced. The first bridge would be deferred for replacement at this time with effects similar to that discussed under Alternative 1. Under this alternative two 42-foot long glue-laminate beams would be used to span second brook crossing site. These beams could be brought to the site over land using grip hoists and sky lines. This method would require many set ups of this process with a potential result of a higher degree of soil erosion and vegetation trampling and removal. Bringing the beams in using a helicopter would require some trees to be removed at or near the brook crossing to allow the helicopter a safe approach

and drop site. Trees removed near the stream bank may cause some sedimentation. Trees would be left on site or if suitable and needed used in the bridge replacement. These new beams would require replacement of the existing bridge abutments. Expectation is some soil disturbance would occur during this replacement but the abutments are relatively far from the actual wetted width of the stream so sedimentation into the stream is expected to be minimal. Work would occur between May and October to avoid **brook trout** egg deposition.

The Signal Ridge Trail would be relocated as described under Alternative 2 with similar effects.

3.3e Effects on Fisheries - Cumulative Effects for All Alternatives

The fishery resource has been sustained over the years in the Sawyer River watershed primarily through natural processes. No stocking has augmented populations of brook trout in streams of the Sawyer River drainage however the Saco River has been stocked annually with brook trout, and with brown trout and rainbow trout sporadically over the years.

Brook trout were probably most impacted when the town of Livermore was at its most populous state. Subsistence fishing occurred more during this historic time than does currently. The surrounding area when the town of Livermore was most active was more open due to the houses, orchards, and other buildings of the area. Logging was extensive with little to no mitigations for riparian areas or stream crossings. Expectations are past actions increased sedimentation, siltation, stream temperatures, and removed large wood from the stream channel. These would have negatively impacted brook trout and their habitat.

Today, Sawyer River, its tributaries, and the Saco River primarily provide a recreational fishery. It is unknown if current conditions are a result of past actions or if the streams have restored themselves to something similar to pristine conditions. Canopy cover exists over the smaller streams while the Sawyer and Saco Rivers have forested streambanks. Stream temperatures remain suitable for **brook trout** throughout the summer.

All of the harvest alternatives may contribute some sedimentation to the brooks within the project area however the Forest Plan standards and guidelines minimize this occurrence. Alternatives 1 and 3 would allow for the continuation of some deterioration in the riparian area along the Signal Ridge Trail because these alternatives do not relocate a ¼ mile section away from Whiteface Brook.

Expectation is there would be little to no measurable cumulative effect on **brook trout** or its habitat within the analysis area because Forest Plan standards and guidelines minimize detrimental effects. Implementation of any alternative would add little to the past actions because the areas of the project that could have an effect on **brook trout** and its habitat are extremely small compared to the overall lengths of these streams. Implementation of any of the alternatives would not cause a change in the forest or regional **brook trout** population trend nor stream habitat trend under any of the alternatives.

Expectation is **brook trout** would remain viable under any alternative.

There are no harvests planned in the foreseeable future. Harvests are typically planned for areas on a 15-20 year rotation. Recreational use of the area is expected to increase over the foreseeable future. Expectation is for increased snowmobile use, mountain biking and hiking in the area.

3.4 Recreation - Visual Effects

Issue: Evidence of openings created during harvest activities may be apparent to individuals viewing the analysis area from Mount Tremont, Mount Carrigain, Mount Crawford, and South Hancock. Foreground views may also be affected as viewed from Highway 302, Conway Scenic Railroad, Fourth Iron Campground, Hancock Notch Trail, and Sawyer River Road.

Affected Environment - Visual Quality

The analysis area is located on National Forest lands mapped primarily as Variety Class B (common). Variety Class identifies the scenic quality of the landscape based on characteristics of land, vegetation, water, and rock ledges. Variety class B has moderate terrain with rounded hills or ridges that are not visually dominant and river valleys with moderate relief. Geologic features present are common and would not be outstanding in form, color or shape. Vegetation cover with interspersed pattern offers some visual relief. Water features exhibit common characteristics. Refer to Forest Plan Chapter VII-I for detailed description of these levels.

The analysis area is mapped as Sensitivity Level 1 (High) because, even though use levels are below 50 vehicles per day, user expectations are high.

The Forest Plan (Chapter VII-I-1, and III-11) suggests that management activity in this analysis area should meet Visual Quality Objectives (VQO's) of Partial Retention for middleground and background viewpoints. Middleground views are between 1/4 mile and 3-5 miles from the viewer. Background viewpoints are beyond that. Partial Retention means that management activities may be evident but would remain subordinate to the characteristic landscape.

A VQO of Retention is to be applied to foreground views from critical viewpoints such as Highway 302, Fourth Iron Campground, and Hancock Notch Trail. Retention means that management activities are not evident to the casual Forest visitor, although they may be evident to the trained eye.

Retention VQO allows management activities to be seen, although they are not evident to the casual

Forest visitor. In foreground zones where a VQO of Retention applies, an observed opening of one acre as viewed from a stationary position, or up to three acres when viewed from a moving vehicle, is allowed (see Forest Plan, Appendix C6, on pages VII-C-17 and VII-C-18).

In middle ground zones where the VQO is Partial Retention, an observed opening can be up to ten acres as viewed from a stationary position, or up to fifteen acres when viewed from a moving vehicle. In background zones, an observed opening can be up to 15 acres as viewed from a stationary position, or up to 25 acres when viewed from a moving vehicle (see Forest Plan, Appendix C6, on pages VII-C-17 and VII-C-18).

The physical appearance of the land in and around the analysis area is primarily mature northern hardwoods with a strong softwood component on ridges in the upper elevation slopes and most high peaks in the surrounding area. Softwoods are interspersed with hardwoods in the valley bottoms. Evidence of past management activities are subordinate to other outstanding features in the viewshed. While there are a half-dozen former openings now approaching twenty years of age, that are apparent on the landscape, they are reforested and are evident merely because of their shorter stand height and from the textural change of the stand canopy.

Distant views of the analysis area from nearby peaks and along river and road corridors are a mosaic of continuous forest with textural variety resulting from changes in stand type and stand age class. These textural changes appear natural except where a defined edge or perimeter has resulted. Textural changes resulting from thinning and single tree selection harvests, and from clearcuts more than thirty years old are modestly apparent on the landscape. These texture changes range in size from five to twenty acres. Defined edges are not noticeable following thins and single tree selection. They are noticeable for a period of years following clearcut and group selection prescriptions, where adjacent stand heights differ from the regenerating stand. Within ten years, regenerated openings become dense with foliage, and stand heights approach those of adjacent stands within another twenty years.

The VQO (Visual Quality Objective) from the viewpoints identified within or near the analysis area is partial retention, meaning management activities maybe evident but must be subordinate to the characteristic landscape.

The seen area differs from different vantage points. Views from trails, roads and even some of the peaks are often blocked by dense vegetation. Visibility of harvest units from peaks is primarily a concern when involving views of clearcuts or group selection openings. Views of some openings are reduced in size from the actual acres due to the edge effect of adjacent vegetation, and due to topography and aspect. Small openings, such as those with group selection cuts or narrow clearcuts are often not noticeable depending on the angle viewed from, due to tree cover at the leading edge of the cut. Partial cut prescriptions blend well with other landscape features and vegetation patterns and are much less noticeable because a consistent canopy usually remains after treatment.

Mount Tremont, Mount Hancock and Mount Carrigain have background views into the analysis area. Foreground and middleground views of concern are from State Highway 302, Forest Road 34, and

Conway Scenic Railroad. Hancock Notch trail and Fourth Iron Campground have foreground and views of unit 13 and unit 28 respectively.

3.4a Visual Effect – No Action

This alternative would not affect middleground or distant views from any of the identified viewpoints, or foreground views from Hancock Notch trail, Highway 302, Fourth Iron campground, or from Forest Road 34 because no management activities would occur at this time.

3.4b Visual Effect – Alternative 2

Clearcutting in some alternatives would result in openings in the tree canopy as seen from viewpoints identified below. Table 15 displays a concise review of possible visual impacts for units seen from these viewpoints and the corresponding visual quality objective (VQO) as outlined in the Forest Plan. The acres reported as seen from each viewpoint in the charts below (one for each alternative) are generated from computerized visual analysis and confirmed with on-site verification and photos.



Table 15: Unit and opening seen from known Viewpoints with Alternative 2

Viewpoints	View Distance	Est. Visible Opening	VQO
Mount Tremont	2 ¼ miles 2 ¾ miles 3 ¼ miles 3 ½ miles 3 ¾ miles 4 miles	Unit 2: 1-2 acres Unit 4: 6-8 acres Unit 5: 8-11 acres Unit 6: 1-2 acres Unit 7: 1-3 acres Unit 14: 6-8 acres	Partial Retention
Mount Carrigain	2 ¾ miles 2 ½ miles 2 ½ miles 2 ¼ miles	Unit 5: 1 acres Unit 6: 2-4 acres Unit 7: 1-2 acres Unit 14: 1-2 acres	Partial Retention
South Hancock	3 ¾ miles 3 ¼ miles 3 miles 2 ½ miles	Unit 4: 1 acres Unit 6: 6-7 acres Unit 7: 8 acres Unit 14: 7-8 acres	Partial Retention
Mount Crawford	4 miles 4.3 miles 4.5 miles	Unit 33: 4-6 acres Unit 35: 3-4 acres Unit 37: 2-3 acres	Partial Retention
State Highway 302	Average of 2.5 miles Middleground zone	Units 33, 35, 37, 38 Total of 5 - 8 acres	Partial Retention**
State Highway 302	Foreground	Units 21,22,28,32,40-42	Retention**
River Road	Middleground	Units 37, 38: 6-8 acres	Partial Retention
Hancock Notch Trail	Foreground	Unit 13	Retention**
Fourth Iron Camp	Foreground	Unit 28 +	Partial Retention**
Scenic Railroad	Foreground	Unit 28, 32, 40	Retention**
Sawyer River Road*	Foreground	Unit 22, 24	Retention**

- * The Sawyer River Road up to the gate at Sawyer Pond Trailhead, the open portion of this road, is the section for which Retention applies. The sections beyond the gate are classified as Partial Retention.
- + Unit 28 is in Partial Retention from all locations listed above
- ** Units seen in Foreground views from these locations, and for which Retention and Partial Retention apply, are commercial thin or single tree selection prescriptions

- Views from the identified mountains would not be effected by commercial thin or single tree selection prescriptions
- Field observations from viewpoints were completed in 2001-2002
- From Mount Tremont, the most potential acres are visible, at 34 acres. Along Highway 302, or from Mount Crawford, the most acres are visible from Mount Crawford, at potentially 13 acres.

No new openings would be created in Retention areas under Alternative 2. All proposed treatments are partial harvest (thin and single tree selection) for units within Retention zones. In these areas, the residual stand would appear more spacious than prior to the treatment. For most viewers, tree size, shape and apparent stand health would appear similar to that present. Thinning and single tree selection treatments in these areas would result in removal of a quarter to a third 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 limbs reach into open spaces for sunlight. Landings are removed from the immediate foreground in these areas to conceal the associated opening.

Only when walking within treated areas, such as dispersed hiking on skid trails that may occur, would partial harvest activities be evident to the casual observer. This may occasionally occur in a few units adjacent to Highway 302 and Forest Road 34. Units 28 and 13 are the most likely to receive use within the unit. Portions of Units 21, 22, 28, 32, 40, 41, and 42 would appear more open for a few years. However, most travelers are moving through the area at 40 to 50 miles per hour so a more open condition would not detract from the scenery. Mitigations to limit the number and location of skid trails would minimize visible disturbance to ground surfaces. In addition, season of harvest (fall/winter) would reduce the likelihood that harvest activities would occur while visitor use is high.

Visual effects on the landscape from middleground and distant views as relates to partial harvest prescriptions (thinning, group selection and single-tree selection) would be minimal short-term textural changes in the forest canopy.

Views from Mount Tremont

Portions of Units 2, 4 - 7 and 14 are in the distant view area from Mount Tremont. A ridge immediately north of Sawyer Pond blocks most of the view of Unit 2, which is over two miles distant. An estimated 2 acres maximum would be viewed.

The topography of Units 4 - 7 and 14 is gentle. Portions of Units 4 - 7 face towards Mount Tremont, whereas Unit 14 faces south. Not all of the unit acres would be seen due to the effect of topography and the forested edge (see Tables by alternative)

Reconstruction of Forest Road 85, and any maintenance or spot rocking on Forest Road 86 is unlikely to be seen from distant views, as road widths are not increasing. Reconstruction of the spur road to Units 1 and 2 would not be visible due to the perpendicular orientation of this road as viewed from Mount Tremont.

Units (21-42) to the east of Mount Tremont are not seen due to the thick evergreen canopy at the summit. All the other proposed units to the northwest of Mount Tremont in the seen area are partial cuts, and would not likely be noticeable.

Views from Mount Hancock

North Hancock Peak and Hancock Loop Trail are within dense alpine pole-sized forests that prevent viewing the analysis area. The only view into the analysis area from Mount Hancock is from the small outlook cleared on South Hancock Peak. This outlook views the analysis area from an elevation of 4300 feet. Due to variations in topography and aspect, as well as partial harvest prescription, portions of several units are not seen. The seen area includes portions of Units 4, 6, 7 and 14 where portions of these “created openings” would be observed from South Hancock. The other units are partial cuts that retain the character of the canopy. Clearcut units 2 and 5 are blocked from view by local topography to the west. Each of the four seen units face perpendicular to South Hancock with moderate south-facing topography that reduces the apparent size of the opening. Reference tables 15, 16, and 17 for the amount of seen area from each of the viewpoints. Other units that may be viewed are thinning or single tree selection units so no change in canopy texture would be noticed.

Views from Mount Carrigain

Portions of Units 2, 4 - 7 and 14 may be visible from Mount Carrigain or Signal Ridge. Mount Carrigain is approximately 2¼ miles from Unit 14 and 2½ miles from Units 4 - 7 and 14. These units face away from Mount Carrigain almost enough to completely block them from view. This is due to the slope of the unit, and the leading uncut edge that would block most of the opening from view. Signal Ridge is closer, and would see an estimated fifty percent more of the units.

Units 1-15 are deferred under Alternative 3. Under Alternative 4, units 4 - 7 are deferred and unit 14 is a group selection, which may be nearly indistinguishable from other natural openings on the landscape.

Views from Mount Crawford

At a distance of four miles, portions of Units 33, 35 and 37 may be visible from Mount Crawford.

Views from Highway 302, Conway Scenic Railroad, and from River Road in Bartlett

Portions of proposed clearcut Units 33, 35, 37 and 38 may be visible as middleground views from Highway 302, Conway Scenic Railroad, Saco River and from River Road in Bartlett. These are small clearcuts, averaging nine acres. The design of these units and their position on the slope limits the amount of opening viewed from the above named locations to approximately 5 - 8 acres total. It is unlikely that all four of these units would be viewed from one location due to their being on various aspects.

All proposed treatment units on the lower slopes of Mount Tremont are below 1700 feet elevation. The viewing distance to these units varies from one to three miles, although no view point is closer than a mile. Units 33, 35, 37 and 38 cannot be seen from immediately downslope along these routes. This is because tree canopy foliage prevents viewing these slopes except from middleground views of the facing slopes of Mount Tremont as seen on straight stretches of Highway 302, or straight stretches of the Saco river. Middleground Views of units 33 – 38 from spectators on Conway Scenic Railroad are

limited due to the view orientation (being primarily to the side) from within the train. This would limit visibility straight ahead of these units as would be seen from Highway 302. Views for snowmobile riders on the tracks in winter would be comparable to those shown for Highway 302. From both 302 and the railroad, the narrow corridor and forest canopy would block some views for much of their length.

While the landscape texture of Mount Tremont is fairly uniform from these viewpoints, the small visible openings predicted from middleground and distant viewpoints meet Forest Plan standards and guides. To travelers at 50 miles an hour, these openings would be barely to moderately noticeable.

Portions of selective cut units (single tree selection and thinning) 21, 22, 24, 28, 32, 40, 41 and 42 may be visible in foreground views from along Highway 302, Sawyer River Road, or Conway Scenic Railroad where selection harvest activities are proposed in close proximity to these locations (see maps for each alternative). Project design (mitigations) would minimize the likelihood that these activities would appear noticeable to the untrained eye. For instance, while some evidence of activities along these routes may be present during fall or winter operations, by the following summer evidence of logging would be difficult to observe due to the new foliage.

Partial cut units would not be noticeable from any middleground viewpoints.

Private residences across Saco River on River Road may have distant views of harvest units, although at an oblique angle. Foreground tree canopy often blocks views from these residences, however, approximately four acres of unit 37 and six acres of unit 38 might be visible from these residences.

None of the proposed units are viewed from Mount Langdon, Mount Parker, from points east of Mount Tremont, from the Presidential Dry River Wilderness, or from points within the Pemigewassit Wilderness, except as identified in the charts.

A 50 foot slash disposal zone where logging slash would be removed to minimize potential adverse visual effects would be established along Sawyer River Road in Units 22 and 24, along Highway 302 in Units 21, 22, 32, and 40-42, and within fifty feet of the Conway Scenic Railway (Unit 28), where applicable for each alternative.

Views from Hancock Notch Trail

Hancock Notch Trail passes through the length of Unit 13 under Alternatives 2 and 4. Unit 13 is a single tree selection proposed for winter logging when use of Hancock Notch trail at this location is nearly non-existent. A 50-foot slash removal zone along both sides of Hancock Notch Trail would be implemented. The trail would be restored following implementation.

Views from Mount Tremont Trail

Mount Tremont Trail leaves Highway 302 on an old logging road that is not proposed for use in this project. Tremont Trail starts about halfway between units 40 and 42, and does not view either unit due to the dense hardwood stand that blocks views to these two units. Unit 38 is not seen from the trail as it sits back on a bench well above Mount Tremont trail, which is about half way up the steep draw on its way (ascending) out of Stony brook at this location.

None of the proposed units or the reconstruction of Forest Road 513 would be visible from Mount Tremont Trail. The nearest units are single tree selection Unit 42 across Stony Brook a distance of several hundred feet, and the ten acre clearcut unit 38, which is up slope and over the ridge from the trail.

3.4c Effect on Visuals under Alternative 3

The above discussion is presented by viewpoint, and while presented under Alternative 2 (the Proposed Action), those portions of the discussion regarding foreground and middleground views and effects as seen from along Highway 302, Conway Scenic Railroad, Fourth Iron Campground, and Sawyer River Road are essentially the same for Alternative 3. Units 1-15 and the associated road reconstruction are not included in Alternative 3. This explains the reason the table below shows little visual effect, and no effect from peaks for Alternative 3.

Table 16: Unit and opening seen from known Viewpoints with Alternative 3 *

Viewpoints	View Distance	Units viewed	VQO
Mount Tremont	No units visible	None	Partial Retention
Mount Carrigain	No units visible	None	Partial Retention
South Hancock	No units visible	None	Partial Retention
Mount Crawford	4 miles 4.3 miles 4.5 miles	Unit 33: 4-6 acres Unit 35: 3-4 acres Unit 37: 2-3 acres	Partial Retention
State Highway 302	Average of 2.5 miles Middleground zone	Units 33, 35, 37, 38 Total of 5 - 8 acres	Partial Retention**
State Highway 302	Foreground	Units 21,22,28,32,40-42	Retention**
River Road	Middleground	Units 37, 38: 6-8 acres	Partial Retention
Hancock Notch Trail	Unit 13 not treated	None	Retention
Fourth Iron Camp	Foreground	Unit 28+	Partial Retention**
Scenic Railroad	Foreground	Unit 28, 32, 40	Retention**
Sawyer River Road	Foreground	Unit 22, 24	Retention**

- * The open portion of Sawyer River Road up to the gate at Sawyer Pond Trailhead, is the section for which Retention applies. The sections beyond the gate are classified as Partial Retention.
- + Unit 28 is classified as Partial Retention from all locations listed above
- ** Units seen in Foreground views from these locations, and for which Retention and Partial Retention apply, are commercial thin or single tree selection prescriptions

- Views from the identified mountains would not be effected by commercial thin or single tree selection prescriptions
- Field observations from viewpoints were completed in 2001-2002
- From Mount Tremont, Mount Carrigain, and South Hancock, no potential acres are visible. Along Highway 302, or from Mount Crawford, the most acres are visible from Mount Crawford, at potentially 13 acres.

No new openings would be created in Retention areas under Alternative 2. All proposed treatments are partial harvest (thin and single tree selection) for units within Retention zones. In these areas, the residual stand would appear more spacious than prior to the treatment. For most viewers, tree size, shape and apparent stand health would appear similar to that present. Thinning and single tree selection treatments in these areas would result in removal of a quarter to a third 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 limbs reach into open spaces for sunlight. Landings are removed from the immediate foreground in these areas to conceal the associated opening.

Only when walking within treated areas, such as dispersed hiking on skid trails that may occur, would partial harvest activities be evident to the casual observer. This may occasionally occur in a few units adjacent to Highway 302 and Forest Road 34. Units 28 and 13 are the most likely to receive use within the unit. Portions of Units 21, 22, 28, 32, 40, 41, and 42 would appear more open for a few years. However, most travelers are moving through the area at 40 to 50 miles per hour so a more open condition would not detract from the scenery. Mitigations to limit the number and location of skid trails would minimize visible disturbance to ground surfaces. In addition, season of harvest (fall/winter) would reduce the likelihood that harvest activities would occur while visitor use is high.

Visual effects on the landscape from middleground and distant views as relates to partial harvest prescriptions (thinning, group selection and single-tree selection) would be minimal short-term textural changes in the forest canopy.

3.4d Effect on Visuals under Alternative 4

In this alternative, Unit 14 is changed from clearcut to group selection, unit 2 clearcut is reduced to 7 acres, and units 4 - 8 and 15 are deferred from treatment. Associated road reconstruction under Alternative 4 is the same as that in the proposed action. Group selection in unit 14 includes several openings of $\frac{1}{4}$ to $\frac{1}{2}$ acre in size and totaling about five acres. The group selection openings would not likely be noticeable from Mount Tremont or other viewpoints. This explains the reason the table below shows less visual effect from viewpoints under Alternative 4 then under Alternative 2.

Table 17: Unit and opening Seen from known Viewpoints with Alternative 4 *

Viewpoints	View Distance	Est. Visible Opening	VQO
Mount Tremont	2 ¼ miles 4 miles	Unit 2: 1-2 acres Unit 14: 1-2 acres	Partial Retention
Mount Carrigain	2 ¼ miles	Unit 14: 1 acre	Partial Retention
South Hancock	2 ½ miles	Unit 14: 1-2 acres	Partial Retention
Mount Crawford	4 miles 4.3 miles 4.5 miles	Unit 33: 4-6 acres Unit 35: 3-4 acres Unit 37: 2-3 acres	Partial Retention
State Highway 302	Average of 2.5 miles Middleground zone	Units 33, 35, 37, 38 Total of 5 - 8 acres	Partial Retention
State Highway 302	Foreground	Units 21,22,28,32,40-42	Retention
River Road	Middleground	Units 37, 38: 6-8 acres	Partial Retention
Hancock Notch Trail	Foreground	Unit 13	Retention**
Fourth Iron Camp	Foreground	Unit 28 +	Retention**
Scenic Railroad	Foreground	Unit 28, 32, 40	Retention**
Sawyer River Road	Foreground	Unit 22, 24	Retention**

- * The Sawyer River Road up to the gate at Sawyer Pond Trailhead, the open portion of this road, is the section for which Retention applies. The section beyond the gate, and FR 86 are classified as Partial Retention.
- + Unit 28 is in Partial Retention from all locations listed above
- ** Units seen in Foreground views from these locations, and for which Retention and Partial Retention apply, are commercial thin or single tree selection prescriptions
- Views from the identified mountains would not be effected by commercial thin or single tree selection prescriptions
- Field observations from viewpoints were completed in 2001-2002
- Under this alternative, the most visible area is seen from Mount Tremont, at an estimated 4 acres total. Along Highway 302, or from Mount Crawford, the most acres are visible from Mount Crawford, at potentially 13 acres

No new openings would be created in Retention areas under Alternative 2. All proposed treatments are partial harvest (thin and single tree selection) for units within Retention zones. In these areas, the residual stand would appear more spacious than prior to the treatment. For most viewers, tree size, shape and apparent stand health would appear similar to that present. Thinning and single tree selection treatments in these areas would result in removal of a quarter to a third 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 limbs reach into open spaces for sunlight. Landings are removed from the immediate foreground in Retention areas to conceal their opening.

Only when walking within treated areas, such as dispersed hiking on skid trails that may occur, would partial harvest activities be evident to the casual observer. This may occasionally occur in a few units adjacent to Highway 302 and Forest Road 34. Units 28 and 13 are the most likely to receive use within the unit. Portions of Units 21, 22, 28, 32, 40, 41, and 42 would appear more open for a few years. However, most travelers are moving through the area at 40 to 50 miles per hour so a more open condition would not detract from the scenery. Mitigations to limit the number and location of skid trails would minimize visible disturbance to ground surfaces. In addition, season of harvest (fall/winter) would reduce the likelihood that harvest activities would occur while visitor use is high.

Visual effects on the landscape from middleground and distant views as relates to partial harvest prescriptions (thinning, group selection and single-tree selection) would be minimal short-term textural changes in the forest canopy.

3.4e Cumulative Effect on Visuals

Cumulative effect considers effects of past, present and foreseeable activities across a larger area including adjacent private lands. Cumulative visual effects analysis for this project considers the Sawyer River watershed as the analysis area.

Forest data and field observations indicate that even-aged and uneven-aged timber management has been accomplished in the past in this analysis area and has met Forest Plan standards and guides.

There are increased cumulative visual effects as a result of this action, commensurate with the effects described above for each alternative. Because the condition of forest stands are recovering from past management activities as rapidly as new activities are taking place, the cumulative visual effect over time is in balance, and meets the standards and guides of the Forest Plan.

3.5 Water

Watershed features have an important role in maintaining watershed health. These features include the physical attributes of watershed such as hydrology, soil, and geology. These features influence the biological aspects of a landscape. Hydrologic features and the related components of water quality and water yield are discussed in this report.

Affected Environment - Water Quality and Quantity

Watershed features have an important role in maintaining watershed health. These features include the physical attributes of watershed such as hydrology and soil, which, in turn, influence the biological aspects of a landscape. Soil is discussed in the soil report of this document. Hydrologic features and the related components of water quality and water yield are discussed in this report. In addition, other water related resources such as vernal pools and wetlands (where present) are discussed elsewhere in the EA. Riparian areas are present in the analysis area. These are discussed in this report where relevant.

County Line Timber Sale is located in the Sawyer River watershed, a tributary of the Saco River and in the upper Saco River watershed. The watershed of Sawyer River contains approximately 15,250 acres. This watershed is aligned west to east with the outlet to the east where it joins the upper Saco River. The western end is located at Hancock Notch. There are named and unnamed tributaries of the Sawyer River within the analysis area, including Carrigain Brook and Whiteface Brook. There are also small ephemeral drainages and swales throughout the watershed. The Sawyer River enters the Saco River as the Saco River changes its direction of flow to easterly, almost at a right angle from its upstream flow south out of Crawford Notch. Two smaller subwatershed of the upper Saco River are also included in the watershed area for the proposed project. One is upstream (Halfway Brook - 2370 acres) of the confluence with the Sawyer River, and Stony Brook (2780 acres) is located downstream.

The watersheds are discussed throughout this report at various scales. For certain direct and indirect effects, effects are analyzed within smaller watersheds where project activities are being proposed for implementation. This includes the Sawyer River and portions of the Upper Saco River. For larger scale cumulative effects, the portions of these watersheds that extend above the analysis area are added into the analysis to ensure a consideration of larger scale cumulative effects.

Affected Environment - Streams and Riparian Areas

Streams are important because they are pathways that transport water, sediment, and nutrients through the landscape. Streams are classified in a variety of ways. The simplest is based on how often the stream has water in it. Streams that have water in them continually are called perennial streams. Ephemeral is the name for streams that only flow right after it rains or during snowmelt. Streams that flow beyond a precipitation event but not year round are called intermittent.

A summary of the characteristics of perennial and intermittent streams in the watersheds where project activities. There are 25.5 miles of perennial stream within the Sawyer River watershed (as identified by the current GIS theme using CFF (cartographic feature file) codes) and 11.6 miles of intermittent streams. The number of ephemeral streams is not known since these features are not consistently mapped. 35% of the perennial portions are located in the main branch of Sawyer River. The rest of the perennial portions are located in the tributaries. Carrigain and Whiteface Brooks are the largest of these.

Most of the perennial stream portions within the project watersheds have been classified using the White Mountain National Forest riparian classification system. A riparian area includes stream channels, lakes, adjacent riparian ecosystems, flood plains, and wetlands. As shown in table 18 types 10, 12, 13, 15, 16, 20, and 21 are found within the project watersheds of Sawyer River and upper Saco Watersheds.

Riparian areas and stream courses on the White Mountain National Forest including the Sawyer River and Saco River watershed are generally considered to be properly functioning. This means streams and their associated riparian areas exhibit the attributes and process that are appropriate to each riparian area's capability. Riparian areas dissipate stream energies associated with high flows, filter sediment, develop diverse channel characteristics to provide habitat for aquatic biota, and protect streambanks from scour.

As was described in the vegetation section, extensive harvesting occurred in this area prior to the establishment of the National Forest. Old skid roads and railroad grades are still evident in the analysis areas. Many of these older treatments were clearcuts. 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 Sawyer River watershed with less than potential levels of woody material and loss of diverse channel and floodplain characteristics. Increased woody material contributes to the protection of stream banks, and creation of habitat for aquatic species. However, processes are functioning in the watershed and recovery continues as woody material accumulates and trees regrow.

Riparian types 10, 12, 15, and 20 occur within or adjacent to proposed timber harvest areas. There are also unclassified intermittent and perennial streams with associated riparian areas in the vicinity of proposed units. Types 10,12, and 15 have a bottom type that is a mixture of boulders, cobbles, and gravels in entrenched channels. Type 21 is a low gradient stream with cobble and gravel bottom type where divided channels could be present and depositional processes are active.

Table 18: Riparian Types within project sub-watersheds of Sawyer River and Saco River

Riparian Type	Miles	Brief Description	Units Within or Adjacent
10	6.9	Steep gradient, V shaped valley	42
10L	.1	Steep gradient, V shaped valley, dominated by bedrock features	
12	18.0	Moderate gradient, U shaped narrow flat floored valley	12,13,3,30,28
12D	.2	Moderate gradient, U shaped narrow flat floored valley, debris influenced	
12L	0.1	Moderate gradient, U shaped narrow flat floored valley, dominated by bedrock features	
13	.9	Moderate gradient, shallow V shape valley, high bedload	
15	1.7	Low gradient, boulder dominated	28
16	.2	Moderate gradient, V shaped valley, very large boulders	
20	5.3	Low gradient, very broad flat floored valley	11
20D	1.4	Low gradient, very broad flat floored valley, debris influenced	
21	.3	Low gradient, bedload dominated by cobbles and gravels	
Unclassified, perennial	2.8	varies	34
Unclassified, intermittent	16.1	varies	21,22

In contrast, other riparian types such as 20 and 21 have a larger component of finer material such as gravel and sand in the bedload. The lower gradient combined with a less resistant bedload and bank material results in a less stable channel more prone to adjustment from changes in runoff and high flow events. These channels rely on vegetation and woody material for channel stability and often have a wider active floodplain due to more active meandering processes. Portions of Sawyer River and Saco

River exhibit these characteristics.

Public Water Supply

Using information from the State of New Hampshire's data on public water supplies, several public water supply sources are present within the Saco River watershed. None of these are in the Sawyer River watershed. Only one public (surface water) use site is found within the analysis area. This source is located on a side tributary downstream of the analysis area and no treatments are proposed in its watershed. All of the rest of the listed public water supplies use ground water wells mostly located adjacent to the Saco River well downstream of the proposed activities. There are other private surface water uses in that watershed as well, up stream and downstream of the analysis area.

New Hampshire Water Quality Standards

The State of New Hampshire designates surface waters in Sawyer River and Saco River watersheds as Class B, acceptable for fishing, swimming, and other recreational purposes and, after adequate treatment, for use as water supplies. At present, there are no surface waters listed as not meeting water quality standards in the Sawyer River watershed or this portion of the Saco River by the state of New Hampshire.

New Hampshire 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. Under these antidegradation provisions, waters of the National Forest are designated as "Outstanding Resource Waters" (ORW) and shall be maintained and protected (NHDES, 2001). Some limited point and nonpoint source discharges may be allowed providing 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 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. Soil and Water Conservation Practices (SWCP) and project mitigations 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.

Background for Water Chemistry

Water quality can be affected by a change in water chemistry. Changes in water chemistry have been observed in studies done in the White Mountain National Forest and elsewhere (Martin, Noel, and Federer, 1981, Davies, K., 1984, and Stafford, Leathers, and Briggs, 1996). Removal of trees increases temperature, reduces transpiration, increases soil moisture and streamflow, increases decomposition of organic matter, increases mineralization and nitrification, and increases in exchange of ions in the soil (Martin, et al 1986). Increases in water, nutrients, and temperature are reduced within a few years as vegetation regrows so these variables return to precutting levels (Martin, et al 1986). Uptake by vegetative growth is, at first, less than nutrient release by accelerated mineralization, so nutrients are lost

from some systems through streamflow (Borman and Likens, 1979) for the first few years after harvest.

Studies have shown that changes to nitrate concentrations have the potential to exceed water quality standards for short periods of time after harvest. Concentrations high enough to exceed water quality standards were associated with clearcutting entire watersheds (Pierce et al, 1971) along with subsequent herbicide treatment to keep vegetation from growing back. Water from watersheds with uncut portions tended to dilute this effect within the watershed. Watersheds that were treated with more conventional methods **did not** exceed water quality standards for nitrate (Hornbeck, et al, 1973). Martin and Pierce (1980) recommended use of buffer strips, less cutting in the upper portions of watersheds, and staggered harvest to reduce this effect.

Another effect is the changed concentrations of nutrients and their depletion. Calcium losses have already been discussed in the soil report. Studies have shown that the usual harvest practices such as those used on the White Mountain National Forest including those proposed in the County Line project, do not result in large nutrient losses and do not pose a risk to water quality (Brown, 1983). Usual harvest practices including mitigations would be used for the proposed County Line project. Because of this, water quality standards would not be exceeded.

Background for Water Temperature

When forest harvest reduces canopy shading along streams, the potential exists to increase stream water temperatures. Increases in stream temperature can be prevented or greatly reduced with reduced-cut or no-cut buffers along the edges of streams (Davies, 1984 and Staffard, et al 1996). Mitigations prescribed for riparian areas, classified riparian areas, and intermittent streams provide for retention of shade on these streams. Trees adjacent to these channels and on steep streambanks would be retained. In thinning and single tree selection units, (the majority of treatment acres), trees and significant canopy cover is retained throughout the units. In addition, only portions of watersheds are being treated. This further reduces the potential for temperature increases in streams.

3.5a Effect on Water Chemistry and Temperature – (No Action)

There would be no direct or indirect effects on water chemistry or temperature from implementation of Alternative 1 (No Action). The current condition would remain. Chemical water quality and temperatures would remain high quality and cold within water quality standards.

3.5b Effect on Water Chemistry and Temperature - Alternative 2-4

Because mitigations would be used regardless of the action alternative selected, loss of nutrients, changes in water chemistry, and water temperatures related to the harvest of trees is not expected to deplete nutrient levels in the watershed or cause water quality standards to be exceeded for any of the action alternatives. Differences between action alternatives to water quality are unlikely to vary or be measurable between alternatives since mitigation would avoid direct effects. In addition is the

mitigating effect of partial harvest treatments and the low percentage of the watershed that would be treated. Chemical quality would remain high, water quality standards would continue to be met, and temperatures would stay cold through the use of mitigations as described above.

3.5c Cumulative Effects on Water Chemistry, Temperature and Sediment

There is a limited dataset for water chemistry within Sawyer River watershed and the upper Saco River. These samples were analyzed for pH and major dissolved ions. Based on this data, the water in the watershed is chemically dilute with a mean pH of 6.5 and mean specific conductance of 27 umhos. The dominant cation is calcium with a mean of 2.2 mg/l. The dominant anion is sulfate with a mean of 4.9 mg/l. Temperatures were cool, averaging 54 degrees Fahrenheit (12.1C) within water quality standards. Overall chemical quality is high and none of the measured parameters indicate concerns for human use or aquatic biota.

There is no available data on bacterial components such as coliforms in the water. There is some potential for bacterial levels to be elevated locally and seasonally due to recreational use in the watershed. A trail parallels the upper Sawyer River throughout much of its length. Camping may occur in close proximity to the stream, although at very low levels. A shelter is located near Sawyer Pond, at an appropriate distance to mitigate pollution concerns.

Erosion and sediment transport in streams are natural processes. There is no data on suspended sediment, bedload, or turbidity in Sawyer River or the upper Saco River. It is likely that fine sediment is transported from roads to streams at crossings, ditch outlets, culverts, and other locations. Limited roads exist on lands managed for timber, wildlife, and semi-primitive motorized recreation activities in 2.1, 3.1 and 6.1 lands within the analysis area. These lands comprise 46% of the watershed, mostly located on lower elevations and along the river. The soil reports states that no rilling or rutting is evident on the roads in this watershed, so erosion from roadbed surfaces is sheet erosion and transport is limited to periods of runoff.

Studies have shown that sediment from roads is evident during runoff events even where best management practices are used. Where roads are in place, one study has shown that mitigations keep suspended sediment levels less than 2 NTU (nephelamine turbidity units) during non-storm flow periods on clearcut watersheds (Patric, 1980). The same study showed virtually no increase in average turbidity from lighter selection cuts that removed 25-30% of the basal area. However, regardless of cutting intensity, turbidities did increase during storms and were traced to logging roads. Another well-known study at Hubbard Brook (Likens, et al 1970) found negligible increases in stream turbidity after vegetation in a watershed was felled and left in place with no roads or skid trails. However, later studies at Hubbard Brook (Hornbeck, et al 1987) of a strip cut watershed with roads and skid trails did result in increases in turbidity. This points towards the roads and skid trails that are used to access and remove felled trees as the conduits for sediment movement and transport. This, in turn, indicates the importance of directing mitigations or BMPs towards roads and skid trails associated with the proposed activities.

There are few existing roads in Sawyer River watershed. Five percent (5%) of the watershed is in the Pemigewassett Wilderness Area, has no roads, and is managed for wilderness values. Another 56% of the watershed is MA 6.1 and 6.2 lands managed as semi-primitive nonmotorized and retained in a relatively natural or undisturbed state. As a result more than half of this watershed does not have roads that can contribute sediment during runoff events.

The highest densities of roads are found on private lands within the project watershed. But these private lands comprise only 1% and are located in the lowermost portions of the watershed, downstream from the area where treatments would occur. Likely increased sediment from these roads is occurring in localized areas and contributes to sediment loads in the Saco watershed during times of runoff.

3.5d Water Quantity - Background

Water quantity in streams is largely related to the amount of precipitation that occurs throughout the year and the amount of summer evapotranspiration. At Hubbard Brook, 62% of the precipitation became streamflow (Likens and Bormann, 1995) and most of the rest was lost to evapotranspiration. Nonetheless, evapotranspiration has the greatest effect on streamflow from June through September. Changes in evapotranspiration result from changes in vegetative species, density and successional stage. Change in vegetation results in change to streamflow during summer low flow periods. The magnitude of change depends on the extent of change to vegetation (Hornbeck, et al 1993). Streamflow is lowest from August to September.

Hornbeck, Martin, and Eagar (1997) summarize that at least 20-30% of the basal area must be cut to generate detectable increases in annual water yield. Water yield increases usually diminish within 3-10 years.

Based on the research described above, it is unlikely that localized water yield increases are currently present within Sawyer River or upper Saco watershed as the result of previous timber sale activity. There have been no other timber sales within the analysis watersheds within the last 10 years. Because of this, no water yield increases are expected to be measurable in the affected streams.

For the project scale analysis, five subwatersheds were delineated. Upper Sawyer River (6360 acres), Carrigain Brook, (2670 acres), and Lower Sawyer River (6220 acres) comprise the Sawyer River watershed. Two additional subwatersheds that contain proposed treatment areas, Stony Brook (2780 acres) and Halfway Brook (2370 acres), drain directly into the Saco River.

In addition, smaller intermittent streams were assessed for water quantity effects to estimate increases in water yield and to predict if these smaller streams would be likely to adjust channel dimensions. Changes in the predicted flow combined with stream characteristics determine this response. None of the watersheds of these smaller streams would have more than 25% of the basal area removed, therefore no change in water flows and no channel adjustment would be expected to occur.

3.5e Effects on Water Quantity - No Action

There would be no new direct, indirect, or cumulative effects on water quantity from implementation of

Alternative 1. Forest Plan direction, Standards & Guidelines, and Soil and Water Conservation Practices would continue throughout the analysis area. Current and on-going management activities would continue, but no new, federal management activities would be initiated during this entry. Changes such as road maintenance might occur through current management direction, natural processes, or other management decisions in the future.

3.5f Effects on Water Quantity – Alternatives 2-4

Effects of harvest on streamflows tend to be localized and are unlikely to extend beyond first or second order streams in well-managed forests, where relatively small portions of the watershed are being harvested at a given time. This is because such increases lose their identity as they join streamflows from larger surrounding rivers (Neary and Hornbeck 1994). Channel characteristics (width, depth and bedload) may adjust to increased flow levels for the duration of the increase. The magnitude of increase and type of channel dictates the extent of change. This alteration could result in erosion from the channel and subsequent contributions to sediment, the extent of which is determined by structural characteristics of the stream. Proposed mitigations would combine to reduce this effect.

Where less than 25% reduction in basal area is proposed, no measurable increase in discharge is expected in the associated channel (Hornbeck, Martin, and Eagar, 1997). When analyzed, all of the subwatersheds with would have less than 25% basal area removed for each action alternative. No measurable change in yield means no channel adjustment is expected.

3.5g Background - Streams and Riparian Areas

Direct and indirect effects to streams, riparian areas, and floodplains would be mitigated as described below so that effects to these features are short term and recoverable. The condition of streams and riparian areas is related to the amount of disturbance that occurs in these areas. Direct effects include disturbance at stream crossings and removal of trees from the riparian area. Indirect effects include sedimentation from erosion and channel adjustment due to increased water yield. Through the use of mitigations, effects to streams, riparian areas, and floodplains are expected to be mitigated and not of consequence to the condition of these features. Streams, riparian areas, and floodplains would continue to function in much the same way as the current condition. Monitoring would occur to ensure these practices are implemented and effective.

3.5 h Mitigations for Streams and Riparian Areas

- For perennial riparian areas, no trees would be harvested from within 10 feet to either side of the top of the bankful mark except at designated crossings. Vegetation on streambank slope would be left intact. Outside this no cut buffer, there is an additional buffer where up to 50% of the basal area can be harvested. The width of this buffer is defined below and depends on riparian type.

Riparian type 10, 15 the greater distance of the inner-gorge or $(50 \text{ ft} + (4 \times \% \text{ slope}))$

Riparian type 12 50 feet + $(2 \times \% \text{ slope})$

Riparian type 20 the greater distance of 50 feet or floodplain to top of first terrace
Unclassified perennial 80 feet on either side

- For intermittent and ephemeral streams, specific protection measures would be prescribed on a site-by-site basis. Trees adjacent to the channel would be retained to provide structure and stability.
- Streams with a definable channel would be kept free of logging debris
- Trees would be felled directionally away from streams where possible
- Existing woody material in streams would be left in place
- Stream crossings would be designated
- Monitor and restore stream crossings following implementation
- Designate stream crossings before snow coverage if possible
- Apply additional drainage control and/or improved crossing structures if needed

3.5i Effect to Streams, Riparian Areas, and Floodplains – No Action

There would be no new direct or indirect effects on streams, riparian areas, or floodplains from implementation of the No Action alternative. The current condition would remain. Stream, riparian areas, and floodplain would continue to function as presently.

3.5j Effects to Streams, Riparian Areas, and Floodplains -- Alternatives 2-4

Considering these mitigations, the condition of streams, riparian areas, and floodplains, effects related to the removal of trees is not likely to vary between the alternatives and is expected to meet Forest Plan standards for water quality.

Forest vegetation also contributes to streamcourse stability in all streams in the analysis area. Stream buffers and limited treatment areas would retain adjacent a portion of large woody material, which becomes a source of future large wood to streams, and provides for structurally intact streambanks. These buffers also allow for intact near-stream areas for more effective filtering of runoff.

All stream and riparian areas would have mitigations as discussed above. Mitigations to protect stream features are expected to be effective. Therefore, sediment resulting from increased flows is not likely to occur in the larger streams, Sawyer River, or upper Saco River. Long-term direct and indirect effects to streams and riparian areas are not expected to occur for any of the action alternatives.

3.5k Background for Water Quality effects - sediment from harvest, roads, skid trails, and landings

Fine sediments are easily transported suspended in water. Direct effects can occur where roads and skid trails go across stream channels because, at these locations, sediment can be delivered directly into the channel. Indirect effects can occur from sediment transport on skid trails, roads, landings, and disturbed ground from tree dragging.

The EIS for the Forest Plan states that sediment production and its impacts from roads, skid trails, and landings can be reduced to a negligible amount with the use of mitigations such as careful layout and construction, using caution in wet and muddy conditions, and use of road closures. Skid trails also result in onsite soil erosion although the impact is small when mitigations are used. Careful consideration of skid trail location, designated skid trails, minimizing the number of skid trails, and avoiding steep slopes and wet areas with skid trails greatly reduces adverse effects to soils and water. Other mitigations include the use of waterbars, suspending operations during saturated and muddy periods, minimizing disturbance to stream channels, and winter harvest. Maintenance of Soil and Water Conservation Practices during harvest activities is expected to minimize potential effects. Prescribed mitigations would reduce effects to short term and minimal levels, and thereby result in no change to water quality.

Recent studies have shown that mitigations such as these would keep suspended sediment levels under 2 NTU (nephelamine turbidity units) during non-storm flow periods on clearcut watersheds (Patric, 1980). The same study showed virtually no increase in average turbidity from lighter selection cuts that removed 25-30% of the basal area. However, regardless of harvest intensity, turbidities did increase during storms and were traced to muddy logging roads. Another well-known study at Hubbard Brook (Likens, et al 1970) found negligible increases in stream turbidity after vegetation in a watershed was felled and left in place with no roads or skid trails. However, later studies at Hubbard Brook (Hornbeck, et al 1987) of a strip cut watershed with roads and skid trails did result in increases in turbidity. This points towards the roads and skid trails that are used to access and remove felled trees as the conduits for sediment movement and transport. This, in turn, indicates the importance of directing mitigations (including Best Management Practices, BMP) towards roads and skid trails associated with the proposed activities.

Most effects related to road reopening and skid trails are short term in duration through the use of the BMPs listed in Table 19. However, the effect of elevated turbidity during storm events would probably remain in the portion of the watershed downstream from roads. Skids road contributions would decrease to near zero as they revegetated and stabilized after use. Turbidity increases during storms related to permanent (existing) 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 because these roads are existing. Alternatives 2, 3, and 4 include road reconstruction that improves the road surface and drainage on these existing roads. Alternatives 2, 3, and 4 also propose 1000 feet of road relocation, which could cause a minor increase in cumulative effects for a year or two. However, the terrain where this road relocation is to occur is nearly flat, and not near Sawyer River or Saco River. Hence, any runoff during the first two years, and thereafter, would not likely carry sediment into these rivers.

Normal ongoing road maintenance, and reconstruction of these roads would probably contribute some sediment since disturbance and use of these roadbeds allows sediment to mobilize and be removed in subsequent rainfall events. However, since the increases in turbidity occurs 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.

The next page provides:

Table 19: Mitigations for Water Quality

Effect	Table 19. Mitigations for Water Quality	Source													
Roadbed disturbance during spring	<ul style="list-style-type: none"> Closure of roads for a period during spring. Closure of operations during muddy and saturated conditions when needed. 	Forest Plan Appendix E													
Sediment transport from skid roads	<ul style="list-style-type: none"> Winter harvest where feasible. Location and number of skid trails agreed to in advance with the sale administrator. Minimize number of skid trails Skid trails would be on the contour where practical. Drainage features would be designed to disperse runoff after collecting it. 	Forest Plan Appendix E													
	<ul style="list-style-type: none"> Skid roads would be located on slopes 40 percent or less. Where possible, skid trail grades would be 20% or less. 	Appendix E S&G III-17													
	<ul style="list-style-type: none"> Spacing of cross drainage on skid trails would be guided as shown below (also found in the LMPIII-22) <table border="1"> <tr> <td>Grade, %</td> <td>2-5</td> <td>6-10</td> <td>11-15</td> <td>16-20</td> <td>21-30</td> <td>31-40</td> </tr> <tr> <td>Spacing, ft</td> <td>300-500</td> <td>200-300</td> <td>100-200</td> <td>100</td> <td>80</td> <td>60</td> </tr> </table>	Grade, %	2-5	6-10	11-15	16-20	21-30	31-40	Spacing, ft	300-500	200-300	100-200	100	80	60
Grade, %	2-5	6-10	11-15	16-20	21-30	31-40									
Spacing, ft	300-500	200-300	100-200	100	80	60									
landings	<ul style="list-style-type: none"> Landings would not be located within 100 feet of a stream. 	S&G III-18													
Sediment from stream crossings on skid trails	<ul style="list-style-type: none"> Where needed, silt fence or another effective methods would be used prevent sediment from reaching a stream course disturbed by crossing areas. Channelized runoff from skids trails and roads would be dispersed before entering a riparian area. Watershed protection measures such as waterbars and sediment control would be maintained as necessary until no longer needed. Stream crossings would 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. 	Forest Plan Appendix E													
	<ul style="list-style-type: none"> Skidding within 100 feet of a flowing stream would be limited to dry or frozen and/or snow covered ground conditions except on designated skid trails for stream crossings. Exposed soil would be limited to less than 5% of the riparian area. 	S&G III-18													
	<ul style="list-style-type: none"> Locate skid roads outside of riparian areas to the extent possible Align stream crossings so a minimum possible area is disturbed. When possible avoid crossings at riparian types 10. Stream width to depth ratio and gradient changes should be kept to a minimum and restored on temporary crossings. Cross drainage on skids roads used in the timber sale would be directed into areas suitable for trapping sediment and not directly into a stream. 	S&G III-21													
	<ul style="list-style-type: none"> For intermittent and ephemeral streams, specific protection measured would be prescribed on a site-by-site basis. Protection measures for intermittent and ephemeral streams with a definable/visible channel may include designated stream crossings and retention of trees adjacent to the channel. 	S&G III-19													

In addition, the Forest Plan EIS (IV-25) states that there have been no documented cases of damage to fish or other aquatic organisms due to sediment on the forest. There has also been no mention of sediment as an impacting factor to water quality or aquatic life in any of the monitoring plans. In the 1993 Monitoring Report, monitoring in municipal watersheds showed occasional storm related turbidity measurements above the threshold 5 NTUs. However the NTUs exceedances did not appear to be related to forest management activities. In 1995, an onsite review of the effects of timber harvesting and road construction on each district was documented. Standards and guides for sediment control have been found to be effective in keeping the effects of management activities within the range of those shown in the Forest Plan EIS.

3.5l Effects to Water Quality – sediment from harvest, roads, skid trails, and landings – No Action

There would be no direct or indirect effects on water quality from implementation of the no action alternative. The current condition would remain.

3.5m Effect to Water Quality – sediment from harvest, roads, skid trails, and landings - Alternatives 2-4

These alternatives are discussed together because the effects of each action alternative are essentially the same for all action alternatives, except where units are deferred. Soil impacts on skid roads depends on the season of harvest not the treatment method. It is estimated that up to ten percent ground disturbance may occur in units harvested during the summer/fall and only one percent disturbance occurs during winter harvest (C.Guenther, sale administrator, 2-2002 and Rod Wilson, forester, 1-2003). Mitigations are expected to reduce potential effects from skid roads to short term and without measurable effects to water resources.

The amount of sediment anticipated for this sale can be measured by two parameters; 1) the acres of ground disturbance from skid trails and landings, plus the miles of road reconstruction and new construction and 2) stream crossing options (see Table 20). Based on table 20, Alternative 3 disturbs 34 acres, compared to 46 acres for Alternative 4, and 58 acres in Alternative 2. These numbers are an estimate of the maximum amount of ground disturbed (by processes such as compaction and loss of ground cover) which could be expected from the roads, landings, and skid trails that are needed to harvest these units. The amount of disturbance is an indicator of the area across which increased sediment transport could occur. The water quality measures above are solely used to show the differences between each alternative.

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 provide an example of the condition that these facilities would be in several years following the sale if all appropriate standards and guidelines are followed. Skid trails and landings are vegetated and stable, showing little evidence of sheet or rill erosion. Water quality remains high. The turbidity standard for Class B waters is "not exceed natural conditions by more than 10 NTUs". The Proposed Action and alternatives would not violate this standard because mitigations outlined for the project would be implemented. Use of these mitigations would reduce potential effects to temporary and short term, and would not result in impacts

to designated uses. In addition, Soil and Water Conservation Practices (SWCPs) are prescribed for all action alternatives.

Mitigation measures to be employed during construction of the bridges would mitigate potential sedimentation or other direct or indirect impacts or cumulative off-site impacts to the streams. Other protection measures and buffer widths for intermittent or ephemeral streams would be prescribed on a site-by-site basis. Proposed treatments along brooks tributary to Sawyer River would meet Forest Plan standards and guidelines. Proposed partial cut treatments adjacent to Carrigain Brook in Unit 3, adjacent to Sawyer River in Units 11, 12 and 13, and adjacent to Stony Brook in Unit 42 would be implemented according to Best Management Practices and Forest Plan direction.

Proposed design improvements such as adding drainage ditches on Forest Road 513 and adding surface rock at one location on Forest Road 86 may improve resistance of these roads to erosion.

Skid roads in harvest units may show some short term erosion, which is normally contained to the immediate area with water bars that direct runoff out over the forest floor, and seeding on skid trails and landings where needed.

Removal of the vegetation canopy does not normally cause a measurable increase in runoff or erosion that would affect water quality. There is little change (no measurable increase) in the amount of runoff leaving most partial cut units. The effectiveness of the remaining canopy to intercept rain and snow, and the ability of the forest floor to intercept and absorb runoff remains fairly constant. This is especially true as the residual trees re-occupy the canopy, natural regeneration and growth of shade tolerant understory trees and herbaceous plants reestablish, and grass, tree and shrub species establish on skid roads.

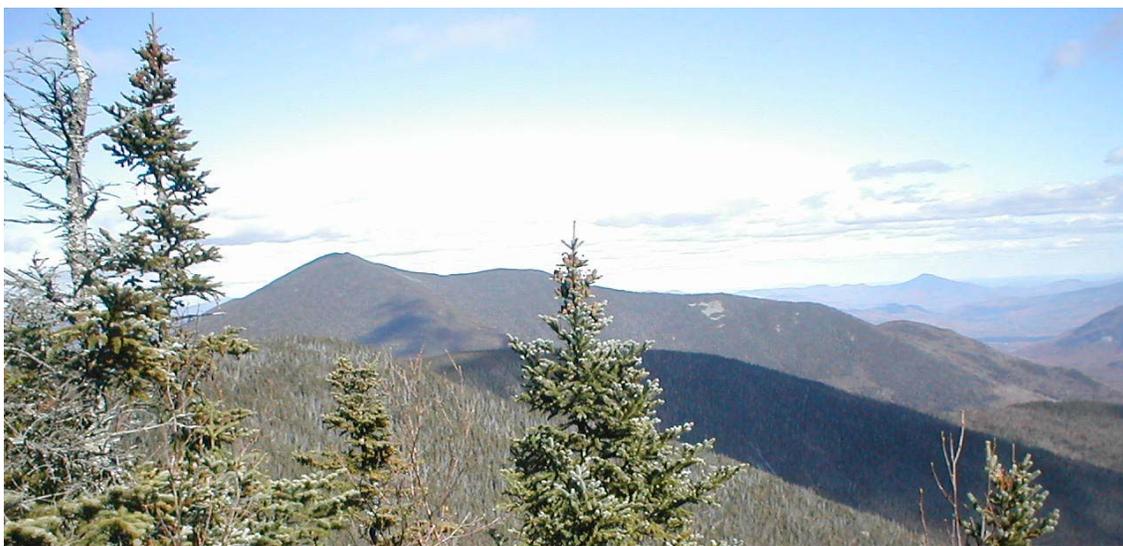


Table 20: Summary of Water Quality Measures

Alternative	Acres Disturbed by Skid Roads	Feet of Road Re-construction	Relocation and temp road	Acres of Disturbance	Bridges receiving work
1	0	0	0	0	Existing bridges
2	49	16,579	1700	58	<ul style="list-style-type: none"> • Replace existing bridge deck on Whiteface Brook bridge • Temporary log stringer bridge over Carrigain Brook • Replace deck surface for Carrigain Brook bridge • Footbridge constructed at 2nd stream crossing on Sawyer Pond Trail.
3	30	7,392	1700	34	<ul style="list-style-type: none"> • Replace existing bridge deck on Whiteface Brook bridge
4	38	16,579	1700	46	<ul style="list-style-type: none"> • Replace existing bridge deck on Whiteface Brook bridge • Temporary log stringer bridge over Carrigain Brook • Footbridge constructed at 2nd stream crossing on Sawyer Pond Trail.

Based on 20 foot road width.

3.5n Background for Stream Crossings

Sediment can be mobilized and enter a stream at stream crossings. This may occur if surface runoff is allowed to channelize before reaching a stream or stream buffer (filter). (Farrish et al, 1993). When combined with mitigations such as temporary stream structures to protect the channel, drainage structures, and sediment control where needed, the overall integrity of the stream is protected. Designated crossings are the only sites that may require restoration after proposed activities are

complete. Restoration is often successful due to the quick revegetation ability in this area. Designated crossings would have drainage control where needed to prevent runoff directly into a stream. Silt fences may be used to prevent sediment from running off disturbed sites into streams. Crossing sites would be reshaped and stabilized if needed. In this way, impacts related to stream crossings would be minimized. Most studies show that best management practices (BMPs) are very effective at reducing or eliminating the transport of sediments into watercourses (as summarized by Stafford, et al, 1996).

The temporary stream crossing (existing truck road) at Carrigain Brook has a risk of exposing mineral soil during construction of the temporary bridge. There are few opportunities at stream crossings to divert road drainage. It is likely that some sediment mobilized on this portion of the road would end up in the overflow channels. To mitigate this potential, road construction and drainage design at stream crossings would include appropriate mitigations. The temporary bridge over Carrigain Brook would be placed outside the existing streambank and would not disturb the stream banks. Sediment and erosion control features would be used during construction.

3.5o Cumulative Effects Area Identification

The cumulative effects area (CEA) for water resources is the analysis watershed and includes the upper Saco River watershed above the project watershed since this flow merges into the project watersheds. This scale is used to assess cumulative effects across a larger landscape.

This scale watershed was selected because the effects of multiple uses within a watershed could become additive and result in cumulative effects. As water flows downstream, pollutants mobilized into the watershed, changes in water yield and chemistry related to activities and uses merge with other waters within the watershed. This scale is large enough to integrate processes within the watershed and predict effects.

3.5p Cumulative Effects on Water Quality, Water Quantity, Condition of Streams, Riparian areas, and Floodplains

Past and present activities in the watershed that add to cumulative effects include recreation activities such as hiking trails, use at one shelter, road maintenance and road use, and most importantly, State Highway 302 road widening. Future activities would potentially include this proposed action, completion of the Highway 302 widening, any additional activity on private lands, and continued recreation use.

In each of the subwatersheds, less than 25% of the existing basal area is proposed for removal under any of the action alternatives. Due to the limited nature of timber practices and the use of BMPs no measurable increases are present in the watershed from any past timber harvest treatments. Units in current proposed actions may increase water yield in some smaller localized watersheds, although in Sawyer River or the upper Saco River these additions to water yield would not be measurable. This is because far less than 25% of the basal area in these larger watersheds is proposed for removal in all action alternatives.

Only 2.8% of the analysis watershed area is being treated under the maximum treatment alternative. In addition, to protect against cumulative effects on water quantity from generation of additional runoff, the

Forest Plan includes a standard and guideline that limits the amount of clear cutting in a 1,000 acre or larger watershed to 25 percent within a ten year period (LRMP p. III-17). None of the alternatives would approach the 25% limit for clearcuts in any of the analysis watersheds.

Roads are likely contributing to some changes in the routing of water and sediment transport processes where present. This effect increases with proximity to stream and/or degree of slope. Past, present, and future road activities are expected to continue in much the same way as present. Road density in the watershed is very low. Road reconstruction and road relocation proposed in the action alternatives would result in the greatest direct and cumulative effect. Limited sediment transport into Sawyer River or into Saco River could result from this new construction. Alternatives 2 and 4 also have potential to result in sediment into the Carrigain Brook by installing/removal of a temporary bridge.

The greatest potential cumulative effect to the Saco River is from the State Highway 302 reconstruction activities. The activities take place on a two mile section of highway at and below Stony Brook and include road straightening, widening, and repaving, placement of new culverts, and bridge improvement at Stony Brook Bridge. Some trees have been removed to allow for the widening and straightening, and some ledge (including Sawyer Rock) has been removed. Geotech fabric and other erosion control measures are in place. These activities are ongoing, and are expected to conclude in the fall of 2003.

Project mitigations are expected to be effective based on previous experience on the White Mountain National Forest. The combination of mitigations, project design, and soil and water conservation practices would prevent measurable cumulative effects from occurring. These measures and project designs have been monitored and modified through the years to best address these activities and their related effects on the White Mountain National Forest.

Future recreation activities in Sawyer River and Saco River watersheds are expected to remain constant. Recreation use in this watershed is largely limited to along trails, streams, and shelter. Numerous trails are located within the Sawyer River watershed with as much as a third (1/3) of these trails are adjacent to the Sawyer River. These trails and backcountry camping sites within riparian areas may be contributing to increased sediment loads into streams at localized areas. There is no evidence of sedimentation above naturally occurring levels and no observable cumulative impacts.

There would be a low risk of cumulative effects on water quality, water quantity, the condition of streams, riparian areas, and floodplains in Sawyer and upper Saco Rivers from the Proposed Action in combination with other ongoing activities within the analysis area, including the activities on State Highway 302. This is because the proposed action and alternatives would create a small amount of new disturbance. This action, properly mitigated to avoid unnecessary effects, in conjunction with these other actions, would not exceed State water quality standards individually or cumulatively within Sawyer River or Saco River drainages.

Figure 9

3.6 Soils

Affected Environment – Soils

The County Line analysis area has soils common to the White Mountain National Forest. At elevations generally below 2,500 feet, the soil is mainly deep, well- and moderately-well drained, sandy loam tills on 10-25% slopes. These soils correspond to the areas of “suitable” land base where planned timber management is allowed on the Forest MA 2.1 and 3.1 lands. All of the County Line Project proposed activities are in this zone. All soils other than those where there are all-season roads are under a closed forest canopy that intercepts rainfall and prevents initiation of soil erosion. While there have been no harvests since 1985, all previous harvest areas are completely regenerated to a new stand of trees (Alimi 2003). Skid trails are covered with leaves, and in many cases, the forest is regenerating. A review of sale folders does not indicate any soil erosion issues with previous sales (Alimi 2003).

On the Forest, soil hazards that may occur include dry debris slides, deep soil slumps, and surface soil erosion. In County Line analysis area dry debris slides are not a risk, because the ecological land type with very steep slopes and thin, gravelly soil where these may occur does not exist here. Deep soil slumps occur on very steep banks along major rivers and streams where there is poorly graded, very fine sandy-loam that has slight plasticity. These “break land” ecological types also do not occur in the affected sub-watersheds. Therefore, surface soil erosion and compaction are the possible impacts of interest for this proposed project. The surface soil erosion hazard rating for the specific areas proposed for harvest is mostly moderate (LRMP at VII-F-3, ELT 105), though there is there is a small amount of high (ELT 115G) and low (ELT 11). The soil compaction hazard is mainly moderate (LRMP at VII-F-3).

Roads, skid roads and log landings are the main concern for soil erosion because they expose bare mineral soil that may erode (Patric, 1976). The mere act of cutting trees is not a source of soil erosion, because it does not expose mineral soil (Hornbeck). The soil erosion risk is greatest when a road is originally constructed (Stone).

Much of the permanent road system in this vicinity is already in place. This includes Sawyer River Road, and Forest Roads 85, 86, 86A, 34A, 34B, and 513. These are well-maintained roads that are not showing evidence of accelerated soil erosion (ruts, channels), though surface or sheet erosion sometimes occurs at specific locations. Skid trails and log landings from use prior to 1985 are mostly leaf covered and are not showing signs of accelerated soil erosion.

Skid roads and log landings are the main concern for soil compaction. Permanent truck roads are not a concern because these are not considered part of the “suitable land base”, meaning they need not be returned to a forested condition. Log landings and skid trails from previous harvests are often still visible, and often return to softwood forest, although available evidence indicates that freeze and thaw cycles loosen the soil, and that sufficient oxygen is available to support plant growth in 2-3 years (Donnelly and Shane 1991). Many log landings across the Forest are re-vegetated successfully. In general, over snow hauling can reduce soil compaction (Lull 1959).

In summary, limited evidence of soil erosion in this vicinity supports research findings that soil erosion and sedimentation at managed forestry operations can be controlled with timely application of standards the guidelines (Martin et al). This is consistent with other findings about soil erosion in Eastern Forests, where it is reported that forestland can be managed so there is little or no increase in soil erosion (Patric).

3.6a No Action Alternative 1

The No Action alternative would not change the existing rate of soil erosion that is attributed to normal geologic rates within the analysis area. While maintenance of Forest Roads, including grading and culvert cleaning disturbs the soil surface, and therefore may briefly increase susceptibility of disturbed areas to soil erosion, experience here and elsewhere indicates the impacts are minor, remain on-site, and do not lead to indirect soil erosion of surrounding or downslope areas.

Surface soil erosion under the No Action alternative would not change on Forest Roads 34, 34A, 34B, 85, 86A and 513. It would continue at a low rate similar to that which already occurs. As has been the case in the past, it may be slightly greater immediately after annual road grading done for maintenance purposes. Forest Roads 34, 34A, 34B, 85, 86A and 514 would continue to experience minor, site-specific, localized, surface soil erosion.

Accelerated soil erosion is not likely to occur. These roads were built or are managed according to the standards and guidelines of the 1986 Forest Plan, which were designed to minimize soil erosion. These practices have been used effectively since the early 1970s. Permanent soil compaction exists on these road locations, as anticipated in the 1986 Forest Plan FEIS. Skid roads associated with previous timber sales in this watershed are generally overgrown and/or covered with leaf litter, thus minimizing the impact of raindrop splash, which can be a precursor to soil erosion.

Widening of U.S. Route 302 is occurring immediately downstream from Sawyer River Road, and for a few miles to the east. Some tree cutting has occurred and mineral soil has been exposed in a narrow strip along the existing road. Mitigation measures are being applied, as necessary. Only site-specific sheet erosion is anticipated, especially given the gentle terrain and mitigation measures.

3.6b Alternative 2 - Proposed Action

Reconstruction of one mile of Forest Road 85, 1.4 miles of Forest Road 513, 0.74 miles of access road to units 1 and 2 and 0.2 miles of Forest Road 34B would re-expose mineral soil. However, well-maintained ditches and culverts on properly designed roads with environmentally safe outlets for surface water would minimize effects to soils because the volume and discharge of water would not be likely to initiate accelerated soil erosion. As noted previously, prior use of these roads for timber management purposes has not created soil erosion issues.

Short, temporary roads into units 28 and 40 would potentially expose mineral soils, although because these soils are well drained and the terrain is gentle, only sheet erosion would likely occur. Any sheet erosion that does occur is expected to be of limited duration and magnitude.

Trucking on permanent roads where harvest is limited to winter would lead to little rutting, and only minor sheet erosion because the ground is frozen. Trucking during the summer and fall may result in rutting and sheet erosion, however, proper road drainage would limit effects to similar conditions as is present now. Trucking on temporary roads may also lead to sheet erosion; however, the short distances and gentle terrain on well-drained soil would limit the magnitude and duration of impacts. Soil compaction would occur on these temporary roads, although the impacts are limited to a 2-3 year period. Re-vegetation on these temporary roads is expected to occur, especially since these roads are not left

open for public vehicle use.

Skidding would affect an estimated 573 acres, all within the slope guidelines of the 1986 Forest Plan. Of this only 153 acres are clearcut units. The remaining acres of harvest are varying combinations of summer, fall and winter activity. The majority of soils in this area have moderate soil erosion hazard (LRMP VII-F-3). Mineral soil would likely be exposed on portions of the main skid roads. Sheet erosion would likely occur on these main skid roads, especially where there are short, steeper grades. Secondary skid trails throughout harvest units that are used only a few times would generally not experience exposure of mineral soil. Mineral soil may be exposed on 8-18% of the surface area (Martin 1988). The erosion hazard rating for the applicable soils appears in the 1986 Forest Plan (VII-F-3). The effects on soils for this proposed activity are consistent with those estimated in the 1986 Forest Plan FEIS (IV-30-32).

Log landings are not considered a significant source of soil erosion, because small size on generally flat terrain and well-drained soils away from streams limits the hazard (CFRU Information Report 38). In Alternative 2, 9 previously used landings and 4 new landings would be used. This amounts to about 2 additional acres in landing status. While there can be substantial churning of the exposed mineral soil, especially with summer and fall harvesting, their small size, careful location and consideration of surface drainage patterns limits the possible magnitude of soil erosion to on-site re-distribution of soil. All landings are re-shaped after use, and stabilized with seed, fertilizer and lime, if needed, to prevent erosion after the sale is closed.

There are no significant soil hazards associated with this alternative such as potential for deep soil slumps or proposed activities on unusually steep slopes.

Old skid trails in the analysis area do not show evidence of soil erosion, or direct or indirect contribution of sediment to local tributaries or brooks. Previous harvesting in this vicinity does not show evidence of-site specific erosion that would be of concern locally or that would cause cumulative soil erosion impacts. However, there is some possibility that minor amounts of sheet erosion may occur and cause short term indirect impacts where road reconstruction activities are planned. These impacts would be of short duration and magnitude.

Cumulative impacts of road reconstruction, road relocation, skid trails and harvest treatments are expected to be relatively small, of short duration, and generally restricted to the roads or main skid trails. Erosion control mitigations and project design on these well drained till soils should essentially mitigate impacts to well within the scope of those anticipated in the Forest Plan.

3.6c Alternative 3

The kind and intensity of soil erosion and compaction effects would be the same as Alternative 2 although the magnitude would be substantially less because fewer acres are treated and 1.74 miles of road is not reconstructed. The proposed bridge improvement and other proposed recreation projects are similar to those proposed in Alternative 2. Fewer acres treated, only 36 acres proposed for clearcutting, and less miles of road reconstruction would further reduce the potential for short term effects such as localized sheet erosion under this alternative. This alternative eliminates road reconstruction on two of three proposed roads. These are in the upper Sawyer River area. While experience here and elsewhere on the Forest has not revealed soil erosion or compaction as being a substantial impact, under this

alternative, not re-exposing mineral soil on those areas would reduce the occurrence of soil erosion.

There are no significant soil hazards associated with this alternative such as potential for deep soil slumps or proposed activities on unusually steep slopes.

Cumulative soil effects from re-construction of Route 302 are the same as in Alternative 2 and 4. Cumulative impacts of road reconstruction, road relocation, skid trails and harvest treatments are expected to be relatively small, of short duration, and generally restricted to the roads or main skid trails. Erosion control mitigations and project design on these well drained till soils should essentially mitigate impacts to well within the scope of those anticipated in the Forest Plan.

The potential impacts to soils and direct or indirect erosion from harvest activities, road system reconstruction, and skid trails under this alternative is less than Alternative 2 and 4 because activities above Whiteface brook are deferred. Only 36 acres are proposed for clearcut under this alternative. For those specific units and roads included in this alternative, (units 21-42) the direct, indirect and cumulative impacts are essentially the same as those in Alternatives 2 and 4 in these same areas. Overall, the potential effects of this alternative on soils are likely to be lower in intensity, magnitude and duration than in Alternatives 2 and 4 because fewer acres would be impacted.

3.6d Alternative 4

The direct, indirect and cumulative impacts of this alternative related to roads, skid trails and harvesting are essentially the same as in Alternative 2. However, there are only 51 acres proposed for clearcutting. The proposed bridge improvement and other proposed recreation projects are very similar to those proposed in Alternative 2. Short term, localized effects and cumulative effects from main skid trails and road reconstruction (Forest Road 513) would be about the same as under Alternative 2. No anticipated effects are expected from the bridge improvement and proposed recreation projects due to the nature of these projects, and due to project design and proposed mitigations designed to limit on site erosion.

This alternative excludes harvest within units 5 and 7, which are on hardpan soils. These soils have higher soil erosion and compaction characteristics than soils in the majority of the sale. This alternative treats fewer acres than alternative 2, although more than alternative 3. However, on site evidence in this vicinity does not indicate soil erosion issues with harvest activity are present. Project design and mitigations would reduce the direct, indirect and cumulative impacts of this alternative to levels of intensity, magnitude and duration well within the scope of those anticipated in the Forest Plan

The cumulative impacts of re-construction of Route 302 would be the same as other alternatives. Cumulative impacts of road reconstruction, road relocation, skid trails and harvest treatments are expected to be relatively small, of short duration, and generally restricted to the roads or main skid trails. Erosion control mitigations and project design on these well drained till soils should essentially mitigate impacts to well within the scope of those anticipated in the Forest Plan.

3.6e Cumulative Effects - Soil

The sub-watersheds analyzed for soil erosion cumulative impacts include those sub-watersheds that have

harvest or road building activities planned. This area was analyzed because most soil erosion is site-specific on the generally deep, well-drained soils found in Eastern Forests (Patric). Past activities include timber sales, and their associated skidding and harvesting. There has been little harvesting or road reconstruction in the last twenty years within the analysis area. The last timber sale in the analysis area began in the early 1980s and was closed in 1985. This sale occurred in the upper Sawyer sub-watershed, near where units 12 and 15 are located. Other sub-watersheds included in the analysis had not received harvest treatments since the late 1970's.

There have been two road related projects within the analysis area. They are the recent road reconstruction of Route 302 by the New Hampshire Department of Transportation and the repair of a 200 foot section of Sawyer River Road (FR 34) that slid out in the late 1990's. The slide closed Forest Road for two years until it could be rebuilt. No other future timber sales (or recreation projects) are planned on Federal lands at this time other than this project.

3.6f Cumulative Effects - No Action

Sheet soil erosion has occurred from all the above-mentioned activities, because there is always a period before soils are stabilized when it may erode. As mentioned earlier, roads are the main concern. It is well known that the soil erosion impact is greatest during the first twelve months after a road is built (Stone). There was one channel erosion event on the Sawyer River Road that occur during an extreme weather event; however, beyond this, there is no on-site evidence based on field inspection that accelerated soil erosion from all sources has occurred or is occurring. This is because the roads and skid trails are properly designed, located, and maintained for use. The Sawyer River Road is repaired, and the erosion has been arrested.

In addition, field inspection reveals that all previous harvest areas have re-vegetated to a thrifty forest, including those locations that were clear-cut harvest. Skid trails are leaf covered, the forest canopy has overgrown the skid trails, and they do not show evidence of chronic soil erosion, such as erosion channel development. Overall, therefore, the cumulative soil erosion impact is short-term sheet erosion at limited locations that has occurred when mineral soil was exposed during earlier actions.

3.6g Cumulative Effects - Alternative 2

The alternative adds to the cumulative effects described for No Action. Roads and skid roads, especially, would experience some renewed sheet erosion. Alternative 2 presents no significant change in the magnitude, duration or intensity of activity that might lead to surpassing some threshold leading to greater soil erosion, especially a shift from sheet to accelerated erosion. No extraordinary soil conditions occur at the sites of additional activity in this Alternative. The density of permanent and temporary roads is remains low. Re-construction of Route 302 includes progressively stabilizing soils as work proceeds. As in Alternative 1, sheet erosion may occur on permanent, all season roads, when they are maintained. It may also occur on temporary roads, skid trails and log landings. Therefore, soil erosion would be limited when best management practices are applied. The potential for soil erosion is greater than Alternative 1, but well within the scope of those anticipated in the 1986 Forest Plan FEIS.

3.6h Cumulative Effects - Alternative 3

Cumulative impacts under this alternative are also similar to Alternative 1, but potentially substantially

smaller than Alternative 2. Alternative 3 does not in itself or cumulatively with past, present and potential future activities present a magnitude, duration or intensity of effects that might lead to greater soil erosion, or especially to a shift from sheet erosion to accelerated erosion. No extraordinary soil conditions occur at sites where activities are proposed in this Alternative. The density of permanent and temporary roads would remain low. Many of the formerly used roads and landings are not re-opened. Re-construction of Route 302 includes progressively stabilizing soils as work proceeds. As mineral soils are exposed, they are stabilized with mulch, and re-vegetated.

As in Alternative 2, sheet erosion may occur on permanent, all season roads when they are maintained. Sheet erosion may also occur on temporary roads, skid trails and log landings for short periods following their use. Hence, cumulative effects from past activities are nearly negligible. Therefore, soil erosion would be limited when best management practices are applied. The potential for soil erosion is smaller than Alternative 2.

3.6i Cumulative Effects - Alternative 4

The cumulative impacts of Alternative 4 are similar to Alternative 2 because the permanent roads restored, and used, and the temporary roads opened and used, and the number of log landings, is essentially the same. It is primarily the reduced acres of clear-cut harvest and the associated skid roads that reduces the project specific and cumulative impact.

3.7 Soil Calcium

Issue:

- Some people are concerned that logging may cause loss of calcium in forest soils and reduce soil productivity.

Soil Calcium – Background and Affected Environment

Research at Hubbard Brook Experimental Forest on the White Mountain National Forest have included studies about soil calcium loss from atmospheric deposition and timber harvest (Federer 1989). The concern is possible long-term effects on forest productivity, health and composition. Results show there is reason for concern when short rotation forestry is practiced, meaning clear-cut harvest at 40-year intervals, especially when whole-tree harvest is applied. Whole-tree harvest means that the treetops and upper limbs are removed from the forest along with the tree boles. Thus the Forest Plan requires a higher standard when whole-tree harvest is planned.

For this calcium depletion analysis, the distinction between even-aged (clear-cutting, seed tree) and other practices (single tree selection, shelterwood, thinning, group selection) is based on differences in the magnitude of effects. Clear-cut and seed tree have a greater short-term effect on soil calcium loss because more biomass is removed from the site and harvest-induced leaching occurs when this intensity of harvest occurs. Studies show however, that very long-term uneven-aged harvest can have greater effects on soil calcium loss (Adams et al 2000) because more biomass may be removed from the forest over time.

Site-specific soil impacts related to soil or forest productivity are not likely to extend beyond the actual harvest activity area. The time span for this analysis is from early harvesting at the beginning of the 20th century to the reasonably near future, as estimated by others (Likens et al 1996). Early harvesting is considered because land use history affects soil nutrients, including calcium. Future harvesting and atmospheric deposition are considered for the same reason.

Based on research at Hubbard Brook it is estimated that 2.1% of the total soil calcium may have been lost since 1950 when acid rain began in earnest (Fay 2003). This estimate is a re-calculation of original work done at Hubbard Brook that applies new information, especially better information on mineral weathering inputs, to the calcium budget (Likens et al 1998).

Historic records indicate that portions of the County Line sale area were harvested in the early 1900's (Goodale 1999). The kind of harvest is not certain, e.g. clear-cut vs. selection, because the area is only characterized as "second growth forest. However, historical records indicate it was selective harvest (Belcher 1980). Bole-only selective harvest on northern hardwood deep till soil is estimated to deplete approximately 0.8% of the total calcium supply (Fay 2003). It is reasonable to expect at least ten more years of acid deposition is likely to occur within this cumulative effects analysis period, leading to an estimated 0.3% loss. The total cumulative impact on all sites previously harvested therefore, is estimated at 3.2% of the total calcium supply currently otherwise available to those soils.

Some researchers believe there may be a larger pool of soil calcium than was applied in earlier studies. If so, then estimated calcium loss may be smaller than estimated in this analysis. The unaccounted for source is calcium-oxalate, and is known to occur in trees and forest soil organic matter.

Research findings indicate the 1970 Clean Air Act and its 1990 Amendment are altering the impacts of acid deposition (Likens et al 1996). Less acid anions are being deposited through atmospheric deposition. While the consequences of this are not yet appearing as an improvement in stream acid neutralizing capacity (ANC), it is reported that in the long term, stream chemistry recovery would probably occur. Even with an uncertain timeline, continued rates of depletion as estimated by Federer (1989) are not likely in the long term. A gradual improvement is expected.

Soils at County Line are deep and moderately or well drained. The proposed treatment areas do not include soils shallow to ledge where soil mass or nutrient supply is a concern. Research guidance recommends no whole-tree harvest under these conditions (Pierce et al 1993). No whole tree harvesting is proposed for this project. Northern hardwood stands on the White Mountain National Forest are managed on a 120-year rotation length, significantly longer than the 40-year rotation visualized by Federer (1989).

In general, soil calcium concentrations in this southeast portion of the Forest are low as compared to other richer soils in the northwestern part of the forest (Bailey 2003). However, long-term forest measurements at nearby Bartlett Experimental Forest do not indicate a change in forest biomass accumulation (growth) since measurements have been taken in 1934 (Neugenkapien 1998). This includes many sites that have been harvested over the years, including harvest early in the century. A summary of other measurements in this vicinity, including bole-only, whole-tree harvest, and clear-cutting, do not indicate biomass accumulation has been impacted (Fay et al 1997).

Sixty years of measurement at Bartlett Experimental Forest do not indicate any changes in forest composition (Leak et al 1998). Some believe changes in soil nutrition could affect species composition. Forest health measurements made on WMNF as a part of a regional study indicate only minor branch dieback that might be attributed to soil calcium changes, in comparison to significant mortality shown in western Pennsylvania from calcium loss (Hallett et al 2001). Forty sites across all mineralogy of the WMNF where deep soil pits have been excavated to characterize soil chemistry, and mineral weathering rates, did not reveal any unusual mortality in these 60+-year-old northern hardwood forests (Fay 2003). Sugar maple is a species of concern with respect to soil calcium. All clear-cuts in this vicinity have successfully regenerated.

The general effects of timber harvest activity on soils can be found in the Forest Plan FEIS, pp. IV-30 through IV-32.

3.7a Effects on Soil Calcium - No Action

Under Alternative 1, harvesting is deferred on lands that are currently assigned as suitable timberland in the 1986 LRMP until some later time. Because no harvesting would occur, the current supply of soil calcium would be maintained on the 573 acres of northern hardwood forest that could be affected by this project. Continuing estimated losses attributable to acid deposition would occur, as would losses from past harvest activity. Existing soil calcium (base saturation) is available in these soils to buffer possible future impacts from acid rain or from proposed timber harvest. Research findings based on detailed modeling at Hubbard Brook indicate that a hysteresis pattern exists for soil calcium, meaning that soil calcium recovery from past harvest and acid deposition is possible over time.

Because no harvesting would occur under Alternative 1, the present buffering capacity of the soil is likely to persist. Indirectly, this can help minimize potentially cumulative impacts to forest productivity, species composition, and health that may result from future timber harvest or acid deposition. Based on current research and monitoring these forest conditions would likely remain unchanged (WM Monitoring Report 2000, pp. 43-50). The only evidence of negative indirect effects in northern hardwoods shown at “sugar maple decline study sites” located on the Forest is limited dieback of branches (Hallett, 2000). Species other than sugar maple are not showing evidence of decline. Sugar maple is of special interest because it is a calcium demanding species.

3.7b Effects on Soil Calcium - Alternatives 2

No whole-tree harvest is proposed in this project. Clear-cut and seed tree harvest lead to an estimated 3.2% loss of soil calcium from a single entry, bole-only harvest in northern hardwood forest (Fay 2003). Single-tree selection, thinning and group selection harvest leads to an estimated <1% loss of soil calcium from a single entry, bole-only harvest in northern hardwood forest (Fay 2003). The percent estimated losses come from earlier calculations (Fay 2003), which are based on recent calcium budget information (Likens et al 1998). Differences among alternatives relate to the proportions of these two categories of harvest, and the acres harvested.

The acres of harvest by method and alternative are shown in Table 21. The separation is shown in the same categories, as described above.

Table 21: Acres of Northern Hardwood Treated by Harvest Method(s)

Harvest Method	Alternative 1 (Acres)	Alternative 2 (Acres)	Alternative 3 (Acres)	Alternative 4 (Acres)
Clear or Seed Tree Cut	0	153	36	51
Other Rx	0	420	268	404
Total acres	0	573	304	455

Environmental factors that may affect calcium depletion include atmospheric deposition and timber harvest. The overall consequences of harvesting activities in Alternatives 2-4 would be to lower the buffering capacity of the soil.

The direct effects of timber harvest proposed for each alternative can be calculated by applying the percent of estimated calcium loss by harvest method (e.g. Clear-cut and Seed Tree cut, or Other Methods) to the acres proposed for each Alternative.

Table 22: Estimated Calcium Loss (within units to be treated) by Alternative.

Alternatives	Clear-cut or Seed Tree (1)	Other Methods (2)+
1	None	None
2	3.2 % on 153 acres	<1 % on 420 acres
3	3.2 % on 36 acres	<1 % on 268 acres
4	51 acres	<1 % on 404 acres

+ For column 2, a factor of 1 percent was used in the calculation, even though this is higher than the < 1 % figure the formula assumes.

Potential indirect effects of timber harvesting are effects on forest productivity. The Forest Service has a responsibility to maintain long-term productivity of the National Forest. Measurement of northern hardwood permanent forest plots at Bartlett Experimental Forest and at other sites across the White Mountain National Forest does not indicate a statistically distinguishable change in forest productivity due to human impacts, even including the impacts of acid deposition and timber harvest (Nuegenkapan, 1998). However, there is a continuing concern about the impacts of acid deposition on forest productivity and health, especially related to sugar maple (NAPAR 1998). Research on this topic continues in the Northeast. Other related studies are already summarized herein (Hallett 2000; Fay et al 1997; Adams 2000).

Stocking surveys of clear-cut harvest areas across the forest, including those areas in County Line analysis area, indicate clear-cuts successfully regenerate within three years of harvest (Alimi, 2003). Visits to “till source” study plots across a full range of calcium richness sites on the White Mountain National Forest did not reveal any qualitative evidence of changes in forest health on northern hardwood stands over sixty years old at low, mid and ridge-top positions. These stands and their soils are similar to those found in the County Line analysis area (Fay 2003).

3.7c Soil Calcium - Cumulative Effects

The cumulative effects analysis area for soil calcium includes only those 573 acres within Habitat Management Units 511, 512 and 513 where treatments are proposed. Outside of proposed units, the cumulative effects on soil calcium within this analysis area are the same for all alternatives, and are at baseline (3.2%). Cumulatively, ongoing natural and human caused cycling of calcium through the ecosystem occurs, and has been estimated by as shown in the formula below. To quantify this process, cumulative calcium loss due to human caused factors can be estimated from the following formula: Estimated Cumulative Effect equals 0.8% (land use history) + 2.1% (acid deposition up to 2001) + 0.3% (future acid deposition) + percent for the proposed harvest (derived from table 22). The first three figures represent the baseline percent for the analysis area under the No Action alternative. The cumulative percent for the No Action alternative therefore, is the baseline percent (3.2%). Units within action alternatives would be at baseline plus the estimated (3.2 or <1%) percent calcium loss associated with that unit’s treatment. Each alternatives effect is summarized in table 23.

Table 23: Estimated Cumulative Effects of Alternatives in Compartments treated

Alternative	Clear-cut or Seed Tree (1)	Other Methods (2)	Cumulative Effects within units
1	None	None	3.2% (baseline)
2	3.2 % on 153 acres	<1 % on 420 acres	6.4% on 153 acres 4.2% on 420 acres
3	3.2 % on 36 acres	<1 % on 268 acres	6.4%% on 36 acres 4.2% on 268 acres
4	3.2% on 51 acres	<1 % on 404 acres	6.4% on 51 acres 4.2% on 404 acres

The greatest site-specific cumulative effect on estimated soil calcium loss would occur with Alternative 2 because the greatest acres are clear-cut, and the most acres are harvested overall. The least impact is Alternative 3 because it has the fewest clear-cut acres and total acres harvested. Alternative 4 is intermediate in cumulative impact.

Given the long-term measurement of forest productivity at nearby Bartlett Experimental Forest, and the absence of any change in growth, despite a history of forest harvesting, plus the other evidence presented, it is estimated that changes in long term soil productivity are not occurring at a magnitude that would lead to changes in forest productivity, forest health or species composition at the County Line Sale Area.

Figure 10

3.8 Heritage Resources

Issue: *Effects of proposed harvest on local heritage resources such as the remains of the historical town of Livermore, Sawyer River CCC Camp, Cobb Cemetery, an old rock quarry, and old railroad grades.*

Affected Environment - Heritage Resources

Surveys for the County Line Analysis area were done under the names Tremont and Stony Brook. These are the original names of proposed actions that are incorporated into this proposed action. A cultural resource report for Tremont (1997), and another prepared for Stony Brook (2001) document the locations of heritage resources within the affected area. These reports can be viewed at the Saco Ranger District.

Many historic features such as cellar holes, stonewalls, and a mill foundation are present in the area where the historic town of Livermore once existed. Livermore is a former logging town built during the 1870's and abandoned in the 1930's. During this time the logging railroad was built and rebuilt on the north side of Sawyer River three times. The tracks crossed Sawyer River to the south side at the townsite and log-hauling tracks along with associated logging camps, known as "Little Canada", were on the south side of the river. A quarry south of Sawyer River and a few scattered logging artifacts on the hillsides around Livermore can be found.

Near the junction of Sawyer River Road and US Route 302 are the remains of the Sawyer River Civilian Conservation Corps (CCC) camp. A stone chimney remains. An area adjacent to the chimney has long been used as a parking lot for dispersed use, and is used for parking for winter use of Sawyer River road.

The Maine Central railroad existed where the existing railroad grade lies. Cobb homesite and cemetery are located just south of 4th Iron Campground along what was a wagon road. An additional cemetery and several homesites are located on adjacent private land north of this area.

Much of this area was logged during the late 1800's and early 1900's. Skid and haul roads were built to accommodate horse logging over short distances to main oxen-roads or to the railroad. Many of these old haul roads are still evident on the ground.

No known prehistoric sites have been identified in the analysis area.

3.8a Effects on Heritage Resources under all Alternatives

The analysis area was surveyed by a cultural resource Para-professional in 1997, 1998 and 2000.

The identified Heritage Resource sites are not within or adjacent to the proposed activity areas with three exceptions. A rock quarry is located within unit 31. This small quarry has not been used in several decades. It was associated with the historic town of Livermore. The quarry site would be avoided during skidding operations and would not be impacted by the partial harvest adjacent to it.

Hancock Notch trail passes through unit 13 and is on an old logging railroad grade. The trail would be avoided during skidding by placing a main skid road through another part of the unit separate from the hiking trail. Skid trail crossings would be used to minimize skidding on the hiking trail to the maximum extent possible given other resource considerations, such as avoiding wet areas or exceeding Forest Plan standards for skid trail density.

The third site within a treatment unit is Cobb Cemetery. Recommendations by the Forest Archeologist are to remove a few of the trees that have grown within and immediately adjacent to Cobb Cemetery, especially if they are leaning or have rot in the stem, to protect the headstones from the possibility of a tree falling on it. All of these known historic sites would be protected from disturbance and (except the activity mentioned above) avoided during harvest operations. Because these sites would be protected, there would be no direct effect to known heritage sites under any of the alternatives.

All other identified sites would be avoided as they are not in areas proposed for treatment. There are currently no National Register of Historic Places within the analysis area and none of the proposed activities would jeopardize any site from being considered in the future.

Any cultural resource that is exposed by or otherwise discovered during sale activities requires immediate cessation of operations and notification of the Forest Service. Cultural resource specialists would evaluate the site and recommend measures needed to protect it from disturbance.

3.8b Cumulative Effects on Heritage Resources under all Alternatives

Since no direct or indirect effects to heritage resources, and no prehistoric sites are known to be within or adjacent to proposed harvest units, no cumulative effects to cultural resources would occur under any of the alternatives.

3.9 Economics

Affected Environment - Economics

The analysis area is located in the Towns of Livermore and Harts Location in Carroll County, New Hampshire. From an economic and social standpoint the analysis area is closely connected to Bartlett, and receives use from local residents and from non-local visitors. Timber product industries, tourism, and recreation associated with the National Forest bring visitors, jobs, and generate economic activity.

Local business is heavily dependent on tourism that is drawn to the areas beauty and the opportunities to shop for goods and services. A wide variety of outdoor activities and supportive infra-structure for these activities has evolved including destination resorts, motels, hotels, restaurants, outlet shopping, supply stores, outfitter/guides, and rentals. A wide spectrum of services associated with these activities provide many jobs including jobs in forest management and recreation. National Forest lands are an integral part of the economic life of these communities, both as a destination point for outdoor recreational activities and as a scenic backdrop for private activities where views of the surrounding National Forest add to the quality of the experience.

Local employment includes jobs in retail, tourism and service, with a some in light manufacturing, building, road construction and forest industries. Forest Plan direction is to identify opportunities for

local communities to enhance self-sufficiency and a feeling of social well-being (Forest Plan, page III-28).

Regional and local economies rely to a degree on forest industries. Forest products jobs in the region north of the project are among the highest-paying jobs in that area. Local mills and forest product manufacturers from New Hampshire, Vermont and Maine have shown interest in recent sale offerings. Local and regional purchasers compete for timber from a variety of sources including private lands, state forests, and the White Mountain National Forest. Demand for timber products is reflected in timber sale bids, and indicates strong competition for timber, whether private or from public lands. Average bid prices for National Forest timber are comparable to those received on private land. National Forest sales sometimes include quality hardwood sawlogs that are difficult to find from private sales because private forest managers often convert trees to money soon after a stand becomes merchantable or when market prices peak. Providing volume from the White Mountain National Forest on a sustained basis stabilizes local markets, especially when prices are depressed. This has a beneficial effect by stabilizing communities that are dependant on mill jobs. Providing National Forest timber under this project would provide jobs in harvesting, manufacturing, and marketing and would likely provide payment of yield taxes and other taxes to the incorporated town of Harts Location and to the State of New Hampshire. Revenue from this project may also provide for on-site sale area improvement funds and revenue to the US Treasury.

For example, in 2001, a project on the Saco Ranger District bid for \$168.00 per thousand board feet (MBF) and would have generated approximately \$15,120.00 in taxes to local towns. That particular sale was not awarded due to a lawsuit. The alternatives for County Line Project might provide benefits as shown below.

3.9a Economic Effects - Project Costs and Benefits

The direct costs of planning, preparing, and administering timber sales are approximately equal to the revenues received by the Federal government for those products. In 1997 the WMNF received income for timber sold equal to about 90% of what it cost to operate the timber management program *and* to share in the costs of running the overall Forest [WMNF, 1997 TSPRS Report (Timber Sale Program Information Reporting System)]. In more recent years this figure has approached 100%. The following analysis shows the direct costs and benefits for this project; it does not incorporate overall WMNF Timber Program costs and benefits.

Congress directed the Forest Service to look at other factors besides making a profit when selling timber. The Forest Service considers the needs of wildlife habitat diversity, species viability, soils, water, and effects to the public. These mitigations frequently result in higher costs to prepare the timber for sale or lower revenues because of restrictions on logging practices.

Supply-and-demand estimates and long-term cost/benefit analyses are made at Regional Planning or Forest Plan level. This project is sensitive to cost efficiency, although the selected alternative may not be the least costly, have the highest dollar return, or produce the greatest timber volume output.

This proposed action follows Forest Plan direction to manage certain National Forest lands for multiple uses. It is planned and analyzed in response to, and in accordance with, National laws and policies, and Forest Plan direction.

The following discussion is a specific breakdown of cash flow for County Line Project. It is based solely on the estimated monetary transactions that are related directly to the Proposed Action. These transactions include the estimated costs of the project and the estimated revenue distributions to federal and local governments triggered through timber sale receipts.

Step 1 - Timber Selling Value, or Stumpage Value. All financial transactions begin with the selling value of the timber. This is the amount that the government can expect private parties to bid for the proposed timber sale. Selling value is established through competitive bidding. The selling value used for this analysis is \$168.00 per thousand board feet (MBF), which is the average stumpage value offered for the original Iron Maple Project bid (although was not awarded due to litigation). Estimated selling values are as follows:

Table 24: Estimated Stumpage Value

<u>Alternative</u>	<u>Volume</u>	<u>Value</u>
Alternative 1	Zero MBF	\$ Zero
Alternative 2	4,000 MBF	\$672,000
Alternative 3	1,500 MBF	\$252,000
Alternative 4	2,200 MBF	\$369,600

Step 2 - Yield or Severance Tax. A ten percent tax on timber selling value (Step 1, above) is levied by the towns in which the timber sale occurs. Yield taxes are collected directly from the timber sale purchaser and can be used for any purpose. They are not deducted from Federal revenues. However, it is reasonable to attribute the local tax revenue to this project. Timber sale bidders surely consider local tax obligations when bidding on federal timber. Yield tax revenues are as follows:

Table 25: Yield or Severance Tax

Alternative 1	\$ Zero
Alternative 2	\$67,200
Alternative 3	\$25,200
Alternative 4	\$36,960

Step 3 - Twenty-Five Percent Fund and Total Local Revenue. This fund was established by Congress in the Act of May 23, 1908 and amended in 2001. Twenty-five percent of all gross revenues on National Forest lands (including timber receipts from Step 1) are returned to the state for support of public schools and roads. The state distributes these funds to local governments whose jurisdictions include National Forest lands based on the amount of National Forest land in each local jurisdiction.

The modification of the act in 2001 gave the states an option on how these payments were calculated, based on a three year average or an annual basis. For purposes of this cost comparison we used 25% of the project selling values. The estimated yield tax, 25% fund and total local government revenues are as follows:

Table 26: Estimated Local Revenues

<u>Alternative</u>	<u>Yield Tax \$</u>	<u>25% Fund \$</u>	<u>Total Local Revenue</u>
Alternative 1	\$ Zero	\$ Zero	\$ Zero
Alternative 2	\$67,200	\$168,000	\$235,200
Alternative 3	\$25,200	\$63,000	\$88,200
Alternative 4	\$36,960	\$92,400	\$129,360

Step 4 - Net Federal Timber Sale Receipts. When twenty-five percent fund distributions to local communities (Step 3) are deducted from the selling value (Step 1) the difference is the net federal timber sale receipts. Notice again that yield taxes are levied against the timber sale purchaser, they are not deducted from federal receipts. Net Federal receipts are as follows:

Table 27: Estimated Net Federal Timber Sale Receipts

<u>Alternative</u>	<u>25% Fund</u>	<u>Net Receipts</u>
Alternative 1	\$ Zero	\$ Zero
Alternative 2	\$168,000	\$504,000
Alternative 3	\$63,000	\$189,000
Alternative 4	\$92,400	\$277,200

Step 5 - Project Planning, Preparation, and Contract Administration Costs. Funds have already been expended in support of this project including ongoing stand inventories (annual program), and on the preliminary design and the analysis documented in this Environmental Assessment. These expenditures are irreversible and cannot be recovered or changed by any of the choices among current project alternatives. Planning costs are \$120,000 based on an average cost of \$30.00 per MBF for a Proposed Action of 4,000 MBF. The same planning cost is incurred no matter which alternative is selected. If an "action" alternative is selected, the timber sale would be prepared on-the-ground for selling. Preparation work includes harvest area layout, tree marking, timber appraisal and contract preparation. Preparation work costs approximately \$20.00 per MBF. When timber sale contracts are awarded to a successful bidder, a sale administrator is assigned to the project. Administrators manage all aspects of the contract including logging operations and erosion control, with costs of approximately \$15.00 per thousand board feet. All costs are based on Fiscal Year 2003 budget information.

Table 28: Estimated Timber Project Costs

<u>Alternative</u>	<u>Plan</u>	<u>Prep</u>	<u>Admin</u>	<u>Total</u>
Alternative 1	\$120,000	\$ Zero	\$ Zero	\$120,000
Alternative 2	\$120,000	\$80,000	\$60,000	\$260,000
Alternative 3	\$120,000	\$30,000	\$22,500	\$172,500
Alternative 4	\$120,000	\$44,000	\$33,000	\$197,000

Step 6 - Net Federal Revenues. The total costs outlined in Step 5, above, for project planning, sale preparation, and contract administration can then be deducted from the net Federal receipts (Step 4) to yield the net Federal revenue. Net Federal revenues are as follows:

Table 29: Estimated Net Federal Revenues

<u>Alternative</u>	<u>Net Federal Receipts</u>	<u>Total Costs</u>	<u>Net Federal Revenue</u>
Alternative 1	\$ Zero	\$120,000	\$-120,000
Alternative 2	\$504,000	\$260,000	\$244,000
Alternative 3	\$189,000	\$172,500	\$16,500
Alternative 4	\$277,200	\$197,000	\$80,200

Step 7 - Total Public Revenue. The sum of all revenues to local and Federal government that originate directly from this project includes yield taxes and twenty-five percent fund distributions from Steps 2 and 3, and net Federal revenue from Step 6. Total public revenues are as follows:

Table 30: Estimated County Line Project Public Revenue

<u>Alternative</u>	<u>Total Local Revenue</u>	<u>Net Federal Revenue</u>	<u>Total Public Revenue</u>
Alternative 1	\$ Zero	\$ -120,000	\$ -120,000
Alternative 2	\$235,200	\$244,000	\$479,240
Alternative 3	\$88,200	\$16,500	\$104,700
Alternative 4	\$129,360	\$80,200	\$209,560

3.9b Effects on economics – Alternative 1

This alternative would not create jobs or generate revenue for local governments since no timber would be harvested. This alternative would not meet the goal of providing a sustained level of forest products. There would be no economic benefit realized by the US Treasury, the timber sale purchaser and employees, the town of Harts Location, Carroll County, or the State of New Hampshire. Total direct costs related to the cost of this environmental analysis are estimated to be \$120,000. Local governments would not receive the approximately \$235,200 in timber yield taxes and 25% Funds associated with Alternative 2.

3.9c Effects on economics – Alternative 2

This alternative would result in the availability of approximately 4,000 MBF of timber for harvesting, manufacturing, and marketing jobs. Given the numbers in the analysis above, this alternative might provide gross receipts to the US Treasury of \$244,000, and the 10% Timber Yield Tax and 25% fund would distribute about \$235,200 to the Town of Harts Location and to the State of New Hampshire.

3.9d Effects on economics – Alternative 3

This alternative would result in the availability of approximately 1,500 MBF of timber for harvesting, manufacturing, and marketing jobs. Given the numbers in the analysis above, this alternative might provide gross receipts to the US Treasury of \$16,500, and the 10% Timber Yield Tax and 25% fund would distribute about \$88,200 to the Town of Harts Location and to the State of New Hampshire.

3.9e Effects on economics – Alternative 4

This alternative would result in the availability of approximately 2,200 MBF of timber for harvesting, manufacturing, and marketing jobs. Given the numbers in the analysis above, this alternative might provide gross receipts to the US Treasury of \$80,200, and the 10% Timber Yield Tax and 25% fund would distribute about \$129,360 to the Town of Harts Location and to the State of New Hampshire.

3.9f Cumulative effects - economics

The cumulative effect of this proposed timber sale would result in providing a source of quality hardwood sawlogs and other forest products on a sustained basis. Whole tree logging is not proposed so increased revenues from potential bidders interested in chipping treetops and branches are forgone. Employment in harvesting, manufacturing, transportation, and support positions would contribute to maintaining local, state, and federal economies. Experience has indicated there is and would continue to be increased demand for timber produced from the National Forest in addition to timber harvested on private land.

Providing timber from the White Mountain National Forest does not adversely impact private timber landowners, reduce bid prices for private timber. There is no indication that White Mountain National Forest timber sales influence private landowners to harvest pulp versus sawtimber, nor to apply clearcut versus uneven age harvests on their lands. Sale offerings of National Forest timber have not been shown to influence overall market prices for any sector of sawtimber, veneer or pulp.

The annual timber accounting report for the White Mountain National Forest indicates that the timber sale program has a positive economic benefit locally and in terms of revenue to local, state and federal governments.



3.10 Exemplary Communities

An exemplary community typifies the qualities and processes of a specific ecological community of plants. NHNHI (New Hampshire Natural Heritage Inventory) surveyed the analysis area in 1996 and identified five exemplary communities within the analysis area. One exemplary community is a Boreal/transitional shrub bog near Sawyer River, one-quarter mile due west from Unit 9. Another is a mesic hardwood site on acidic bedrock or till that lies a quarter mile south of Unit 2 and would not be affected. Two locations in MA 6 lands well above proposed Units 21-24 were identified as containing sensitive species. The fifth location is a hemlock-beech-oak-pine rich community that lies partially within the south portion of Unit 28. This community does not require protection nor would the forest type or species components be altered during implementation of the single tree selection prescription.



Figure 11

3.11 Other Issues brought forward during public involvement that are resolved with project design including mitigations

Following CEQ § 1500.4(c)(d) the following issues are incorporated into discussions in Chapter 3 under the related resource. The issues listed in this section are limited in extent, duration, and intensity and were not used to generate an alternative. The first section discloses issues that can be resolved by project design including mitigations. The second section discusses Other Issues brought forward during public involvement that are resolved at a higher level, as listed under items 1, 2, 3, or 4 in section H of chapter 1.

Recreation

Public issues and agency concerns related to recreation are discussed below. Each is a separate issue and falls into one of the following categories.

- 1. *Providing safe access and safe use of travelways***
- 2. *Managing multiple uses in Sawyer River drainage***
- 3. *Maintaining the integrity of recreation facilities and recreation opportunities in the analysis area***
- 4. *Minimizing the impacts to recreation users during implementation***

3.11a □ *An agency concern is to provide safe access to the planning area for administration of the National Forest and for public recreation in Sawyer River drainage, in accordance with the White Mountain National Forest Plan.* Alternatives may include item 1, and do include items 2 and 3 of the following:

1. Restore approximately one mile of existing Forest Road 85, and place a temporary bridge over Carrigain Brook to access units 1-3.

This action is proposed under Alternatives 2 and 4 only. Vehicular access would be provided for the duration of a timber sale contract. When the contract is complete, the bridge would be pulled, and the road would be accessible only by foot or mountain bike. The road would not significantly change from its current condition once natural reseeding and brushing takes place.

2. *Replace the existing Whiteface Brook bridge deck (horizontal surface)*

Whiteface Brook Bridge structural integrity for use by heavy road-maintenance equipment and logging trucks is a concern. Although the bridge is capable of handling normal administrative and public traffic, in order to maintain the condition of the road for safe passage over time, it needs periodic maintenance. Road maintenance includes periodic grading and surface rocking using heavy gravel trucks. Loaded gravel trucks may exceed the safe structural capabilities of Whiteface Brook Bridge, which was built in the 1950s and has deteriorated with use. While there is an allowable mitigation for use of the bridge by logging trucks – to stop at the bridge approach and

then proceed slowly over the bridge, eventually this bridge would need to be brought up to standards for the road to be maintained for public use.

3. Reconstruct approximately 1.4 miles of Forest Road 513

Existing Forest Road 513 would be reconstructed under all action alternatives, and then returned to its current ‘closed’ condition following implementation. Closure means that the road would remain available for future use and would be closed to public motorized traffic. In a ‘closed’ condition, use is not likely to increase over that presently occurring. There is no evidence of current use except at a dispersed campsite that is occasionally used and is located on the 513 road about a quarter mile from Highway 302. Additional use resulting from opening this road, if any, would only be foot or mountain bike use. Road reconstruction would be in compliance with Forest Plan direction to manage for multiple use and sustained yield those lands identified as MA 2.1 and 3.1.

Implementation of these bridge and road reconstruction projects are part of the proposed action and alternatives because they facilitate accomplishment of actions designed to meet the “purpose and need”. Resolution of this agency concern occurs with the design of the proposed action, and to varying degrees, with the design of the alternatives to the proposed action. The anticipated direct and cumulative environmental effects of the proposed bridge and road reconstruction actions are discussed in the previous sections of Chapter 3. The presence of these roads would remain unchanged following implementation because these roads already exist. Access and use by hunters, bikers and hikers is expected to remain at low levels similar to existing conditions. Other than minor, short term, direct impacts in the immediate area where road and bridge improvements would occur, no changes in use and no use-associated increase in environmental impacts would occur under any of the action alternatives.

3.11b □ *Improvements to Sawyer River Road (roads, bridges and parking) would invite increased use and associated impacts in the Sawyer River area and especially the high use Sawyer Pond area.*

Improved parking at the snowmobile trailhead for Sawyer River Road may result in some increased motorized and non-motorized use. As one writer suggested, under Alternative 4, Fourth Iron Parking facility would be used if the need arises, rather than enlarge parking at the trailhead.

Needed bridge improvements, and maintenance of Sawyer River Road to its current design level, is not expected to increase the use of the Sawyer River area to a measurable degree. This project does not include a proposal to improve any other parking within Sawyer River drainage.

At the snowmobile trailhead, the total amount of parking area would not increase significantly under a redesign of that facility. An estimated additional two vehicles with trailers would be the increased capacity. The safety factor of having more room to maneuver vehicles with trailers may result in some small increase in use. No increase in use is expected during other seasons, as the parking lot is seldom used outside of snowmobile season.

Factors that influence snowmobile use levels in Sawyer River drainage include the condition of other trails in the general area. Sawyer River snowmobile route experienced increased use in the winter of 2002 because Bear Notch snowmobile route became too bumpy due to lack of snow and high use.

3.11c • *Winter use of Sawyer River Road by logging trucks would close this road to snowmobiling*

Use of Sawyer River Road in winter months by logging trucks would impact snow machine, skiing and snow shoeing opportunities. Closure of the Sawyer River Road to snowmobiling would temporarily eliminate this portion of trail from being used. Conflicting winter use has been mitigated in the past on other roads by requiring timber sale purchasers to plow one lane of a road and leave the other lane available for other users. The narrow width of Sawyer River Road, a single lane road with turnouts, precludes this option.

Summer and fall logging operations are allowed in many of the units. However, winter operations are allowed for all units, and are required for units 1-3 and 13. This requirement was placed on units 1-3 because FR 85 does not have a rocked surface, and putting rock on this road is not considered necessary. Unit 13 is winter logging only to minimize impacts to users on Hancock Notch Trail. Since winter logging is required on four units, and is an option for the remaining units, closure to snowmobile use would be needed. The duration of impact is affected by several factors including purchaser operating schedule; weather, and feasibility of plowing Sawyer River Road. It is likely that snowmobiling would be curtailed on FR 34 for at least part of or all of one winter.

There would be little impact to snowmobiling under alternative 3, since only units 21, 22 and 24 would come out Sawyer River Road, for a distance of a quarter mile on Forest Road 34. An alternative route would be likely for this short distance and enable snowmobiling to continue.

Snowmobiling on Rob Brook road and across the Meadow Brook trail system (Sawyer River Run trail) to the plowed portion of FR 34 would be allowed. At the point the plowed road is encountered, users would have to turn back. Signs would be placed at these areas informing the public of the closure. Therefore, while portions of the route may be used, users would not be able to ride through to Highway 302.

3.11d *Summer and fall use of Sawyer River Road by logging trucks may be a safety concern for mountain bikers and vehicle operators using Sawyer River Road*

This concern is related to the safety of forest users on Sawyer River Road. Logging operations would follow all federal, state and contractual requirements to insure the safety of other forest users and travelers on Sawyer River Road. A requirement to stop at Carrigain and possibly Whiteface brook bridges, before proceeding, is included in mitigations for this road. Appropriate signing along the road and at logging sites would be required under the sale contract. Log truck drivers are required under the sale contract to maintain safe speeds and follow other specific contract requirements, and can be shut down if violations occur.

Additional mitigations include placing appropriate safety signs along all Forest Roads and trails where activities are occurring to caution people about harvesting activities. Signs warning hikers would be placed at Sawyer Pond Trailhead and Signal Ridge Trailhead.

3.11e *Opening Forest Roads 513, 85, and 86 may encourage off road vehicle use and result in subsequent resource impacts unless these roads are properly closed following their use*

Several people are concerned that logging roads should be closed to subsequent motorized vehicular use following harvest activities due to the potential for resource damage. All roads to be used for this project would remain in their current status. Only Forest Road 34 is now and would remain open. Other roads (FR 85, 86, 513, and 34B) would remain closed. These roads are gated and closed year round, and would remain so.

3.11f *If road closures are not planned, use of the secondary roads and skid roads following sale activities for recreational motorized use would impact wildlife and other resources*

Forest roads that are currently closed to public vehicular use and that may be used in this action include FR 513, FR 85 , FR 86 and FR 34A. Management of these roads would not change following implementation of any of the alternatives. Each of these roads would be returned to their existing condition (closed) following completion of management activities. Motorized off road vehicle use on the White Mountain National Forest is prohibited. There would be no change in the opportunity for illegal use to occur following this action than there is currently.

3.11g *Units 21-24 must not intrude upon the Rare II boundary, as this would be a violation of law*

Units 21-24 do not intrude into the Rare II boundary. The Rare II boundary is located on 6.1 lands. This boundary is commensurate with the steep (inoperable) slope above the 2.1 and 3.1 lands where these units are located. These units remain on the operable ground within MA 2.1 and 3.1 lands.

3.11h *Winter logging should be proposed despite possible impacts on winter uses on Sawyer River Road because it is least impacting on natural resources.*

Summer or fall logging are considered where resource effects are determined to be acceptable or desirable. In some cases, summer logging may be desirable, such as when scarification of surface soil (duff) layers from skidding activities is beneficial. Scarification of soils fosters the establishment of sugar maple seedlings, which germinate and survive when in contact with mineral soil. Soil scarification provides sugar maple seedlings an opportunity to establish in regenerating young stands over competing birch, red maple, beech and other hardwood species that tend to dominate many sites. However, resource impacts to soils and damage to the residual stand are primary considerations. These considerations often limit summer harvesting to non-susceptible soils and to clearcut prescriptions where damage to the residual stand is not a concern.

3.11i *In order to provide more opportunities for mountain biking, leave drainage pipes in place and keep Forest Road 513 open following the sale*

Disperse camping currently occurs on or adjacent to Forest Road 513 within a quarter mile of Highway 302. However, there are no plans to keep Forest Road 513 open, or to increase dispersed recreation opportunities as part of the project. This public comment is in conflict with current direction for this area. Forest Plan direction, and project specific planning direct road management levels to remain at current levels following this project.

3.11j *Restoring the road into Units 1 and 2 would cause more resource damage and be more permanent than skidding, even though the distance is long for skidders*

The road distance from Forest Road 85 to the proposed landing for Units 1 and 2 is approximately 0.74 miles. Along with resources effects related to skidding these distances, the IDT considered the expense of a permanent road that would be less costly to move logs over versus skidding that distance. Considering the potential volume for this proposed action and therefore the number of trips with a skidder, the IDT agreed that a permanent access road (closed to public motorized use) would be best. The IDT evaluated this based on long term transportation system needs analysis for access to this area to meet vegetation management objectives.

3.11k *Improving sanitary facilities at Fourth Iron Campground is fine although increasing access for administration with a permanent road would invite additional resource impacts such as trampling by four wheelers that go around closures, and vandalism that accompanies such improvements*

An SST toilet under alternatives 2 and 3 would require improved access for pumping. Access to pump out the toilets would be upgraded a minimum amount to accommodate larger septic trucks.

Upgraded access under alternatives 2 and 3 would not likely increase resource impacts within Fourth Iron facility as it would be gated. However, upgraded access would be more evident, and may sustain some unauthorized use by the public. The road would remain closed to public use. Off road vehicle use or vandalism could occur now, although the current access road is not very noticeable.

Under Alternative 4, an improved composting toilet with no upgraded access would maintain the character of the area and eliminate the need for improving access for pumping (as in the SST Type). The existing temporary road that provides access to the compost toilets would continue to serve that purpose. An improved composting toilet would be more effective than the existing composting toilet and would be less costly than the SST type.

Public vehicular access to Fourth Iron Camping Area would not change from current conditions. The site would remain a walk in camp area. The existing character of Fourth Iron Campground is not expected to change due to improvements of the sanitation facility. No additional parking or tent sites are proposed, and are not anticipated in the future. Under all Alternatives access would be for administrative use only.

3.11l *Buffer zones along trails should maintain the integrity of these trails in order to minimize evidence of the activity*

Where removal of trees is proposed near trails (unit 13) and near high use areas (unit 28), skid road location and marking density would take into consideration the effects to recreation. Trees would be felled and removed in a direction away from the trail wherever possible. Skidding would not be on the trail location, except for crossings needed to avoid wet areas, reduce skid trail density, or to minimizing damage to residual trees.

3.11m *Nancy Pond Scenic Area should not be impacted by the proposed action as this would disturb the integrity of this Natural and Scenic area*

Nancy Pond Scenic Area is not near any of the proposed harvest treatments or access routes proposed under this action. Units 21, 22 and 24 are the nearest activities and lie ½ mile from the Nancy Pond trailhead and 1 ¼ miles from the Nancy Pond Scenic Area. Activities in these units would not change existing human or natural impacts to Nancy Pond Scenic Area.

3.11n *Harvest and road work could effect hunting and fishing opportunities in the area*

Throughout the 1950's to the 1980's abundant hunting was enjoyed in the Sawyer River drainage and in Rob Brook area. Much of the reason for this is because second growth forests reached merchantability and were thinned, salvaged and clearcut. These harvest activities resulted in abundant forage for game species and subsequent healthy populations of these species. Sport fishing in Sawyer River occurs primarily below the Sawyer Pond trailhead because the stream above has low flow, is narrow and is accessed only by foot.

Significantly less harvesting has occurred in Sawyer River drainage since the 1980's, and use of the area by hunters is in decline. However, the primary reason is that the game populations have declined with the decrease in harvesting. All of the action alternatives would increase the hunting opportunities in the area, although continued management would be necessary in subsequent decades to change the trend to increasing opportunity.

A small amount of fishing is known to occur in the lower portions of Sawyer River. The Saco River is stocked by the Fish and Game, although any stocked fish in Sawyer River would have migrated there. Fishing would only be affected by changes to water quality or stream characteristics, neither of which are expected to occur (see Fisheries and Water sections above).

3.11o Noise of logging would affect the visiting public unless done when use is lowest

Most public use in the planning area occurs during summer. Use numbers fall off dramatically after September. By late October, the few remaining visitors are hunters, and the occasional tourist. For this reason, many of the units are scheduled for fall and winter logging, when use is lowest.

The season of logging is designed to reduce potential conflicts with road and trail users. Summer logging for instance, is allowed only on clearcut units that are away from roads and trails. These are units 4 - 7 (Alternative 2 only), 14, 33, and 35-38. Unit 33 is the closest of these to high public use areas. Unit 33 is approximately 2000 feet from Fourth Iron parking lot and campground, across State Highway 302. Unit 13 is bisected by the Hancock Notch Trail, and is designated as winter logging only.

The majority of public use where noise from logging might be audible is along State Highway 302 and the first half mile of FR 34. The majority of use along this portion of Highway 302 is thru traffic. Other noises associated with vehical operation would likely obstruct logging equipment noise.

Public use on FR 34 is light in the fall and winter when logging would occur in unit 24. Unit 24 is the only unit that logging would be apparent from FR 34. Forest visitors walking up FR 86 past the gate at Sawyer Pond Trailhead, and those crossing Carrigan Brook on FR 85, would hear evidence of logging in close proximity to these roads, however these units (34

Some noise might be audible by those in Fourth Iron parking lot or campground, primarily from units in close proximity (Units 28, 32 and perhaps 40). These units are restricted to fall or winter logging when use in the campground and parking lot is low (fall) to none (winter). Fourth Iron parking lot is not plowed during the winter.

Snowmobile parking for the Sawyer River Trail is provided at the Junction of Sawyer River Road and State Highway 302, and receives moderate winter snowmobile use (averaging four vehicles per weekend day and half that on weekdays). Logging noise might be audible from Units 22, 24, and portions of 30 and 32 for those preparing to depart from this parking lot during the winter months. In addition, the snowmobile route passes near Units 1, 2, 8, 11 and 12, on Forest Road 86. These units are likely to be harvested in winter and may be audible to snowshoers and cross country skiers, and for which a conflict with road plowing might occur.

Part of Signal Ridge Trail is in close proximity to harvest Units 1 and 3. Units 1 and 3 require winter harvest only, because Forest Road 85 is not designed for wet season haul. There has been no evidence of winter use of Signal Ridge trail. This trail begins two miles from Sawyer River parking lot, the nearest access in winter.

Hancock Notch trail passes through Unit 13, about 6 miles from the Sawyer River parking lot, the nearest access in winter. This unit is winter logging only, to reduce the likelihood of conflict with recreation use, which is very low to non-existent in winter.

All units proposed for harvest along State Highway 302 are fall/winter harvest only. The other use adjacent to that segment of road is the Conway Scenic Railroad, which operates from July 1 to the end of October each year. Fall and winter logging activities would not interfere with visitor experience on the Scenic Railroad.

3.11p *Cumulative impacts from this sale combined with other sales in the WMNF may reduce the recreation opportunities*

This concern is related to the cumulative effect that vegetation management and maintained or improved road access may have on recreation opportunities. Cumulative effects considers past, present and possible future activities in the general vicinity of this project. For the purpose of analyzing cumulative effects of harvest activities on recreation, the Sawyer River drainage was considered.

The next foreseeable harvests in the analysis area depend on direction provided in Forest Plan revision. There is a strong likelihood that harvest activities would continue in portions of the Sawyer River area to a similar extent as has occurred in the recent past.

Harvest levels have been relatively low for the past twenty years. This project is the first action in Sawyer River drainage since the early 1980's. The analysis for this project does not indicate that any measurable impacts to recreation opportunities would occur under any of the action alternatives. There are no known or foreseeable future activities, timber or recreation that are planned for this area. Under the new Forest Plan, while harvesting would likely be allowed in this area, it would likely be ten to twenty years before another entry is proposed. Therefore, as forests and skid roads have re-grown following past activities, they would also re-grow from this action and from any potential future activities. Overall recreation opportunities would likely remain as they are now.

Vegetation Management Activities

3.11q *Because of the popularity of Fourth Iron campground, long-rotation management with retention of large diameter trees and winter-only harvesting in Unit 28 would reduce impacts to this facility.*

Winter only harvesting would protect the soils, and minimize disturbance of leaf litter layer. Long rotation management would enhance the size of the individual pine and other trees in the stand. However, several large diameter pine trees have been blown over in the recent two years. This is in part due to the high water table and shallow root systems. The blow downs show evidence that pine tree roots were restricted to the upper two feet of soil.

Unit 28 is proposed for uneven aged management. Uneven aged management is ideal for this site because there is a continuous stand of all ages through-out time. This prescription would provide a similar stand development that long rotation management would, with the exception of pine. Some of the taller pine would be removed. Large pine would likely be harvested so as not to lose them to wind events, and be unable to retrieve them. Unit 28 is proposed for fall or winter logging to avoid impacting the Campground and forest visitors during high use periods, and to minimize visibility

from Highway 302.

3.11r *Cumulative effects of other harvest proposals scheduled in or near the analysis area could have adverse resource impacts*

Potentially, a vegetation management project would occur in this planning area every ten years. However, no other harvest proposals are scheduled for this planning area in the foreseeable future. Soil and hydrologic cumulative impacts would occur if another entry were to occur within ten years. However, the cumulative effect resulting from this action with potential future actions would be analyzed at that time. As for the previous timber sales listed above, the direct and indirect effects to soil and water from those actions has largely been mitigated by natural healing properties that occur over time. All of the areas treated under these projects have regrown. The partial cut units are returning to their pre-treatment Basal Area, and the clearcuts have re-vegetated, depending on the age of the stand, into thriving young stands of between 10 to thirty feet in height with good stocking and continuous canopy cover. The current vegetation on these sites have achieved the ability to intercept and absorb water, contribute to nutrient cycling, provide wildlife habitat (albeit in transition yet to the same age and structure of the former stand) and to perform all the other functions that the previous timber stands performed.

3.11s *Whole tree harvesting could reduce soil calcium and organic material depth*

Whole tree harvesting means removing the whole tree to the landing where tree branches are chipped and removed as a forest product rather than being left at the stump. With this technique, tree branches that would otherwise remain on the forest floor and contribute to the organic matter, are removed as chips. Whole tree harvesting is prohibited on landtypes 111, 311, 411, 102c, 402c and 2. The majority of soils in this analysis area do not restrict whole tree harvesting. However, no whole tree harvesting is planned for this project.

3.11t *The windstorm of 1999 and the ice storm of 1998 should have caused creation of early successional habitat or forage in the analysis area and subsequent sprouting of understory trees and shrubs, creating ample wildlife browse.*

Wind storms and other natural disturbances alter existing conditions in forests. These disturbances can be described as beneficial in many instances, and may compel forest managers to adjust existing management plans or initiate new plans depending on the resources and values involved.

Damage to some tree crowns occurred in some of the hardwood stands within the analysis area from the ice storm of 1998. Most of the trees survived and have sprouted new branches. Many of these trees remain in a weakened condition and are susceptible to insect and disease.

Where tree crowns were moderately to heavily damaged, additional sunlight has been able to reach the forest floor. Understory beech and other shade tolerant species are able to capitalize on these openings. These understory species remain and thrive either naturally or under active management, unless removed from the stand during thinning treatments. The majority of stands to be treated with this project did not receive extensive crown damage or wind damage.

While some blowdown of individual trees is evident in some of the conifer stands, most of the stands to be treated are hardwood stands. There are no locations where conifer trees were blown down in 1999 where treatment is needed within this planning area. There are no blow down areas within this proposed action.

3.11u *Regeneration of created openings must be assured to prevent resource impacts*

Obtaining ample regeneration of harvested areas has not been a concern in the planning area. Evidence of ample regeneration can be found in all previous clearcut harvests in the Sawyer River area. Regeneration through natural seeding, through growth of established seedlings or sprouting of harvested trees is guaranteed. Recent survival exams in regenerated stands in the area, indicate that up to 10,000 individual stems per acre are typically well established by year three, and growing to a height of ten feet or more by year ten. Shade intolerant species including yellow and paper birch, aspen, red maple, striped maple and many others re-establish quickly. Nitrogen fixers including pin cherry and ribes (raspberry) species are also common and serve to replenish soils.

Units that are primarily mixedwood and conifer are not proposed for regeneration harvests. These stands receive single tree selection or thinning prescriptions to promote increased percentages of conifer in the stand, as was historically true of the White Mountains.

As for achieving regeneration of specific desired species on National Forest such as oak where existing oak stands are to be treated, or aspen where aspen is a component in a stand, these stand types are often achieved when additional treatments are prescribed. These treatments may include prescribed burning in oak stands to expose mineral soil for acorns and reduce competition from other species. This planning effort does not treat either of these stand types.

Northern hardwood stands to be treated in this project, would reseed quickly with natural regeneration. Species mix changes as the stands develop. Soil type and depth, water availability, elevation and aspect are primary environmental factors that determine stand succession and development. Stands proposed for even-age treatments (clearcut or thinning) are generally even-aged northern hardwood stands established following early 1900's harvests. Uneven aged stands are maintained in two aged or multi-age condition using single-tree selection prescriptions.

3.11v *Perform post sale monitoring to assure that contract requirements and mitigations are performed*

Post sale monitoring is important to review the implementation of the selected alternative, continue to improve forest management practices and planning, and to document post sale development of the treated areas. Monitoring of the logging operation is performed by the sale administrator on a near-daily basis. The Saco Ranger District plans several monitoring trips each year. Monitoring information is used to avoid problems in the future and to support continued use of proven mitigations.

3.11w *Minimize damage to the residual stand, roots and soil in order to sustain productive forests.*

The type of equipment used, season of harvest, harvest method, and operator skill influence the effects to the residual stand and soils. Contract administration includes frequent contacts with the logger, designated skid trails, and other contractual requirements that limit the amount of soil that is disturbed and damage to the residual stand. Winter logging reduces damage to root systems and soil disturbance on main skid trails, and is required on several of the units. Winter or fall/winter logging is required in some units to minimize the impacts to recreation. See the soils report above for more information on soil effects, and the mitigation measures in Chapter 2 for a list of harvest

requirements designed to minimize impacts to residual stand. Note that the season of operations is limited to fall and winter in all partial harvest units for this purpose. It is designed to prevent harvest and skidding prior to the bark tightening up on residual trees. Summer harvest is allowed in clearcuts because residual trees is not a factor within the units where activities take place.

3.11x *The proposed action does not propose enough cutting to meet the goals of the Forest Plan, especially clearcutting and creating new regenerating stands of over ten acres. This would continue to cause a decrease in the game populations in the area.*

Forest Plan goals include managing habitat for wildlife species by providing the necessary habitat diversity to maintain viable populations of existing native and non-native vertebrate species within the planning area. There are approximately 339 inland wildlife species in New England. Habitat preference for 233 (90 %) of these species is for regenerating stands in young age classes (Forest Plan VII-B-1). The Forest has not maintained regeneration harvesting in accordance with Forest Plan projections.

The Purpose and Need statement for this project is a direct result of this fact, and has influenced the development of alternatives. Refer to the wildlife section of this EA for analysis of the effects of the proposed treatments including creation of regenerating stands under each alternative.

The alternatives (including No Action) respond to resource issues and public controversy that effect the ability of a given project to meet the land stewardship goals for that area. The Deciding Official must choose an alternative and provide supporting rational for the decision. Alternatives selected in the recent past on the Saco Ranger District have been a reasonable blend of resource objectives (needs) with resource issues and public concerns. Project planning has provided for resource protection, creation of some regeneration aged stands, enhancement of softwood habitat, and provides timber to the local economy. The EA provides the Decision Officer a suitable range of alternatives from which to select.

3.11y *Use weed-free native seeding for erosion control to prevent introduction of non-native species*
All erosion control seeding in use by the Forest Service, and in timber sale contracts administered by the Forest Service require use of weed-free native seed. This is required to eliminate the possibility for introduction of non-native species of plants and undesirable weeds when erosion control seeding is implemented, such as on landings or on steeper sections of skid roads. Most skid roads are not steep enough to require seeding, although an occasional section may. Weed free native seed is required in all White Mountain National Forest Timber Sale contracts.

3.11z *Log during periods when the noise of logging would be least noticeable to the visiting public*

Most public visitors to the planning area is during summer. Use numbers fall off dramatically after September. By October, most visitors are primarily moving in vehicles on surfaced roads or are at trailheads and along trails.

The season of logging has been designed to reduce potential conflicts with road or trail users and harvesting operations. Summer logging, for instance, is allowed only on units that are away from roads and trails. These are units 4-7 (Alternative 2 only), 14, 33, and 35-38. Note that these are proposed clearcut units under the proposed action. Unit 33 is the closest of these to high public use areas. Unit 33 is approximately 2000 feet from Fourth Iron parking lot and campground, across State Highway 302.

The majority of public vehicular use, where noise from logging activities might be audible, is from along State Highway 302. The majority of use along this portion of highway is thru traffic, where other noises would obstruct hearing logging equipment noise.

Some noise might be audible by those in Fourth Iron parking lot or campground, primarily from units in close proximity (Units 28, 32 and perhaps 40). These units are restricted to fall or winter logging when use in the campground and parking lot is low (fall) to none (winter). Fourth Iron parking lot is not plowed during the winter.

Snowmobile parking for the Sawyer River Trail is provided at the Junction of Sawyer River Road and State Highway 302, and receives moderate winter snowmobile use (averaging four vehicles per weekend day and half that on weekdays). Logging noise might be audible from Units 22, 24, and portions of 30 and 32 for those preparing to depart from this parking lot during the winter months. In addition, the snowmobile route passes near Units 1, 2, 8, 11 and 12, on Forest Road 86. These units are likely to be harvested in winter and may be audible to snowshoers and cross country skiers, and for which a conflict with road plowing might occur.

Part of Signal Ridge Trail is in close proximity to harvest Units 1 and 3. Units 1 and 3 require winter harvest only, because Forest Road 85 is not designed for wet season haul. There has been no evidence of winter use of Signal Ridge trail. This trail begins two miles from Sawyer River parking lot, the nearest access in winter.

Hancock Notch trail passes through Unit 13, about 6 miles from the Sawyer River parking lot, the nearest access in winter. This unit is winter logging only, to reduce the likelihood of conflict with recreation use, which is very low to non-existent in winter.

All units proposed for harvest along State Highway 302 are fall/winter harvest only. The other use adjacent to that segment of road is the Conway Scenic Railroad, which operates from July 1 to the end of October each year. Fall and winter logging activities would not interfere with visitor experience on the Scenic Railroad.

Streams and Water

3.11aa Provide specific information regarding what uses are compatible and what mitigations would be prescribed in riparian areas to limit degradation and adverse effects to water quality

Portions of stands in partial cut Units 3, 11, 12, 13, and 42 border streams or brooks. Riparian areas may be thinned where beneficial to the stand and the riparian area. Forest Plan standards place restrictions on treatments in riparian areas. These restrictions, and additional mitigation measures identified for this project apply, and include a ten foot no-cut buffer on perennial streams and brooks adjacent to Units 3, 11, 12, 13, and 42.

Forest Plan standards and guidelines for riparian areas in partial cut Units 3, 11, 12, 13, and 42 allow for removal of no more than 50% of the existing basal area in these riparian areas. Other restrictions and mitigation measures can be found in table 5 of Chapter 2, and includes prohibiting skidding equipment in riparian areas except at designated crossings.

Trees to be harvested in riparian areas are felled away from and retrieved away from riparian areas. Riparian areas are only entered with equipment when crossing these areas on designated crossings to reach landings. Trees that provide needed bank stabilization, shade, or unique wildlife habitat (such as cavity trees) are not harvested. Temporary log stringer bridges or culverts are provided at designated crossings to protect water quality and bank stability as determined by the sale administrator.

New landings would be placed outside of riparian areas on upland sites wherever possible. Four new landings would be needed and eight to ten existing landings would be used. The existing landings are not in riparian areas.

3.11bb *Buffer zones along streams should maintain the integrity of these streams to minimize water quality impacts*

Where treatment of trees near streams is proposed, skid roads and marking density would consider the possible effects to streamcourse stability and water quality. Forest Plan standards and guidelines provide direction for riparian buffer widths for each stream type and stream gradient. Within riparian buffers, the silvicultural prescription is modified to remove no more than 50% of the basal area. Additionally, the Forest Plan advises recruitment and retention of trees 18 inches DBH and greater within these riparian buffer areas. Forest Plan standards require minimum designated riparian widths to be 50 feet + (4 X the percent slope). (see Table 5 in Chapter 2)

Skidding of logs is limited within these designated buffer areas. Main skid roads are not located within designated riparian buffers. Tree felling is directed away from the riparian channel in order to reduce the amount of skidding that would occur within these riparian buffers.

These buffer widths have proven to be effective on past harvest treatments. No measurable changes in water quantity or quality are expected. Given the silvicultural prescriptions, the riparian buffer widths, and other resource mitigations, the integrity of these riparian areas is expected to remain intact. Additional mitigations are listed in Chapter 2, section E.

3.11cc *Minimize the water quality impacts of stream ecosystems*

In addition to project design and effects discussion above regarding water quality, standard mitigation measures (Best Management Practices) would be employed to minimize impacts to water quality that might result from the proposed harvest activities and road reconstruction. Proposed design improvements such as adding drainage ditches on Forest Road 513 and adding surface rock at one location on Forest Road 86 may improve the resistance of these roads to erosion. Skid roads in harvest units may show some short term erosion, which is normally contained to the immediate area with water bars that direct runoff out over the forest floor, and seeding on skid trails and landings where needed.

Removal of the vegetation canopy does not normally cause a measurable increase in runoff or erosion that would affect water quality. There is little change (no measurable increase) in the amount of runoff leaving most partial cut units. The effectiveness of the remaining canopy to intercept rain and snow, and the ability of the forest floor to intercept and absorb runoff remains

fairly constant. This is especially true as the residual trees re-occupy the canopy, natural regeneration and growth of shade tolerant understory trees and herbaceous plants reestablish, and grass, tree and shrub species establish on skid roads. Specific direct and cumulative effects from this proposed action are reported in more detail under ‘Water’ near the beginning of this Chapter.

Soils

3.11dd Document the effect on soil from this sale, the cumulative effect of past logging on soil in this planning area; and include estimates of nutrient loss and expected impacts on re-vegetation processes

The No Action alternative would not change the existing rate of soil erosion that is attributed to normal geologic rates within the analysis area. While maintenance of Forest Roads, including grading and culvert cleaning disturbs the soil surface, and therefore may briefly increase susceptibility of disturbed areas to soil erosion, experience here and elsewhere indicates the impacts are minor, remain on-site, and do not lead to indirect soil erosion of surrounding or downslope areas. In addition, road reconstruction and maintenance such as that proposed for Forest Road 513, 34B and 85 would be done to Forest Plan standards and guidelines and would mitigate direct or indirect impacts to off-site streams or wetlands.

Old skid trails in the analysis area do not show evidence of soil erosion, or direct or indirect contribution of sediment to local tributaries or brooks. Previous harvesting in this vicinity, the absence of other activities such as road reconstruction or road construction, and on-site evidence discussed above (see Soils section) regarding the lack of soil erosion, indicate there would not be cumulative soil erosion impacts. This is consistent with the estimation of effects in the 1986 Forest Plan.

Under the action alternatives, the proposed road reconstruction and maintenance of existing Forest roads may expose mineral soil, require installation of temporary drainage structures, and necessitate spot surfacing. Minor amounts of on-site soil movement may occur as a direct impact of these activities. The Forest Plan EIS anticipated some unavoidable short term soil erosion following road reconstruction. Indirect impacts are likely to be little or non-existent because of soil conditions and soil types. Appropriate buffer widths to be used would mitigate off-site impacts. Skid roads to harvest units may lead to some exposure of mineral soil and localized surface soil erosion. Review of previous harvesting in the area indicates these impacts would be of short duration and magnitude.

Soil erosion impacts from skidder traffic within harvest units should be small to non-existent because single passes with skidders tend to either not disturb the mineral soil, or do it in such a minor way that surface organic matter or debris prevents soil erosion. Winter harvest where proposed would largely prevent soil erosion at these sites.

Cumulative impacts of road reconstruction, skid trails and harvest treatments are expected to be relatively small, of short duration, and restricted to the road or skid trail. Erosion control mitigations and project design on these well drained till soils should essentially mitigate impacts to well within the scope of those anticipated in the Forest Plan.

The potential impacts to soils and direct or indirect erosion from harvest activities, road system reconstruction, and skid trails under Alternative 3 is less than Alternative 2 and 4 because activities

above Whiteface brook are deferred. The direct, indirect and cumulative effects of the action alternatives are essentially the same for units 21 - 42.

The direct, indirect and cumulative effects of Alternative 4 are essentially the same as for Alternative 2. Since little erosion is anticipated in harvest units, the reduced acres to be treated would not noticeably reduce anticipated erosion or other soil effects.

Nutrient losses are not expected to occur to the degree that they would be measurable. The reason for this is that in all partial cut units the basal area removed would be one quarter to one third of the basal area of the stand. Within ten years the residual stand would begin to fully occupy the sites and produce a similar amount of organic debris as the stand is at this time. Over time, there would be no noticeable difference in the organic levels or in soil nutrients between the no action and the action alternatives. This is even true for the clearcut acres, except that the difference would be noticeable for some years following treatment, and for a longer period of time cumulatively. However, there is no evidence to suggest that removal of moderate amounts of timber through clear cutting on small acreages within the larger watershed would have an adverse or long term direct or cumulative effect on soil nutrients or on soil productivity.

Along with the above discussion is the fact that there are no expected difficulties in achieving re-vegetation in any of the units. Experience through monitoring of past activities in this area show that re-vegetation would occur without delay, and would fully occupy the sites within two to five years.

3.12 Other Issues brought forward during public involvement that are resolved at a higher level

3.12a *Compare adverse external economic costs to the ecosystem service value of standing forests. Analyze the opportunity costs of the logging program, which include the value of uses forgone on areas logged plus the (potential) benefits associated with alternative uses of timber sale funds. Include the projected loss of recreation user fees that may occur because of the logging operation.*

The writer suggests that “Since the logging program increases costs of water purification and filtration, decreases the value of private timberlands, unfairly competes against alternative fiber and building material businesses, increases wildfire risk, increases repair and maintenance costs for highways and public roads, and decreases the number of jobs in recreation, tourism, fisheries, and alternative forest products, the Forest Service must quantify these adverse economic effects”.

These items are not substantiated for this regional area (within 150 miles). These are clearly general issues that must be handled at a regional level, and are not specific to this project. There is no evidence to suggest that any of the above referenced items would occur under this proposed action except for the reference to maintenance costs for highways and roads.

Vehicle registration fees for commercial vehicles are applied to all vehicles that operate on public roads and serve to raise revenue to maintain and repair State and County roads. In addition, local taxes (10% timber tax) are collected on timber volumes harvested for each sale, and may be used to replenish road maintenance funds within each township from which timber is removed. This tax is levied by the towns in which the timber sale occurs and are collected directly from the timber sale purchaser.

In addition to that, twenty-five percent of all gross revenues on National Forest lands are returned to the state for support of public schools and roads. The state redistributes these funds to local governments whose jurisdictions include National Forest lands. The modification of the act in 2001 gave the states an option on how these payments were calculated, based on a three year average or an annual basis.

There are no projected loss of recreation user fees because of the proposed action under any of the alternatives. The area to be treated, and the treatments proposed are well blended into the existing vegetation, and well mitigated under all alternatives. There are no indications that treatments in the areas proposed for this project would adversely affect recreation, or reduce user fees.

Supply-and-demand estimates and long-term cost/benefit analyses are made at Regional Planning or Forest Plan level. The White Mountain National Forest Plan objectives suggest that management of forest resources, and wildlife habitat, are beneficial to wildlife species. This project is planned with in depth consideration of other resource issues and public values to produce the greatest net public benefit.

3.12b Clearcutting in this planning area would retard development of contiguous late successional forest conditions connected to the Pemigewasset Wilderness and the White Mountain National Forest as a whole.

This issue refers to the idea that large scale continuous mature and old growth forest extending throughout the White Mountain National Forest, encompassing the various Wilderness Areas, unroaded areas, and other National Forest lands, and in which management activities would be limited to partial harvest prescriptions or no harvest, would enhance development of late-successional forest and the associated ecosystem processes that occur at a regional scale.

The wildlife report in this Chapter clearly documents the beneficial effects that the action alternatives, including the proposed regeneration (clearcut) harvests would have on wildlife species. The Forest Plan provides direction for forest management, and for wilderness management. There is no evidence that this project, even cumulatively with other vegetation management projects on the White Mountain National Forest, would harm individual wildlife species (MIS), would detract from their viability, or would suspend the ability of any species or group of species from interacting across its range due to loss of connectivity. In other words, there is no documented loss of connectivity from these actions cumulatively or this action individually.

3.12c Demonstrate how much direct subsidy this sale would provide to the timber industry.

Timber sales are offered in a competitive bidding process where the values and costs associated with a proposed action are considered by the purchaser. There is no evidence of collusion on the part of bidders or in conjunction with the Forest Service resulting in a subsidy to the timber industry. The White Mountain National Forest provides an opportunity for prospective purchasers to buy timber sales and operate them to provide materials to associated markets and to strive to make a profit. The extent they are profitable is dependant on purchaser skill, market conditions, operator efficiency and a host of other factors. There is no intention to subsidize timber industry with this project.

3.12d *Logs from this sale should not be exported to other countries in an unprocessed form, which would reduce employment at local mills. Address the cumulative impacts of where the timber is shipped to, and if removal and processing of raw logs would impact the quality of human health.*

Laws that restrict the export of raw logs apply to timber from National Forests west of the 100th meridian. Forests east of the 100th meridian are not affected by that legislation. The cumulative effects of log exportation, and impacts to the quality of human health at those locations, is outside the scope of this analysis.

Health and safety in the woods are governed by our administrative procedures and by OSHA (Occupational Safety and Health Administration) requirements. Health and safety at the mill are regulated by OSHA and local codes, and are outside the scope of this decision. Given the lack of specific information in the comment (about what is referred to by quality), there is nothing in the comment that would be considered a significant issue or around which to construct an alternative. Potential health and safety issues for the action alternative are mitigated with OSHA regulations and with other operating requirements in the timber sale contract, and with state and local laws. Consequently, while logging is potentially dangerous, the difference between the action alternatives and the No Action alternative is not likely to be significant given these mitigations.

3.12e *Postpone management in this and all areas within the WMNF until the Forest Plan Revision is complete.*

The Forest Plan sets management direction for the White Mountain National Forest through the establishment of short term (10-15 years) and long-range goals and objectives throughout the year 2036. It prescribes the standards, practices, and the approximate timing and vicinity necessary to achieve goals and objectives. The Forest Plan prescribes monitoring and evaluation needs necessary to ensure that direction is carried out, measures quality and quantity of actual operations against predicted outputs and effects, and forms the basis for implementing revisions.

NFMA states that forest plans “shall be revised from time to time when the Secretary finds conditions in a unit have significantly changed, but at least every 15 years.... (16 U.S.C. 1604(f)(5))”. However, Congress did not intend management to cease if the 15-year target date for plan revision was not met. NFMA, Section 1604 (c) illustrates this point. In the development of the original forest plans, Congress specifically allowed management of the forests to continue under existing resource plans pending approval of the first NFMA forest plan for each administrative unit. Section 321 of the Fiscal year 2003 interior Appropriations Act included language that allowed National Forests to continue managing. The language states “Prior to October 1, 2003, the Secretary of Agriculture shall not be considered to be in violation of subparagraph 6(f)(5)(A) of the Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C. 1604(f)(5)(A) solely because more than 15 years have passed without revision of the plan for a unit of the National Forest System.”

A Notice of Intent to revise the Forest Plan was published February 14, 2000, and the revision process is underway. The Final Environmental Impact Statement is expected in December 2004.

3.12f *This project should be removing roads and allowing the forest to return to a natural condition. Provide in your alternatives, an alternative that does not log in this area.*

This is not in conformance with the Forest Plan. The Forest Plan sets management direction and long-range goals and objectives. It prescribes the standards, practices, and itemized the expected timing and locations of actions that would be necessary to achieve the agreed upon goals and objectives. The Forest Plan revision process has identified several alternatives regarding how to manage the National Forest for the next fifteen years. While several of the alternatives would increase the size of Wilderness Areas and Roadless areas, none of the Alternatives would implement this suggestion for the Forest or for this analysis area.

The writer provides no evidence that this particular analysis area should be considered for removal from management or that the writer has evaluated the loss of existing recreation opportunities, or the social and political implications that removing roads or suspending management activities in this area would have. Nor is there any evidence provided that would support removing roads from this area. No evidence is provided to indicate that why or how removing roads would be beneficial. However, the No Action alternative (Alternative 1) does provide an alternative that does not log in this area.

3.12g *Analyze the opportunity costs of the logging program, which include the value of uses forgone on areas logged plus the (potential) benefits associated with alternative uses of timber sale funds. We specifically request an alternative that would utilize available funds for this project to support the ecological restoration component of this sale by itself, without completing the commercial sale component.*

The analysis of other recreation components above shows that no measurable losses in recreation opportunities would occur. There are no demonstrated uses forgone due to logging. While some recreation uses might be displaced temporarily, they would not be displaced out of the analysis area, and would not affect economic opportunities within the local region. The value of wildlife related recreation opportunities might be increased as a result of this action.

Planning activities and management direction for the White Mountain National Forest have been determined by laws and by the Forest Plan. There is no authority to use funds identified for planning purposes or for project implementation strictly for restoration. Nor has there been any indication from public comments, from Forest Service resource specialists, or from cooperating-agency specialists that ecological restoration is needed in this analysis area.

Restoration at a small scale on site specific areas would occur in this project with items such as drainage improvement during road reconstruction on Forest Road 513 and forest Road 85, relocation of a quarter mile of Signal Ridge Trail out of an overflow channel, needed maintenance of roads used for hauling such as Forest Road 34 including bridge improvements, and placement of a foot bridge to reduce impacts to stream banks and increase visitor service on a popular trail as proposed in this project. This kind of restoration and maintenance activity within the analysis area is designed to minimize the effects that man-made facilities have cumulatively over time. Natural processes break down facilities, and alter drainage capabilities of roads and trails, combined with the effects of use, and therefore require maintenance or properly designed restoration and closure. This project attempts to do these things, using appropriated monies where possible, and incorporating these restoration and maintenance activities into project design where possible.

3.12h *Require the use of natural oils in logging equipment for this project.*

There is no provision in the timber sale contract to require logging equipment, including chainsaws, to use natural oils. However, contract clauses CT6.34, CT6.341 and CT6.342 require the purchaser to take all reasonable precautions to prevent pollution of air, soil and water. This includes provisions for servicing equipment, providing sanitation facilities, preventing oil spills, and preparing a Hazardous Substance Plan for substances to be used in the Sale Area. Limitations are placed on how much oil can be stored on site before a Spill Prevention and Spill Countermeasures Plan is required. Purchasers are required to maintain all equipment operation on the Sale in good repair and free of abnormal leakage of fuel, lubricants, coolants, and hydraulic fluid. Purchasers are required to properly dispose of all contaminated soil, vegetation, debris, vehicle oil filters and waste oil in accordance with local, State and Federal regulations off of the National Forest and are required to transport such substances in accordance with State and Federal regulations.

3.13 Environmental Justice

Environmental Justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high or adverse manner by government programs and activities affecting human health or the environment.

One goal of Executive Order 12898 is to provide to the greatest extent practicable, the opportunity for minority and low-income populations to participate in planning, analysis, and decision making that affects their health or environment, including identification of program needs and designs.

This proposed action has been conducted under Departmental regulation 5600-2, December 15, 1997, including the Environmental Justice Flowchart. The proposed action, its purpose and need, and area of potential effect have been clearly defined. Scoping under the National Environmental Policy Act, and the comment periods under 36 CFR 215 have afforded the public ample opportunity to comment on the proposed action.

The activities proposed in the action alternatives pose no human health hazards or significant negative environmental effects regardless of socio-economic group. The revenue generating opportunities associated with this project occur in Sawyer River watershed and may extend well beyond the nearby towns of Bartlett, Jackson and Conway. There would be no change in socioeconomic or environmental conditions within Sawyer River watershed or within these towns under any of the Alternatives.

The action alternatives might provide some job opportunities and contribute to the 25% fund. Although there would be some changes in the forested landscape, dramatic changes in social conditions are not expected (Forest Plan, IV-52 to IV-55, IV-65 to IV-66).

Recreation occurring in Sawyer River watershed would continue without measurable interruption. No measurable change to local economies would result from this action. Recreating public would likely continue using Sawyer River and other adjacent drainages as previously. Therefore, the proposed action would have no adverse effect on minority or low-income populations, and would

not cause adverse human health or environmental effects that affect minorities or low-income populations.

Extensive scoping and comment periods did not reveal any issues associated with the principles of Environmental Justice. All interested and affected parties have continued opportunity to be involved in the comment and decision process.

3.14 Invasive Species

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

Presidential Executive Order 13112 (February 3, 1999) directed stewards of all federal lands to protect said lands from introduction of invasive species and to provide for their control. The objective is to retain a natural ecosystem by limiting spread of invasive species onto the Forest. No invasive plants have been reported within the County Line Project area however there are at least 13 species of plants within the Bear Notch Road and Highway 302 junction that are considered at some level an invasive species (WMNF database). Many of these plants are on private land and have been planted as ornamentals.

The concern is that any of these plants could spread to forestlands under the any of the alternatives. Even the No Action Alternative would allow for the spread of these plants due to the current recreation activities. Wildlife could also transport seeds into the area. Logging equipment would be determined to be free of plant debris prior to entering the National Forest under any of the Action Alternatives. This would mitigate the spread of invasive plants into harvest units and their access routes.

Under all alternatives including the No Action Alternative, efforts would be made to eradicate invasive plants found within the Project area. Interference of eradication efforts by harvest equipment would be kept to a minimum to avoid further spread.

Eradication would be by digging up all of the plants and roots or by covering with black plastic for an extended period of time. Some ground disturbance would be expected from digging up the plants but this would be minimal and localized to the site where it occurs. Covering with black plastic is not expected to have soil disturbance, but it may take several years to accomplish complete eradication.

Monitoring of the site and surrounding areas for several years after eradication methods were applied would be needed to assure infestation does not recur.

Chapter 4 List of Preparers and Agencies Consulted

Interdisciplinary Team

Project Coordinator/Writer/NEPA.....	Rod Wilson, Saco Ranger District
Wildlife Biologist.....	Kathy Starke, Saco Ranger District
Soils Scientist.....	Steve Fay, White Mountain National Forest
Hydrologist	Livia Crowley, White Mountain National Forest
Harvest Operations.....	Ken Jeager, Saco Ranger District
Layout Forester	Edgar Cormier Saco Ranger District
Layout Forester	Keith Konen, Saco Ranger District
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Forest Engineer Technician	Jon Jakubos, White Mountain National Forest

Forest Service Consultants

Assistent Ranger/Ecosystems Team Leader	Rick Alimi, Saco Ranger District
District Ranger	Terry Miller, Saco Ranger District
Recreation	Tom Moore, Saco Ranger District
Archeologist.....	Karl Roenke, White Mountain National Forest

Other Agencies Consulted

New Hampshire Natural Heritage Inventory	Dan Spurduto, Ecologist
New Hampshire Dept. of Fish and Game	Kristine Bontaites, Wildlife Biologist
U.S. Fish and Wildlife Service	Susi von Oettingen

INTRODUCTION

This Biological Evaluation is prepared in accordance with direction provided in Forest Service Manual (FSM) 2672.42 and Section 7 of the Endangered Species Act. It addresses potential effects of the proposed County Line Timber Sale on federally endangered, threatened, and proposed (TEP) species and Regional Forester Sensitive Species (RFSS) that may occur within the analysis area. Federally endangered and threatened species are those determined for eligibility based on guidelines listed by the United States Department of Interior Fish and Wildlife Service (USFWS) under Section 4 of the Endangered Species Act (ESA). Species included on the Regional Forester Sensitive Species list must occur within the proclamation boundary of the Forest and are either a candidate for federal listing under ESA, a species that has been delisted under ESA in the last five years, or are globally (G or T) or nationally (N) ranked as a 1–3 by The Nature Conservancy and Association of Biodiversity Information or are considered Sensitive on the Forest based on a Risk Evaluation. The Regional Forester Sensitive Species list is available on the Internet at www.fs.fed.us/r9/tes/tes.htm.

This Biological Evaluation reviews the Biological Assessment for Threatened and Endangered Species on the White Mountain National Forest (WMNF) in the States of Maine and New Hampshire (USFS 1999a) and the Biological Opinion on the Effects of the Land and Resource Forest Management Plan (United States Department of Agriculture Forest Service (USFS) 1986a, Forest Plan) and other Activities on Threatened and Endangered Species in the White Mountain National Forest and Incidental Take Statement and review and includes, as appropriate, the Terms and Conditions for Indiana bat outlined in this document (USFWS 2000). It also evaluates the Canada Lynx Conservation Assessment and Strategy (USFS 2000a) and associated conservation measures. The Conservation Assessment is based on information from a recent review of lynx ecology in the contiguous United States (Ruggiero et al. 2000). The Canada Lynx Conservation Assessment and Strategy is available on the Internet at www.fs.fed.us/r1/planning/lynx/lynx.html.

Analysis Area: The analysis area encompasses Habitat Management Units 511, 512 and 513. The habitat contained within these units is characterized by typical northern hardwood stands on mid- slopes with a few noted enriched areas. Softwoods line the stream channels and dominate the high ridgetops. The lower sections contained some river terraces, and old river drainage channels. There are no stands of hemlock, aspen, paper birch, pine or oak but they can be found scattered throughout the Analysis Area. New Hampshire Natural Heritage Inventory identified locations of boreal transitional bog and an semi enriched sugar maple ash stand.

The Analysis area lies primarily in the Sawyer River watershed that includes Carrigain Brook, and Whiteface Brook. The eastern portion of the area lies in the Saco watershed with a few units in the Stony Brook drainage. There is one inclusion of private land but otherwise the area is a contiguous block of federal land. Beaver activity has been observed in the area between Rt. 302 and the Saco River. Wet areas are scattered throughout the analysis area but there are no large waterbodies.

No cliffs or rocky outcroppings are known to exist within the Analysis area. Rocky cliffs (Harts ledge) exist outside the Analysis area to the north.

Appendix A - Table 1. Description of the Alternatives

UNIT	C-Std	FOREST TYPE*	Alternative 2			Alternative 3			Alternative 4		
			HARVEST METHOD +	ACRES	SEASON #	HARVEST METHOD	ACRES	SEASON	HARVEST METHOD	ACRES	SEASON
1	38-13	NH	CT	31	W					31	W
2	38-3	NH	CC	25	W					15	W
3	38-6	MW	STS	21	W					21	W
4	28-39	NH	CC	15	SFW						
5	28-39	NH	CC	13	SFW						
6	28-28	NH	CC	23	SFW						
7	28-28	NH	CC	19	SFW						
8	28-6	NH	CT	19	FW						
9	28-2	MW	STS	10	FW					10	FW
11	28-25	SW	STS	6	FW					6	FW
12	29-2	NH	CT	32	FW					32	FW
13	29-33	SW	STS	14	W					14	W
14	29-2	NH	CC	22	SFW					22	FW
15	29-1	SW	STS	19	FW						
21	25-15	NH	CT	24	FW	CT	24	FW	CT	24	FW
22	25-15	MW	STS	15	FW	STS	15	FW	STS	15	FW
24	25-10	NH	CT	11	FW	CT	11	FW	CT	11	FW
28	40-3	MW	STS	35	FW	STS	35	FW	STS	35	FW
30	40-12	NH	STS	27	FW	STS	27	FW	STS	27	FW
31	39-2	NH	STS	44	FW	CT	44	FW	STS	44	FW
32	40-5	NH	STS	13	FW	CT	13	FW	STS	13	FW

33	40-5	NH	CC	7	SFW	CC	7	SFW	CC	7	SFW
34	39-3	NH	CT	54	FW	CT	54	FW	CT	54	FW
35	40-27	NH	CC	8	SFW	CC	8	SFW	CC	8	SFW
37	40-1	NH	CC	11	SFW	CC	11	SFW	CC	11	SFW
38	40-1	NH	CC	10	SFW	CC	10	SFW	CC	10	SFW
40	40-4	NH	STS	22	FW	STS	22	FW	STS	22	FW
41	41-1	NH	CT	18	FW	CT	18	FW	CT	18	FW
42	41-27	MW	STS	5	FW	STS	5	FW	STS	5	FW

Appendix A - Table 2 Summary of total acres by harvest method

	Alternative 1	Alternative 2	Alternative 3
CC	153	36	51
CT	189	164	170
STS	231	104	212
GS	0	0	22
TOTALS	573	304	455

Appendix A - Table 3 Definitions

<i>*Forest Types</i>	<i>+Harvest Methods</i>	<i># Season of Harvest</i>
NH: Northern Hardwood	CC: Clear-cut	SFW: Summer/Fall/Winter (Approx June 15 th to March 15 th depending on ground conditions)
SW: Softwood	CT: Commercial Thinning	FW: Fall/Winter (Approx September 15 th to March 15 th depending on ground conditions)
MW: Mixedwood	STS: Single Tree Selection	W: Winter (Approx December 15 th to March 15 th depending on ground conditions)
	GS: Group Selection Harvest	

SPECIES and HABITAT REVIEW (See BE Table)

Conclusions about whether threatened, endangered, proposed, and sensitive (TEP&S) species and their habitat are known or suspected within the analysis area are based on a review of the New Hampshire Natural Heritage Inventory Program (NHNHI) database and a review of literature on habitat requirements and known occurrences of each species. Most range and habitat information for vertebrate species is taken from DeGraaf and Yamasaki 2001, DeGraaf et al. 1992, and Foss 1994. These publications are based on an extensive literature review of wildlife species that occur in New England, with information from local research or surveys included when available. Federal Recovery Plans (USFWS 1982, 1983, 1991a, 1991b, 1992a, 1992b, 1996) also are reviewed to evaluate habitat preference of federally listed species. The primary source used to evaluate rare plant species, potential habitats, and location of exemplary communities in the analysis area is a landscape analysis (a pre-field prediction tool that used topographic maps, soil maps, geological information, and known information on rare plants and communities) that was conducted for the New Hampshire portion of the Forest (Sperduto and Engstrom 1995). Other information on range and habitat preference for plants is based on information from local flora and inventories (Seymour 1969, Sperduto 1997, Storks and Crow 1979), and field guides (Harris et al. 1964, Newcomb 1977). Information on the two butterfly species on the Regional Forester Sensitive Species list came from H. Pavulaan, personal communication.

Detailed information is available about the federal TEP&S species known to occur on the White Mountain National Forest. Virtually all existing individuals of breeding pairs of bald eagles (*Haliaeetus leucocephalus*) are closely monitored by various agencies. A habitat model developed for small-whorled pogonia (*Isotria medeoloides*) (Sperduto 1988) provides information on habitat parameters and potential occurrence of this species across the Forest. The recent Biological Assessment of Threatened and Endangered Species on the Forest and the accompanying Conference Report and Biological Opinion from the USFWS has provided updated information on the status and habitat requirements of all federal TEP&S species on the White Mountain National Forest (USFS 1999a, USFWS 2000).

Less detailed information is available on the potential occurrence and habitat preferences within the White Mountain National Forest for other federal TEP&S species including Indiana bat, gray wolf (*Canis lupus*), eastern cougar (*Felis concolor cougar*), and Canada lynx (*Felis lynx Canadensis*), as well as most Regional Forester Sensitive Species. Track inventories conducted for Canada lynx on the Forest in the late 1980's and early 1990's and recent hair pad surveys (1999, 2000, and 2001) have not detected this species (Brocke et al. 1993, Kingman 1986, Litvaitis et al. 1987, unpublished White Mountain National Forest data). More bat surveys are being conducted on the forest and adjacent areas. However, in most cases field inventories are often not available. The two exceptions are the American peregrine falcon (*Falco peregrinus anatum*) that has been closely monitored in the State for many years because of its status as a federally listed species until 1999 and Robbins' cinquefoil (*Potentilla robbinsiana*) that is monitored by the Appalachian Mountain Club, New England Wildflower Society and the WMNF and was delisted in August of 2002. A more recent effort to assess wildlife populations on the Forest has provided some information on the status of certain Regional Forester Sensitive Species (USFS 1993, 1994, 1996, 1998, 1999b, 2000, 2001b).

Species Suspected or Documented as Present in analysis area

Based on a review of all available information and several field surveys, it was determined potential habitat existed for two federally endangered species, Indiana bat and Canada lynx and three Regional Forester Sensitive Species; eastern small-footed myotis, northern bog lemming, and American ginseng. Potential habitat for gray wolf, eastern cougar, and Canada lynx is present in the analysis area (see Table 2) but the species are considered extirpated from the area.

Habitat Disturbance Level

It is assumed that habitat disturbance level is high for timber harvest activities.

FIELD RECONNAISSANCE

Habitat

General habitat condition of the analysis area was determined from compartment records and field and stream surveys over the past 15 years. New Hampshire Natural Heritage Inventory conducted plant surveys in the area in the years 1993 and 1995 (Engstrom 1994; Nichols 1996). These surveys indicated two communities of interest within the analysis area but outside harvest units. The Saco district biologist has visited the area numerous times over the past 14 years. A directed search was made by the District biologist and biological technician for American ginseng on August 1, 2001. No plants were observed.

Species

Animals

It will be assumed that **Indiana bat**, **eastern small-footed myotis**, and **northern bog lemming** do occur in the analysis area so a field inventory is not necessary. Canada lynx is considered extirpated from the WMNF, but suitable habitat exists within the Analysis Area.

Plants

American ginseng was documented within the Analysis Area in 1993. None of the other suspected plants (arnica, pond reed bent-grass, squirrel corn, butternut, mountain sweet cicely, White Mountain silverling, pink wintergreen, or nodding pogonia) were found within the project or analysis area. Therefore no further analysis of these species will be conducted.

ANALYSIS OF THE EFFECTS OF ALL ALTERNATIVES

FEDERAL SPECIES

INDIANA BAT (*Myotis sodalis*)

The life history and habitat requirements for Indiana bat are described in the literature (Humphrey et al. 1977, Brady et al. 1983, Kurta et al. 1993, Romme et al. 1995, USFWS 1996) and have been summarized in the recent Biological Assessment (USFS 1999a) and Biological Opinion (USFWS 2000) for the White Mountain National Forest. This species occurs across the eastern United States. Their distribution becomes more restricted in winter when a majority of the population migrates to winter hibernacula in large limestone caves in Indiana, Kentucky, and Missouri. Smaller hibernacula occur in other eastern States.

In spring, when bats leave the hibernacula, males and females appear to disperse separately with males tending to stay relatively close to the hibernacula area and females searching for trees suitable for a maternity site. Recent literature indicates that this species will inhabit both riparian and upland forests.

Individuals prefer to roost in snags or living trees greater than 9" dbh under exfoliating bark with forest canopy closure between 60% and 80%. Maternity colonies usually are located in the largest trees that have some daily exposure to sunlight. Usually several roost trees are used within a maternity colony. Females are pregnant when they arrive at summer maternity colonies usually between April and May. They generally give birth to one young between late June and early July. Young start to fly between July and August. It should be noted that Romme's habitat suitability model (Romme et al. 1995) was developed in the core range of the Indiana bat, which is south of New Hampshire and Maine. It is not known if these criteria apply to the White Mountain National Forest, which is located at the northern fringe of this species range. Possibly individuals may roost in more open habitats in this area to attain greater solar gain as temperature is a key component of roost site selection. This species also prefers to forage over forested habitats with a canopy closure between 50% and 70% as well as riparian habitat and openings. They usually feed in the upper canopy of forested habitats for flying insects.

Occupied and unoccupied habitat

It is generally agreed that the Indiana bat has five habitat requirements: hibernation habitat, summer roosting habitat, maternity roosting habitat, foraging habitat, and fall swarming habitat (prior to hibernation). Godin (1977) reported three occurrences of Indiana bat in New Hampshire. Two of the three specimens were examined by Tom French (biologist with the Massachusetts Division of Fisheries and Wildlife) and Larry Master (biologist with the Nature Conservancy) in the 1980's (Rowse, personal communication 1998). It was determined these had been misidentified and were actually little brown bats (*Myotis lucifugus*). The third specimen could not be located. During a 1992 research project on bat habitat use on the White Mountain National Forest, one male Indiana bat was captured in a mist net (Krusic 1995, Krusic et al. 1996). There has been no female Indiana bats, maternity roosts, fall

swarming, or winter hibernacula detected on the White Mountain National Forest. The closest hibernaculum is in Vermont approximately 80 air miles from the White Mountain National Forest boundary and approximately 170 miles from the analysis area. The hibernacula in Vermont are classified as Priority 3 (low priority) (von Oettingen, personal communication).

Until more information is gathered on preferred habitat for this species on this Forest, it is assumed Indiana bat could forage or roost anywhere on the White Mountain National Forest, except high elevation spruce /fir (>2500') and alpine habitats (USFS 1999a, USFWS 2000). However the probability of this species occurring on the Forest is considered to be very low. Most of the forested stands on the White Mountain National Forest have canopy closure greater than 90%. The literature indicates this species prefers more open habitats (50% to 70% canopy closure) in the core part of its range. Closed canopy forests on the White Mountain National Forest most likely do not provide suitable habitat for Indiana bat, especially females trying to raise young. This conclusion is somewhat supported by two bat studies that were conducted on the Forest in the early 1990's. Of approximately 360 bats caught in mist nets and harp traps on the Forest during the summers 1992-94, only one was suspected of being an Indiana bat (Krusic 1995, Krusic et al. 1996, Sasse 1995). The WMNF contracted bats surveys to occur at 8 locations across the Forest the summer of 2002. No Indiana bats were caught during these surveys (Chenger 2002). If this species did inhabit the White Mountain National Forest, it is estimated it would be here between May 15 and August 30 based on current information about the timing of Indiana bat arrival at winter hibernacula, (USFS 1999a, USFWS 2000).

The County Line project area is under 2500 feet elevation and contains northern hardwoods with some softwood mixed in, however the likelihood of occupancy within the analysis area by Indiana bat is extremely low.

Direct and Indirect Effects

The Biological Assessment (USFS 1999a) and the Biological Opinion (USFWS 2000) describe effects of some management practices on Indiana bats. Bats in general utilize forested habitat for roosting and foraging, open habitat for foraging and road and stream corridors as travel-ways.

The No Action Alternative would have no direct or indirect effects on Indiana bat.

Direct effects to Indiana bats could occur from all Action Alternatives for units with proposed summer (June, July, August) harvest. It is unlikely that fall and winter harvesting (September through March) would directly affect Indiana bats in northern New Hampshire because the bats would have moved on to their hibernacula. Tree removal in the summer could displace or result in direct mortality of roosting bats or cause abandonment of traditional roost sites.

Decreasing the percent of canopy closure by removing trees in the thinning and singletree selection units would indirectly improve, though minimally, the foraging characteristics of the area for Indiana bats. The number of trees removed would be relatively small compared to the overall analysis area and habitat within it. The improved foraging characteristics may be short-lived, as the canopy would most likely close in within a few years after being thinned. A study of foraging and feeding activity of the more common bat species on the White Mountain National Forest indicated that individuals foraged over a

combination of regeneration habitats interspersed with mature and non-forest habitats such as wetlands (Krusic et al. 1996). Indiana bats found in Vermont appeared to prefer areas near large openings.

The Action Alternatives could result in the loss of potential roost trees however this effect is mitigated by Forest Plan Standards which requires all standing dead trees to be left standing where possible (Forest Plan III-15) as well as implementation of the Terms and Conditions from the Biological Opinion.

Cumulative Effects

Throughout the range of this species, the primary causes for decline of this species are thought to be disturbance of winter hibernacula. Other disturbances include loss of forest cover, which may reduce roost trees; stream channelization; pesticide poisoning; indiscriminate handling and collection of individuals by biologists; and natural hazards such as floods and cold weather.

The White Mountain National Forest contains approximately 783,671 acres of which 627,171 acres are considered as potential habitat for the Indiana bat. Removal of trees for all activities (timber, recreation, hazardous tree removal, etc.) are estimated at below 5,000 acres per year or less than 0.80% of the potential Indiana bat habitat on the WMNF. The U.S. Fish and Wildlife Service determined this as an acceptable amount of Indiana bat non-hibernacula habitat disturbance.

The New Hampshire Department of Transportation is currently realigning a portion of Rt. 302. This required removal of some suitable roost trees within the project area along this road. Trees determined to be a safety hazard within the Fourth Iron camping area are removed on an annual basis.

There are no other foreseeable timber harvest projects in the analysis area at this time. The project area is composed primarily of mature hardwood stands. It is expected some trees fall during natural disturbances. Logging activity has occurred in the area since before the land became part of the White Mountain National Forest. There have been no harvests in the analysis area for the past 15 years. The 9 acres of private inholding was logged approximately 12 –15 years ago. This provided disturbed habitat for species that utilize that habitat type however this has since grown out of that age class. This project and natural disturbances during the summer where trees are removed could disturb or displace bats from occupied roost trees. The low likelihood of Indiana bats occurring on the White Mountain National Forest as well as the small percentage of habitat affected by removal of trees during the summer and early fall and the implementation of the Terms and Conditions of the Biological Opinion minimize the potential for this effect.

In addition, Forest Plan Standards and Guidelines (USFS 1986a) provide a diversity of habitat conditions including maintaining mature and overmature habitats (Forest Plan-III-13), reserving large wildlife trees in managed units, retaining standing dead trees where possible (Forest Plan-III-15), and maintaining riparian habitats (Forest Plan-III-18). This, in conjunction with implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000), should ensure that adequate habitat is available for the Indiana bat should some individuals inhabit the White Mountain National Forest.

Effects Determination

Based on all information available, it is my opinion that the **No Action Alternative would have no effect and any of the Action Alternatives may affect but would not likely adversely affect the Indiana bat.** Since the likelihood of occupancy by Indiana bat is extremely low in the analysis area, any effects to Indiana bat from the Action Alternative would be insignificant (cannot meaningfully measure or detect).

TERMS AND CONDITIONS FROM THE BIOLOGICAL OPINION

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). The County Line project is extremely small in relation to Indiana bat habitat. The Terms and Conditions Applicable throughout the year apply to this project.

Terms and Conditions Applicable throughout the year:

1. Develop and implement a management strategy for the WMNF activities occurring within a two-mile radius of the site where the single, male Indiana bat was caught in July, 1992.

The County Line Project area is outside the Two-mile radius of where the Indiana bat was caught.

2. Retain all soft and hard snags in the 10-inch size class or above and wildlife trees within 300 feet of the following landscape features greater than five acres: permanent openings, ponds, lakes, beaver ponds, and wetlands. If hard snags and wildlife trees are not available in these areas leave at least six replacement trees per acre.

The following areas exist in the project area however none are greater than five acres. The septic lagoon, parking area for Fourth Iron (paved), small beaver ponds, private inholding at Livermore, small apple orchard, old gravel pit, and the boreal bog described by NHHI. No ponds, lakes or other wetlands have been located within the project area.

3. Leave all soft and hard snags in the 10-inch size class or above and wildlife trees within 100 feet of beaver ponds less than five acres. If hard snags and wildlife trees are not available in these areas leave at least six replacement trees per acre.

Beaver activity has been observed in Unit 28. Marking would be implemented under all alternatives to meet the above described condition.

4. Protect all known roost trees on the WMNF until such time as they no longer serve as roost trees.

There are no identified Indiana Bat roost trees on the White Mountain National Forest.

Determination

Based on the information described above, it is my determination that **all Alternatives are consistent with the Terms and Conditions for Indiana bat outlined in the Biological Opinion (USFWS 2000).**

CANADA LYNX (*Lynx canadensis*)

The Canada lynx in the contiguous United States is listed as threatened under the Endangered Species Act of 1973 as amended (16 U.S.C. 1531 – 1536, 1538 – 1540) (Final Rule, Federal Register, March 24, 2000). The USFS entered into an agreement with the USFWS in February 2000 (USFS 2000c) to implement the Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) and conserve all lynx habitat on National Forest lands within the range of lynx. A detailed account of Canada lynx ecology in the contiguous United States is available in Ruggiero et al. 2000. Other information and management direction regarding lynx includes the Biological Assessment on the effects of Forest Plans on Canada lynx (Hickenbottom et al. 1999), and the resulting Biological Opinion from USFWS in October 2000. Much of this information is available on the Internet at

<http://www.r6.fws.gov/endspp/lynx> and <http://www.fs.fed.us/r1/planning/lynxlynx.html>.

The specifics of lynx habitat requirements and ecology as it pertains to the White Mountain National Forest were evaluated in the Biological Assessment for Threatened and Endangered Species on the White Mountain National Forest in the States of Maine and New Hampshire (USFS 1999b) and the Biological Opinion (USFWS 2000). Favored habitat for lynx is dense coniferous forest inhabited by snowshoe hare (*Lepus americanus*) (Brocke et al. 1993, Ruggiero et al. 2000). Hoving (2001) found snow depth and amount of coniferous cover were good predictors of lynx habitat in northeastern North America. Canada lynx also will frequent a variety of other habitats including shrub swamps, aspen, paper birch, northern hardwoods, upland openings, bogs, caves, and ledges and feed on alternate prey sources (DeGraaf and Yamasaki 2001, Ruggiero et al. 2000).

While individual lynx may occasionally disperse into the White Mountain National Forest, there is no evidence that lynx are resident or breeding on the Forest (Brocke et al. 1993, Kingman 1986, Litvaitis et al. 1987, unpublished White Mountain National Forest data). The lynx is considered extirpated on the White Mountain National Forest based on the fact that there has not been a confirmed record of lynx on the White Mountain National Forest in several decades (USFWS 2000).

This project is unaffected by the recent national lynx lawsuit (Defenders of Wildlife et al. versus Gale

Norton et al., December 2002), in which the U.S. Fish and Wildlife Service was enjoined from concurring on determinations where the project "may affect" the lynx because lynx are not present on the WMNF. Should this species reoccupy the White Mountain National Forest, consultation with USFWS would occur as described under Section 7 of the Endangered Species Act.

CANADA LYNX CONSERVATION ASSESSMENT AND STRATEGY

The Canada Lynx Conservation Assessment and Strategy describes a process to define suitable and unsuitable lynx habitat and management units for lynx (Lynx Assessment Units) on federal lands (USFS 2000a). Lynx habitat and associated Lynx Assessment Units (LAUs) are defined across the Forest based on lynx foraging and denning habitat. All existing softwood and mixedwood habitat greater than five years old and sites with the potential to grow softwoods or mixedwoods above 2500' are considered suitable lynx habitat. Additionally all existing softwood and mixedwood habitat greater than five years below 2500' is considered suitable lynx habitat. All softwoods and mixedwood habitat less than five years old across the Forest as well as Valley Bottom lands that are not currently typed as softwoods or mixedwood but have softwoods or mixedwood potential are considered unsuitable lynx habitat. All wetlands are considered suitable lynx habitat. All lower mountain slopes that are predominated by northern hardwoods, permanent openings, and alpine areas are considered non-lynx habitat.

Conservation Measures only apply to suitable and unsuitable lynx habitat within an LAU. 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 "Canada Lynx Assessment Unit and Habitat Mapping - White Mountain National Forest - DRAFT".

Conservation Measures Analysis for the County Line Project.

Conservation Measures relating to Programmatic Project planning, Vegetation Management, and Recreation Management and would be applicable to the Proposed Action. Other Conservation Measures were not reviewed for this Proposed Action. A complete list of Conservation Measures is available in USFS 2000f.

The analysis area lies within two LAUs: 7 and 9. Harvest units that lie south of Sawyer River Road are within LAU 7 and those north of Sawyer River Road are within LAU 9. A map of suitable and unsuitable lynx habitat in the Analysis Area, as based on information in the WMNF GIS database, is available in the Project File.

Suitable lynx habitat within the Project Area in LAU 7 (Figure 2) includes all or portions of harvest units 28, 30, 31, 32, 34, 35, and 42. Harvest units 33, 37, 38, 40 and 41 are in non-lynx habitat. Units 28, 31, and 32 are in valley-bottom habitat. Only Unit 30 and half of Unit 34 have denning habitat.

Suitable lynx habitat within the Project Area in LAU 9 (Figure 2) includes all or portions of harvest units 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, and 15. Harvest units 1, 2, and 21, 22, and 24 are in non-lynx habitat. Unit 9 is in valley bottom habitat while Unit 3 is the only unit with denning habitat.

Vegetation Management

Programmatic Guidelines: Regeneration harvests should be in areas where there is little or no habitat for snowshoe hare or in areas to promote it for snowshoe hare. Where some lynx habitat exists, promote development of softwoods. Retain and recruit coarse woody debris for potential denning.

Programmatic Standards: If more than 30% of lynx habitat in an LAU is unsuitable, no further reduction of suitable conditions may occur. For unsuitable or non-habitat, no restrictions apply. Where less than 10% of the habitat is considered suitable for denning, delay management actions that would delay achievement of this objective.

Of the 29,027 acres of lynx habitat in LAU 7, 83% is considered suitable lynx habitat with 8,539 acres of this suitable for denning. 5,008 acres of the 29,027 acres (17%) is considered unsuitable lynx habitat.

Of the 66,970 acres of lynx habitat in LAU 9, 93% is considered suitable lynx habitat with 22% (11,387 acres) of this suitable for denning. 3,721 acres of the 66,970 acres (7%) is considered unsuitable lynx habitat.

Figure 2. shows total acreage of suitable, unsuitable, and denning habitat for lynx in these LAUs.

Figure 2. Current % suitable, unsuitable and denning lynx habitat in LAU 7 and LAU 9					
TOTAL ACRES	NON-LYNX HABITAT	TOTAL LYNX HABITAT	SUITABLE LYNX HABITAT	UNSUITABLE LYNX HABITAT	DENNING HABITAT
LAU 7 42,724 acres	13,697 acres	29,027 acres	24,019 acres (83%)	5,008 acres (17%)	8,539 acres (40%)
LAU 9 66,970 acres	11,523 acres	55,447 acres	51,726 acres (93%)	3,721 acres (7%)	11,387 acres (22%)

Does project reduce suitable lynx habitat?

- LAU 7: YES – Of the proposed treatments (individual tree selection, commercial thinning and clearcutting) that would occur in suitable habitat, the Proposed Action would reduce suitable lynx habitat in LAU 7 by 36 acres. Even though there is a reduction in habitat, the percent of suitable habitat (83%) remains unchanged due to the small amount of habitat altered. Alternatives 3 and 4 would result in a reduction of habitat in LAU 7 by approximately 4 acres (half of unit 35).

- LAU 9: YES- Of the proposed treatments (individual tree selection, commercial thinning, group selection and clearcutting) that would occur in suitable habitat, the Proposed Action would reduce suitable lynx habitat in LAU 9 by 81 acres. Though there is a reduction in habitat, the percent of suitable habitat remains unchanged at 93% due to the small amount of habitat altered. Alternative 3 would not cause any reduction of habitat in LAU 9 and Alternative 4 would cause a reduction by approximately 11 acres.
- Regarding denning habitat, Unit 30 is proposed for single tree selection under all alternatives. This method of harvest would promote softwood habitat and therefore not change the percent of denning habitat. Approximately one fourth (12 acres) of Unit 34 is classed as suitable and denning habitat. Commercially thinning this stand would retain canopy cover though probably reduce the amount of softwood in the stand. A reduction of 12 acres of denning habitat would not change the current amount of suitable denning habitat (40%) in LAU 7.

Does project maintain at least 10% of the LAU in denning habitat?

- **LAU 7: YES** –The percentage of lynx denning habitat in LAU 7 is 40%. Singletree selection harvest in unit 30 would maintain the mature character of these stands and not reduce its potential as denning habitat. Mitigation measures protect existing dead and down wood
- **LAU 9: YES** -The percentage of lynx denning habitat in LAU 9 is 22%. Singletree selection harvest in unit 3 would maintain the mature character of these stands and not reduce its potential as denning habitat. Mitigation measures protect existing dead and down wood.

Does project include salvage harvest?

- NO –

If salvage, are all salvage areas less than 5 acres retained?

- Not Applicable

Is at least 10% of the affected area retained from salvage harvest?

- Not Applicable

Does pre-commercial thinning maintain or enhance snowshoe hare habitat?

- Not Applicable

Do regeneration harvests promote snowshoe hare habitat?

- The clearcuts are in northern hardwood stands but some are relatively close to areas of suitable lynx habitat so these could provide snowshoe hare foraging habitat. Harvest in Units 3, 11, 13, 15, 30, and 42 could promote softwood regeneration that would benefit snowshoe hare.

Do improvement cuts retain and/or recruit conifer understory and/or coarse woody debris?

- YES.

Recreation Management

Programmatic Guidelines: Provide a landscape of interconnected blocks of foraging habitat where recreation use that compacts snow is minimized. Discourage snow-compacting activities in areas where it compromises lynx habitat. Promote retention of softwoods as top priority when relocating trails and other snow compacting uses.

Programmatic Standards: On federal lands in lynx habitat, allow no net increase in groomed or designated over-the snow routes and snowmobile play areas by LAU. Map and monitor the location and intensity of snow compacting activities. The White Mountain National Forest has determined the Sawyer River Road a designated snowmobile trail.

Developed Recreation

Ensure that federal actions do not degrade or compromise landscape connectivity. Avoid new or expanded recreation development along ridgetops below tree line and along 5th order watercourses or larger.

Design trails, roads, and lift termini away from diurnal security habitat (security habitat is defined as an area that provides secure winter daytime bedding sites).

- Not Applicable.

Dispersed Recreation

Evaluate winter recreational special use permits (outside of permitted ski areas) that promotes snow compacting activities.

- The proposed parking lot improvements at the Sawyer River Snowmobile Trailhead to better accommodate vehicles with trailers would not change the current designation of the snowmachine trail as an over-the-snow route.
- The replacement of two footbridges on the Sawyer Pond Trail is also not considered an increase of an ‘over-the-snow’ route as the trail was and still is a designated trail.
- The Signal Ridge Trail is a designated hiking trail. The first quarter mile of this trail would be relocated to shift hikers away from Whiteface Brook improving conditions of

the softwood riparian habitat. The relocation would include obliterating the comparable current trail location. Therefore, the designation and construction of this trail is not considered a net increase of an 'over-the-snow' route.

The "no net increase" standard was developed because lynx have evolved to have a competitive advantage in deep soft snow. It is believed if coyote and bobcat were to enter into suitable lynx habitat via compacted over-the-snow routes, the suitability of the area for lynx would decline.

It is unlikely that lynx would have a competitive advantage over other predators in the proposed Project Area because of the existing snow machine trail on Sawyer River Road and the relatively low elevation of the Project Area (between 800 feet and 1800 feet). When reviewing snow conditions on the White Mountain National Forest (unpublished information collected on snow depths by S. Fay 1999, White Mountain National Forest), it was concluded that snow conditions in higher elevation areas (>2500') could provide a competitive edge for lynx during the winter months. It was also recognized that while low elevation softwood and mixedwood habitats (<2500') may provide lynx habitat, it is likely that winter snow conditions during some years provide equal access for lynx, bobcat and other predators (USFS 2000e).

The concern is where trailheads within the Project Area lead to higher elevations (>2500) within areas of more suitable lynx habitat (e.g. Carrigain Ridge) due to its remoteness and softwood cover. Winter utilization of the Signal Ridge Trail is currently considered low. The potential for it to increase in the future is considered high based on the overall increase in winter activities on the WMNF over the past 10 years. It is unknown at this time whether the existence of this trail and the potential increase in use of it as a hiking trail during the winter would have an effect on what is considered suitable lynx habitat at higher elevations.

Determination

Based on this review, it is my determination that **all Alternatives are consistent with the Conservation Measures outlined in the Canada Lynx Conservation Assessment and Strategy.**

REGIONAL FORESTER'S LISTED SPECIES

EASTERN SMALL-FOOTED MYOTIS (*Myotis leibei*)

Very little information is available about eastern small-footed myotis in New England. This species hibernates in caves and abandoned mines during the winter (DeGraaf and Yamasaki 2001, Godin 1977, Kiser et al. 2001). This species tolerates colder temperatures than other bat species in New England, entering hibernation in late November and leaving in early April (DeGraaf and Yamasaki 2001).

Small maternity colonies or individuals may roost during non-hibernating times in crevices on exposed

rock on the ground and on cliffs, under rocks on the ground, in buildings, on bridges, and on occasion under loose bark on trees (DeGraaf and Yamasaki 2001, Kiser et al. 1995:65, Harvey, 2002). The more common characteristics of a roost site are exposure to the sun and proximity to water (Harvey 2002).

In Virginia, eastern small-footed bats were often captured in mist nets along forested ridge tops in proximity to abundant exposed rock outcrops (Harvey 2002). Areas of regeneration, small forest openings, and over water are assumed to provide foraging habitat for most bat species of the New England area (DeGraaf and Yamasaki 2001, Krusic et al. 1996, Harvey 2002). It could be assumed that eastern small-footed myotis utilize foraging habitat similar to the common bats species of the area: over open, still water and the edge habitat of forest openings, but with a preference for areas in proximity to rocky outcrops or ridge tops.

Occupied and Unoccupied Habitats

There is a documented capture of one *M. leibii* east of the project area in the Bartlett Experimental Forest (Yamasaki, personal communication 2003). Of approximately 360 bats caught in mist nets and harp traps on the Forest during the summers 1992-94, none were suspected of being a small-footed myotis (Krusic 1995, Krusic et al. 1996, Sasse 1995). The WMNF contracted bat surveys to occur at 8 locations across the Forest the summer of 2002. No small-footed myotis were caught during these surveys (Chenger 2002). A winter hibernacula used by an individual of this species occurs over 25 miles from the proposed project area. Banding returns indicated this species travels relatively short distances (less than 25 miles) between summer habitats and winter hibernacula (DaGraaf and Yamasaki 2001). The analysis area contains some rock outcroppings, several bridges, buildings (private and FS owned) all surrounded primarily by mature northern hardwoods.

Direct and Indirect Effects

NO-ACTION ALTERNATIVE

There would be no direct or indirect effects on eastern small-footed myotis from the No Action Alternative.

Direct and indirect effects from the ACTION ALTERNATIVES:

It will be assumed small-footed myotis has similar habits to the common bat species in NH due to the dearth of information on the foraging and roosting habits of this species. Recent literature indicates maternity roosts and individual roosts occur primarily in rock crevasses, bridge joints, and buildings exposed to the sun.

There are no cliffs or ledges within the Analysis area of the County Line project. Harts Ledge lies to the north and is within a mile of the Analysis area. These ledges lie on private land and would not be affected by this project. Expectations are small-footed bats could roost in this area and forage within the

analysis area.

Direct effects to eastern small-footed myotis could occur from all Action Alternatives for units with proposed summer (June, July, August) or fall (September to December) harvest. It is unlikely that winter harvesting (December through March) would directly affect eastern small-footed myotis in northern New Hampshire. While eastern small-footed myotis may leave hibernation as early as March, harvest is usually stopped until snowmelt is done and soils have dried, typically sometime in May or June. Tree removal in the summer or fall could displace or result in direct mortality of roosting bats or cause abandonment of roost sites. The potential for this effect is minimal as the literature indicates that eastern small-footed myotis prefer to roost in rocky outcrops, buildings or other structures

Indirect effects would be a temporary increase in assumed foraging habitat by increasing openings through clearcuts and/or group cuts.

The low likelihood of this species occurring on the White Mountain National Forest as well as the small percentage of habitat affected by removal of trees during the summer and early fall minimize the potential for a negative effect on this species.

Cumulative Effects

Over the last ten to fifteen years, no timber harvests have occurred within the analysis area. Logging did occur on the nine acres of private inholding approximately 12 years ago but this has since grown into a young age-class. The County Line project would initiate habitat diversity in an area that has not had vegetative diversity during the past 15 years.

No other projects are planned in the near future within the vicinity of this project. Streams, roads, trails, etc. are expected to remain for use as travel corridors.

Forest Plan Standards and Guidelines (USFS 1986a) that provide a diversity of habitat conditions (Forest Plan-III-13), reserve large wildlife trees in managed units, retain standing dead trees where possible (Forest Plan-III-15), and maintain riparian habitats (Forest Plan-III-18) should ensure that adequate habitat is maintained for eastern small-footed myotis. Additionally implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000) as incorporated in the Forest Plan amendment (USFS 2001c), should also maintain habitat components needed by eastern small-footed myotis.

Effects Determination

In view of all the information available, it is my determination that the **No Action Alternative would have no impact and that the Action Alternative may impact individual eastern small-footed myotis**

but would not likely cause a trend toward federal listing or loss of viability.

NORTHERN BOG LEMMING (*Synaptomys borealis sphagnicola*)

Northern bog lemmings are extremely rare in New England and the WMNF lies on the southern edge of this species' range. Of the few specimens collected in the eastern United States, two were collected in the alpine habitats (Clough and Albright 1987). They have been found throughout its range at elevations from 1312 to 4510 feet in mossy spruce woods, low elevations spruce-fir, hemlock and beech forests, sphagnum bogs, damp weedy meadows, and alpine sedge meadows (Clough and Albright 1987), DeGraaf and Yamasaki, 2001). A directed search for this species on the White Mountain National Forest has focused on 115A and 6E ecological land types (ELT) as well as boggy and mucky area. Softwoods habitat generally characterized these ELT's. One individual northern bog lemming was trapped in ELT 315A (similar to ELT 115A with pine in the overstory) in the eastern portion of the Forest in 1996 (unpublished data).

Little is known about its behavior. They may construct crisscrossing runways above ground or may burrow just beneath the leaf mold. They may be found in colonies and in the burrows of other small mammals. They forage on grasses, sedges, seeds and fungi. (DeGraaf and Yamasaki, 2001).

Northern bog lemmings appear to prefer sedge meadows and sphagnum bogs. They also inhabit weedy fields, riparian areas, mossy spruce woods, and hemlock and beech forests. In upland habitats they prefer thick understory and ground cover (DeGraaf and Yamasaki, 2001; DeGraaf et al 1992; Godin 1977). This species uses burrows above and below the ground and may construct nests up to several inches below the ground. They are vegetarians feeding primarily on grasses, sedges, seeds, and fungi.

Occupied and Unoccupied Habitats

No northern bog lemmings have been documented in or near the analysis area.

Of the few specimens collected in the eastern United States, two were collected in alpine habitats (Clough and Albright 1987). Sampling of small mammal populations was conducted from 1992 to 1997 (with directive searches for northern bog lemmings from 1995 through 1997) on the WMNF. A directed search for this species on the White Mountain National Forest focused on 115A and 6E ecological land types (ELT) as well as boggy and mucky areas. Softwood habitat generally characterizes these ELT's. One individual was detected during these surveys in a low elevation mixedwood area near a stream (Yamasaki, unpublished data).

Northern bog lemmings have not been documented in or near the analysis area. Existing vegetative cover within the analysis area includes riparian areas along Sawyer River, Carrigain Brook, the Saco

River and Stony Brook. These areas are considered potential habitat for this species, however probability of occurrence is assumed to be very low.

Direct and Indirect Effects

The No Action Alternative would have no direct or indirect effect on northern bog lemming.

All Action Alternatives could have direct effects on the northern bog lemming. Direct effects may occur when heavy machinery compacts snow or soil potentially disturbing or displacing individuals. The potential for displacing individuals is minimal under all Action Alternatives, as the wetter portions of all units would be deferred from treatment. Additionally skid trails would be designated to avoid wet areas.

There would be minimal indirect effects on the northern bog lemming under any of the Action Alternatives as potential habitat where northern bog lemmings may occur would still be suitable upon completion of harvesting operations.

Cumulative Effects

Over the last ten to fifteen years, no timber harvests have occurred within the analysis area. Logging did occur on the nine acres of private inholding approximately 12 years ago but this has since grown into a young age-class. The County Line project would initiate habitat diversity in an area that has not had vegetative diversity during the past 15 years. Past activities may have benefited or displaced northern bog lemmings if they inhabited the area. It is assumed implementation of this project may impact northern bog lemmings in a similar fashion. Currently no other projects are planned in the near future within the analysis area and it is unknown if projects are planned on surrounding private land.

Forest Plan Standards and Guidelines maintain a diversity of habitats (Forest Plan III, 12-13) and protect riparian habitats (Forest Plan III-19). It is expected these would minimize negative effects and provide adequate habitat for northern bog lemming.

Effects Determination

Based on review of available information, it is my determination that the **No Action Alternative would have no impact and that all Action Alternatives may impact individual northern bog lemmings but would not likely cause a trend toward federal listing or loss of viability.**

Table 2

Biological Evaluation:

Review of federally endangered, threatened, and proposed species and Region 9 sensitive species for **County Line Project**, Towns of Livermore, Grafton County, and Harts Location, Carroll County, New Hampshire.

April 2003

FEDERALLY THREATENED AND ENDANGERED SPECIES					
Species	Habitat Requirements	Sightings (Present or Historical) within the Analysis Area	Suitable Habitat within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
MAMMALS					
**Eastern Gray Wolf <i>Canus lupus</i>	Large expanses of forested habitat, with adequate prey base.	NO	YES	NO	Species is Extirpated. All alternatives maintain forested habitat with moose and deer.
**Eastern Cougar <i>Felis concolor cougar</i>	Large expanses of forested habitat, which has adequate populations of deer.	NO	YES	NO	Species is Extirpated. All alternatives maintain forested habitat with moose and deer.
**Canada lynx <i>Felis lynx canadensis</i>	Favor coniferous or mixedwood forests frequented by snowshoe hare. Travel corridors include ridges, saddles, and riparian corridors.	NO	YES	Possibly	Species is Extirpated. The analysis area contains potential suitable and unsuitable lynx habitat based on WMNF interpretation of habitat guidelines defined in Lynx Conservation Assessment and Strategy (USFS 2000a) YES
Indiana Bat <i>Myotis sodalis</i>	Roost primarily under exfoliating bark in upland woodlots and riparian forest. Prefer dead or nearly dead trees. Will alter roost sites often. Forages in the foliage of upper canopy trees along rivers, lakes and open areas. Winter hibernacula include caves and old mines.	NO	SUSPECT	Possibly	Analysis and Project Area contains suitable roost trees

BIRDS					
Bald Eagle <i>Haliaeetus leucocephalus</i>	Large bodies of water with fish and large trees nearby for nesting.	NO	NO	NO	No large bodies of water in Analysis Area.
PLANTS					
Small-whorled Pogonia <i>Isotria medeoloides</i>	Open woods with an oak component. Less than 1500' elevation. Enriched hardpan soils or presence of ledge.	NO	NO	NO	Unit 10 has oak component, however potential habitat within analysis area using method developed by Sperduto 1988.

Species	Habitat Requirements	Sightings (Present or Historical) within the Analysis Area	Suitable Habitat within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
REGIONAL FORESTER'S SENSITIVE SPECIES					
MAMMALS					
Eastern Small-footed Bat <i>Myotis leibii</i>	Winter hibernacula include caves, mines, and old buildings. Roost sites include rocky ridgetops and outcrops, cliff faces, buildings, and bridges.	NO	SUSPECT	Possibly	No caves present. Pvt. Inholding has buildings. Some scattered rock crevasses.
Northern Bog Lemming <i>Synaptomys borealis sphagnicola</i>	Prefers sedge meadows and bogs. Other habitats include riparian areas, openings, krummholz, and softwoods. Requires moist to wet loose soils. Prefers dense herbaceous or mossy understory. Uses burrows.	NO	SUSPECT	Possibly	Riparian areas and softwoods present.
BIRDS					
Bicknell's Thrush <i>Catharus bicknelli</i>	Spruce, fir, birch, and krummholz communities of high elevations (>3000').	YES	YES	NO	Has been documented along Carrigain ridge, but the harvest units are at least 2 miles away, lower in elevation, and therefore outside of suitable habitat.
American Peregrine Falcon <i>Falco peregrinus anatum</i>	Requires cliff faces for nesting. Feeds on birds. Forages in open areas.	NO	NO	NO	No cliffs present in analysis or project area
Common Loon <i>Gavia immer</i>	Lakes and ponds at least ¼ mile long. Nests on water's edge. Require adequate prey base of small fish, amphibians to feed young.	NO	NO	NO	No large lakes or ponds
**Migrant Loggerhead Shrike <i>Lanius ludovicianus migrans</i>	Grasslands with scattered trees and shrubs.	NO	NO	NO	No grasslands present in analysis area.
REPTILES					

Species	Habitat Requirements	Sightings (Present or Historical) within the Analysis Area?	Suitable Habitat within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Wood Turtle <i>Clemmys insculpta</i>	Riparian areas of slower moving streams. Wooded or heavily vegetated stream banks as well as fields and meadows used for foraging. Hibernates in stream bottoms or muddy banks. Sandy and gravelly areas used for nesting sites.	NO	NO	NO	Streams too rocky and fast moving with no muddy, sandy or gravelly areas for nesting..
**Timber Rattlesnake <i>Crotalus horridus</i>	Rocky south-facing outcrops or ledges.	NO	NO	NO	Species Extirpated. No south-facing rocky outcrops or ledges.
INSECTS					
White Mountain Fritillary <i>Boloria chariclea montina</i>	Alpine. Inhabits lush, moist areas near sheltered spots, wet springs, and rocky outcrops above 4500'. Alpine goldenrod common food plant Larval host unknown but may be blueberry or willow.	NO	NO	NO	Not alpine
White Mountain Butterfly <i>Oenesis melissa semidea</i>	Alpine. Prefers sedge meadows. Adult host plant unknown. Larva feed on Bigelow's Sedge.	NO	NO	NO	Not alpine
PLANTS					
Arnica <i>Arnica lanceolata</i>	Alpine ravines, damp banks and rock ledges. At low elevations on rocky river banks, gravel bars, beaches, and alluvial flats of rivers and streams at low elevations.	NO	SUSPECT	NO	Not alpine, no ledges but rocky river banks, gravel bars. Field survey indicated non-presence.
Dwarf White Birch <i>Betula minor</i>	Bogs and wet, rocky alpine slopes, summits and gullies. Acidic rocky barrens and peaks.	NO	NO	NO	Not alpine, no bogs or rocky slopes.
Pond Reed Bent-grass <i>Calamagrostis lacustris</i>	Alpine and subalpine areas of wet rocky or gravelly sites. Wet ledges. Streamside meadows.	NO	SUSPECT	NO	Not alpine, but wet ledges and Sawyer River present. Field survey indicated non-presence.
Alpine Bitter Cress <i>Cardamine bellidifolia</i>	Cold ravines or on wet mossy rocks in the alpine area.	NO	NO	NO	Not alpine

Species	Habitat Requirements	Sightings (Present or Historical) within the Analysis Area?	Suitable Habitat within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Bailey's Sedge <i>Carex baileyi</i>	Wetland species of fens, swampy woods and meadows of calcareous soils. Ditches and disturbed openings on calcareous soils.	NO	NO	NO	Ditches exist along all roads but no calcareous soils or swampy woods in project area..
Piled-up Sedge <i>Carex cumulata</i>	Open ledges, dry sandy soils; open oak forests or hardwood talus; clearings; burned oak-pine rocky summit woodlands.	NO	NO	NO	No open ledges, clearings, burned summits.
Weigand's Sedge <i>Carex weigandii</i>	Boggy or peaty soils, boreal bogs; acidic soils of drier, shrubby, sometimes disturbed, margins of acidic sphagnum bogs or poor fens.	NO	NO	NO	No boggy soils
Squirrel Corn <i>Dicentra canadensis</i>	Rich, moist, deciduous woods	NO	SUSPECT	NO	Small areas of enriched habitat present outside harvest areas.
Goldie's Woodfern <i>Dryopteris goldiana</i>	Rich, damp woods of calcareous soils. Rich mesic forests.	NO	NO	NO	Small areas of enriched habitat, but no calcareous soils present
Oakes' Eyebright <i>Euphrasia oakesii</i>	Alpine. Exposed gravelly slopes or ledges or open ledgy areas.	NO	NO	NO	Not alpine
Proliferous Red Fescue <i>Festuca rubra ssp arctica = var prolifera</i>	Alpine. Rocky or peaty soils.	NO	NO	NO	Not alpine
Northern Comandra <i>Geocaulon lividum</i>	Peat bogs at high altitudes. Damp humus in spruce-fir woods at med to high elevation (fir waves);	NO	NO	NO	Analysis area not high enough in elevation
Mountain Avens <i>Geum peckii</i>	Moist alpine areas. Snowbank, wet meadow, streamside communities in the alpine. Occurs rarely at low elevation sites, in rocky streams.	NO	NO	NO	Not alpine
Butternut <i>Juglans cineria</i>	Rich, moist, alluvial soils and dry, rocky hillsides with limestone. Old farmsteads.	NO	SUSPECT	NO	Small areas of enriched habitat present; old farmstead is present, but field survey indicated non-presence.

Species	Habitat Requirements	Sightings (Present or Historical) within the Analysis Area?	Suitable Habitat within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Auricled Twayblade <i>Listera auriculata</i>	Temporarily flooded and seasonally ice-scoured riverbanks with calcareous soils. Stream banks, mossy woods, alder thickets, boggy alluvial woods, cedar swamps, gravel riverbank, and lake and pond shores	NO	NO	NO	No calcareous soils. Streambanks not mossy, no alder thickets,
Broad-leaved Twayblade <i>Listera convallarioides</i>	Wet, cold woods, usually in deep shade; peaty glades, spruce/fir woods; thickets, nutrient poor mossy-forested seeps.	NO	NO	NO	No wet woods or peaty glades.
Heartleaf Twayblade <i>Listera cordata</i>	Wet cold, woods and sphagnum bogs; sub-alpine scrub; bases of wet, seepy ledges, outcrops/cliffs, spruce/fir woods on lime.	NO	NO	NO	No sphagnum bogs, seepy ledges.
Alpine Cudweed <i>Omalotheca supina</i>	Gravelly slopes and ravines at high altitudes; exposed alpine areas and snowbank communities.	NO	NO	NO	Not alpine.
Canada Mountain Ricegrass <i>Oryzopsis canadensis</i>	Dry, rocky openings just below treeline and into krummholz zone; sandy deciduous woodlands; early successional plant communities; along sandy roadsides, and on open, sparsely brushy ground.	NO	NO	NO	No rocky openings, roadsides and adjacent woodlands not sandy.
Mountain Sweet-Cicely <i>Osmorhiza berteroi</i>	Rich, moist, deciduous, shaded woods. Recently found on Bog Dam road in ditch.	NO	SUSPECT	NO	Small areas of enriched habitat present, but field survey indicated non-presence.
American Ginseng <i>Panax quinquefolius</i>	Moist soils of almost any type. Often cool, rich, rocky, deciduous, woods with shrubby underbrush. Semi-mesic forests w/ rocky, thick humus of colluvial soils.	YES	YES	Possibly	Yes. Ginseng has been documented in the Analysis area and close to the Project Area.
White Mountain Silverling <i>Paronychia argyrocoma (ME)</i> <i>Var albimontana (NH)</i>	Mid-elevation, bare rocky summits, ledges, and cliffs; sand/gravel barrens of Saco River between Bartlett and Fryeberg.	NO	SUSPECT	NO	Potential habitat on Mt. Carrigain. Suitable habitat is outside the project area.

Species	Habitat Requirements	Sightings (Present or Historical) within the Analysis Area?	Suitable Habitat within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Sweet Coltsfoot <i>Petasites frigidus var palmatus</i>	Swampy woods, meadows with calcareous soils. White cedar swamps.	NO	NO	NO	No cedar swamps or wet meadows
Wavy Bluegrass <i>Poa fernaldiana</i>	Alpine gardens in Presidential and Franconia Mts.	NO	NO	NO	Not alpine
Boott's Rattlesnake Root <i>Prenanthes boottii</i>	Variety of alpine habitats, moist tundra, steep cirque ledges and crests, and disturbed alpine sites such as trailsides and hut areas	NO	NO	NO	Not alpine
Pink Wintergreen <i>Pyrola asarifolia</i>	Rich, moist woods and bogs of calcareous soils. Moist alluvial soil of lower river terrace forests. Spruce/fir forests. Prefers areas around wetlands/	NO	SUSPECT	NO	Small areas of enriched habitat present but field survey indicated non-presence.
Robbin's Cinquefoil <i>Potentilla robbinsiana</i>	Alpine zone in Presidential Range of WMNF.	NO	NO	NO	Not alpine
Livelong Saxifrage <i>Saxifraga paniculata</i>	Alpine. Exposed calcareous, gravels and rocks; grows on limy seepy open cliffs of the calcareous open rocks/cliffs.	NO	NO	NO	Not alpine and no limy, seepy, open cliffs.
Moss Champion <i>Silene acaulis var exscapa</i>	Moist, alpine meadows. Gravelly barrens.	NO	NO	NO	Not alpine
Nodding Pogonia <i>Triphora trianthophora</i>	Mid-elevation beech hardwoods usually on south-facing slopes. Deep leaf litter with humus.	NO	SUSPECT	NO	South facing slopes at mid elevation with some beech present but field survey indicated non-presence.
Boreal Blueberry <i>Vaccinium boreale</i>	Alpine bogs, meadows of Presidential and Franconia Mts. Exposed gravelly or rocky sites.	NO	NO	NO	Not alpine

NA: Not Applicable

** Considered Extirpated from the White Mountain National Forest per US Fish and Wildlife Service

Appendix B

MANAGEMENT INDICATOR SPECIES

Management Indicator Species	Habitat the Species is Representing as a Management Indicator	Habitat Present in Analysis Area/Potential in Analysis Area	Documented or Suspected in Analysis Area	Regional Population Trend*	Habitat Trend#	Expected Changes from Project Implementation			
						Alternative 1	Alternative 2	Alternative 3	Alternative 4
Chestnut-sided warbler <i>Dendroica pensylvanica</i>	Regeneration–age Northern Hardwood/Mixedwd	Currently no regeneration-age but potential	Suspect	Declining	Declining	No Change as no habitat currently present	Suitable habitat increased by 153 acres	Suitable habitat increased by 36 acres	Suitable habitat increased by 51 acres
Northern Goshawk <i>Accipiter gentilis</i>	Mature and Overmature Northern Hardwood/Mixedwd	Yes	Suspect	Uncommon but Stable	Mature and overmature hardwood age class increasing in acres	Increase of suitable habitat by 1160 via succession	Eliminates nesting habitat on 153 acres.	Eliminates nesting habitat on 36 acres.	Eliminates nesting habitat on about 51 acres.
Broad-winged Hawk <i>Buteo platyperus</i>	Mature and Overmature Paper Birch and Aspen	No stands of PB or Asp, but present as a component of other stands	Suspect	Stable	Mature age class decreasing; overmature age class somewhat stable	No Change as no habitat currently present	Creation of 19 acres of paper birch and aspen habitat for future suitable habitat	No Change	Increased component of PB within clearcuts.
Ruffed Grouse <i>Bonasa umbellus</i>	All Ages of Aspen and Regeneration and Young Paper Birch	No stands of PB or Asp, but present as a component of other stands	Suspect	Declining or uncertain	Paper birch & aspen regen decreasing Young age classes increasing	No Change as no habitat currently present	Creation of 19 acres of paper birch and aspen habitat	No Change	Increased component of PB within clearcuts.
Rufous-sided Towhee <i>Pipilo erythrophthalmus</i>	Regeneration of Young Oak or Oak/Pine	No/No	No	Declining	Decreasing	N/A	N/A	N/A	N/A
Gray Squirrel <i>Sciurus carolinensis</i>	Mature and Overmature Oak or Oak/Pine	No/No	No	Stable	Stable	N/A	N/A	N/A	N/A
Northern Junco <i>Junco hyemalis</i>	Regeneration and Young Pine	No/Yes	Suspect (does utilize other habitats).	Slight decline	Decreasing	No change	No change	No change	No change
Pine Warbler <i>Dendroica pinus</i>	Mature and Overmature Pine	No/Yes	No	Increasing	Stable	No change	No change	No change	No change
White-tailed Deer <i>Odocoileus virginianus</i>	All Ages Hemlock during deep-snow winters.	No/No	Suspect (does utilize other habitats).	Stable	Stable to decreasing	N/A	N/A	N/A	N/A
Snowshoe Hare <i>Lepus americanus</i>	Regeneration of Young Spruce, Spruce/Fir and Fir	Yes, but primarily outside project area	Suspect: have seen evidence of presence in analysis area.	Stable to increasing	Decreasing	No change	Initiate conversion to S/F on 36 acres; enhance S/F on 39 acres.	Initiate conversion to S/F on 5 acres.	Initiate conversion to S/F on 36 acres; enhance S/F on 20 acres.
Cape May Warbler <i>Dendroica tigrina</i>	Mature and Overmature Spruce, Spruce/Fir and Fir	Yes, but primarily outside project area	No	Stable/fluctuate with spruce budworm outbreaks	Increasing	No change	Initiate conversion to S/F on 36 acres; enhance S/F on 39 acres.	Initiate conversion to S/F on 5 acres.	Initiate conversion to S/F on 36 acres; enhance S/F on 20 acres.

Appendix B

MANAGEMENT INDICATOR SPECIES

Management Indicator Species	Habitat the Species is Representing as a Management Indicator	Habitat Present in Analysis Area/Potential in Analysis Area	Documented or Suspected in Analysis Area	Regional Population Trend*	Habitat Trend#	Expected Changes from Project Implementation			
						Alternative 1	Alternative 2	Alternative 3	Alternative 4
Eastern Kingbird <i>Tyrannus tyrannus</i>	Upland Openings – Grass, Forb, Orchard	No/Yes	No (Livermore orchard considered too small for these species)	Declining	Stable to decreasing	No change	No change	No change	No change
Eastern Bluebird <i>Sialia sialis</i>									
Mourning Warbler <i>Oporornis philadelphia</i>	Upland Openings-Shrub	No/Yes	Suspect	Stable	Decreasing	No Change as no habitat currently present	Suitable habitat increased by 153 acres	Suitable habitat increased by 36 acres	Suitable habitat increased by 51 acres
Black Duck <i>Anas rubripes</i>	Wetlands and Water	No/No	No	Declining	Fluctuates with beaver activity	N/A	N/A	N/A	N/A
Brook Trout <i>Salvelinus fontinalis</i>	Permanent Lakes, Ponds, Streams	Yes	Yes	Stable	Stable	No change	No change	No change	No change
Peregrine Falcon <i>Falco peregrinus</i>	Cliffs and Talus	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A
American Marten <i>Martes americana</i>	Forest that is 30+’ tall with at least 80 ft ² of basal area	Yes	Suspect	Increasing	Increasing	No change	Decreases habitat on 342 acres via reduction of basal area.	Decreases habitat on 200 acres via reduction of basal area.	Decreases habitat on 221 acres via reduction of basal area.
Osprey <i>Pandion haliaetus</i>	Large water bodies	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A
Common Loon <i>Gavia immer</i>	Large water bodies	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A
Sunapee Trout <i>Salvelinus aureolus</i>	Deep cold water bodies with shallow gravel bars	No/No	No	Considered extirpated from WMNF	Stable	N/A	N/A	N/A	N/A
Robbin’s Cinquefoil <i>Potentilla robbinsiana</i>	Alpine	No/No	No	Stable/Increasing; Delisted in 2002	Stable	N/A	N/A	N/A	N/A
Canada Lynx <i>Lynx canadensis</i>	Dense softwoods	Yes, suitable habitat in Units 3, 4, 5, 6, 7, 11, 13 and parts of 8, 9, 12, 15, 35 and 42.	No	Considered Extirpated from WMNF	Increasing	No change	Initiate conversion to S/F on 36 acres; enhance S/F on 39 acres.	Initiate conversion to S/F on 5 acres.	Initiate conversion to S/F on 36 acres; enhance S/F on 20 acres.

Appendix B

MANAGEMENT INDICATOR SPECIES

Management Indicator Species	Habitat the Species is Representing as a Management Indicator	Habitat Present in Analysis Area/Potential in Analysis Area	Documented or Suspected in Analysis Area	Regional Population Trend*	Habitat Trend#	Expected Changes from Project Implementation			
						Alternative 1	Alternative 2	Alternative 3	Alternative 4
Gray-cheeked Thrush (now Bicknell's Thrush) <i>Catharus bicknelli</i> Blackpoll Warbler <i>Dendroica striata</i>	High elevation spruce/fir	No/No	No	Declining Stable?/fluctuate with spruce budworm outbreaks	Stable	N/A	N/A	N/A	N/A

NA Not Applicable as the habitat is not present nor expected in the analysis area.

*USDA Forest Service. 2001. Evaluation of Wildlife Monitoring and Population Viability WMNF Management Indicator Species. White Mountain National Forest, Laconia, NH.

#USDA Forest Service. 1991. 1993. 1994. 1995. 1996. 2000. Monitoring Reports, White Mountain National Forest, Laconia, NH

USDA Forest Service. 2001. Analysis of the Management Situation for Wildlife, White Mountain National Forest, Laconia, NH

USDA Forest Service. 2003. CDS database

Trani et. al. 2001. Patterns and trends of early successional forests in the eastern United States *in* Conservation of Woody, Early Successional Habitats and Wildlife in the Eastern United States. Wildlife Society Bulletin 2001 29(2): 407-494.

Appendix C

Management Systems and Harvest Methods

Management systems are long-term strategies to regulate inventories and harvest outputs in forest stands. The major systems are even-aged, uneven-aged and two-aged management. Harvest methods are the means used to implement these strategies. They refer to the methods used to foster stand development, including structure, species, and growth rates, and to encourage reproduction in the stand.

Even-aged management consists of growing stands of a single age class for an identified time period, known as a rotation. This mimics the way many species grow naturally. At the end of a rotation a new stand is initiated either by a single removal cut (clearcut) or a series of cuts over a relatively short time (shelterwood or seedtree). Seedtree and shelterwood cuttings involve leaving a scattered layer of mature trees to provide seed or shelter for new regeneration. In the White Mountain National Forest, where seed is usually abundant and most of the hardwood species sprout from the stump when cut, clearcutting is the most efficient evenaged regeneration method. This method is most efficient regarding the short time frame that is required to re-establish a new stand that maximizes utilization of the site in terms of growth or volume production.

Uneven-aged management creates a stand where several different age or size classes occupy the same stand and perhaps the same acre. Each harvest in the stand is a regeneration harvest creating space for new seedlings. It also releases the residual trees from competition, allowing them to increase growth and vigor. Under uneven-age management, the stand is harvested more frequently than with an evenaged system, usually about every 15 years.

Harvest Method

Harvest method refers to the selection of numbers of trees and species of trees to be removed from a stand, and over a specified time period. The harvest methods (or silvicultural prescriptions) proposed for this sale are listed below.

Clearcutting - In a clearcutting operation the entire stand is cleared so that a (generally) single-aged generation of trees can colonize the site under full sunlight. White Mountain National Forest Plan standards require a quarter to half acre reserve patch for every ten acres clearcut. Following a clearcut harvest, the new stand of trees can originate from any combination of wind-born seed (most species except oak and beech), animal deposited seed (e.g., oaks and beech), seed accumulations in the soil (e.g., pin cherry), re-sprouting from stumps (e.g. many hardwood species, no local conifers) and advanced (pre-existing) regeneration of any species (very common in conifer stands and with shade-tolerant hardwoods). The new generation of trees usually forms a closed-canopy seedling layer in five to seven years. Clearcutting can be used to address growth repression resulting from advancing age, excessive crowding, and disease or disturbance history. Clearcutting is also the primary method for producing early successional wildlife habitat.

Seed tree - A seed tree cut is a regeneration harvest very much like a clearcut except that a certain amount of trees are retained throughout the opening to provide a seed source. The "seed trees" enhance regeneration chances of selected species, especially species such as oak, which have relatively large heavy seeds. These seed trees may be removed at the end of five to ten years, or simply left.

Commercial Thinning - Thinning is a silvicultural treatment done in younger stands where the density of trees is greater than needed to utilize the site and often too great to maximize individual tree growth

and vigor. The operation consists of harvesting individual trees in a regular pattern throughout the stand. Trees selected for cutting are either surplus to stocking needs or undesirable from the standpoint of species or growth potential. The residual stand is moderately stocked and consists of individual trees with an above-average capacity for growth. Growing space and site resources of light, water and nutrients that once supported the entire stand are more available to the remaining trees. Tree growth may accelerate or continue at about the same rate, depending on the degree of crowding prior to the cutting. Relief from crowding improves the merchantable volume, overall quality and market value of the residual trees in the stand. Regeneration is not a goal of thinning. Improving the species composition and wood quality of a stand for potential future harvest is a goal of thinning.

Single-Tree Selection - Individual trees are removed in a regular pattern throughout the stand; but unlike thinning, some trees are removed from each merchantable size class, from each age class, and from each level of the stand canopy. The selection cuttings are repeated at intervals of ten to twenty years. Growing space and productivity are influenced in two ways. Tree removals create gaps throughout the stand canopy. Larger canopy gaps made by the removal of one-to-several dominant and co-dominant trees would allow light to reach the forest floor and provide growing space for reproduction. These openings are from 1/100th to 1/10th acre in size. Single-tree selection results in approximately one sixth of the unit in openings following treatment. Gaps of all sizes made by removal of individual upper and mid-canopy trees create growing space for crown and root expansion of neighboring trees. This results in their increased growth and vigor. Regeneration is a continuous process, with new generations of trees initiated in a regular pattern throughout the stand with each subsequent harvest entry.

Group Selection - This method appears as a pattern of small openings throughout a stand, usually covering about one-sixth of the land area in the stand. The cuttings are repeated at intervals of 15-20 years. In practice, individual openings average one-half acre in size, though Forest Plan definition allows for openings up to two acres. Reproduction is a continuous process, with new generations of trees colonizing each successive opening. The distinction between group selection openings and clearcuts is the pattern and size of the cleared area. A larger percentage of exposed ground in a group selection unit is shaded by adjacent trees, favoring shade-tolerant and intermediate species.

Shelterwood - Using this harvest method, a stand is harvested down to 20-30 Basal Area per acre, an estimated 25 trees per acre, under which understory regeneration is allowed to establish. The two "stories" of the stand are then allowed to develop, resulting in a "two-aged" condition. Some of the overstory could be harvested once the understory becomes well established. In this project, the intent is to open the stand sufficiently to allow for low intensity underburning that is expected to foster the development of oak regeneration. Oak is a pioneering species that will compete with other pioneering species provided the seedlings and saplings are able to get adequate sunlight.

Appendix D

Acronyms & Abbreviation List

The following acronyms and abbreviations may be found in this document.

Ac	Acres	MBF	Thousand Board Feet
BA	Biological Assessment	NEFE	Northeast Forest Experiment Station
BE	Biological Evaluation	NEPA	National Environmental Policy Act
BMPs	Best Management Practices	NF	National Forest
C	Centigrade	NFMA	National Forest Management Act
CEQ	Council on Environmental Quality	NH	New Hampshire
CFR	Code of Federal Regulations	NHFG	New Hampshire Fish & Game
DN	Decision Notice	NHNHI	New Hampshire Natural Heritage Inventory
EA	Environmental Assessment	NMFS	National Marine Fisheries Service
EIS	Environmental Impact Statement	NO3	Nitrogen Dioxide
ELT	Ecological Land Type	(NO ₃)	
EPA	Environmental Protection Agency	O3 (O ₃)	Ozone
ESA	Endangered Species Act	p.	page
FEIS	Final Environmental Impact Statement	pp.	pages
FOIA	Freedom of Information Act	PAOT	People At One Time
FONSI	Finding of No Significant Impact	Pb	Lead
FP	Forest Plan		A chemical term for the
FR	Forest Road	pH	hydrogen ion concentration of a solution
FS	Forest Service	PILT	Payment in Lieu of Taxes
FSH	Forest Service Handbook	PM	Particulate Matter
FSM	Forest Service Manual	ppb	Parts per Billion
Ft	Feet	ppm	Parts per Million
FY	Fiscal Year	R9	Region Nine
GIS	Geographical Information System	RD	Ranger District
HMU	Habitat Management Unit	ROD	Record of Decision
IDT	Interdisciplinary Team	ROS	Recreation Opportunity Spectrum
K-V	Knutson-Vanderberg		Forest and Rangeland
LAU	Lynx Analysis Unit	RPA	Renewable Resources Planning Act
LCAS	Lynx Conservation Strategy	RVD	Recreation Visitor Days
LTA	Land Type Association	S & G	Standards & Guidelines
LRMP	Land and Resource Management Plan	SO2	Sulphur Dioxide
MBTA	Migratory Bird Treaty Act	T & E	Threatened and Endangered
MIS	Management Indicator Species	TESSC	Threatened, Endangered, & Species of Special Concern
MMBF	Million Board Feet		

TEPS	Threatened, Endangered, Proposed, & Sensitive Species	USFWS	United States Fish & Wildlife Service
USDA	United States Department of Agriculture	VQO	Visual Quality Objectives
USDI	United States Department of the Interior	WMNF	White Mountain National Forest

Appendix E - 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, or at a given stage (sere) of plant succession, an ELT is usually occupied by a predictable and relatively uniform plant community. Typical size of an ELT area is generally 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.

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.

Millwood minimum piece specification requires a minimum diameter outside bark of 8.0 inches for paper birch and 50 percent sound wood.

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

Chipwood refers to utilization of that material beyond the merchantable top, including branches and the top. Chipwood does not meet minimum piece specifications for pulpwood.

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. An interdisciplinary team is assembled because no single scientific discipline is sufficient to adequately identify and resolve issues and problems. Team member interaction provides necessary insight to all stages of the process.

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 - 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. (mixed wood) 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.

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

"Q" Factor - A method used in uneven-aged management to express the desired number of trees by diameter class. A "Q" factor of 1.5 means that each diameter class would have 1.5 times the number of trees than the next highest diameter class.

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 that 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.

Ton - A measure of volume for chipwood.

Appendix F

REFERENCES AND LITERATURE CITED

Hydrologic Input

- Brown, G.W. 1983. **Forestry and Water Quality**. OSU Book Stores, College of Forestry, OSU, Corvallis, OR.
- Dingman, S.L. and K.J. Palaia. 1999. **Comparison of Models for Estimating Flood Quantiles in New Hampshire and Vermont**. Journal of the American Water Resources Assoc., vol.35, no.5.
- Farrish, K.W., J.C. Adams, and C.V. Thompson. 1993. **Soil conservation practices on clearcut forests in Louisiana**. Journal of Soil and Water Conservation, 48(2), 136-139.
- Gilliam, J.W. 1994. **Riparian wetlands and water quality**. Journal Environmental Quality, 23 (5) 896-900.
- Hornbeck, J.W, G.E. Likens, R.S. Pierce, and F.H. Bormann. 1973. **Stripcutting as a means of protecting site and streamflow quality when clearcutting Northern hardwoods**. In: Forest Soils and Forest Land Management, Proc. 4th North American Forest Soil Conf., Laval Univ. Press, Quebec, Canada.
- Hornbeck, J.W, C.W. Martin, and C. Eager. 1997. **Summary of water yield experiments at Hubbard Brook Experimental Forest, New Hampshire**. Can. J. For. Res., 27, p. 2043-2052.
- Hornbeck, J.W., M.B. Adams, E.S. Corbett, E.S. Verry, J.A. Lynch. 1993. **Long-term impacts of forest treatments on water yield: a summary for northeastern USA**. Journal of Hydrology 150(1993):323-344.
- Hornbeck, J.W., C.W. Martin, R.S. Pierce, F.H. Bormann, G.E. Likens, and J.S. Eaton. 1987. **The northern hardwood forest ecosystem: ten years of recovery from clearcutting**. USDA Forest Service, Research Paper NE-RP-596.
- Leopold, L.B., M.G. Wolman, and J.P. Miller. 1964. **Fluvial Processes in Geomorphology**. Unabridged Dover Publications, NY (1995) republication of the edition published by W.H. Freeman & Co., San Francisco, CA, 1964.
- Likens, G.E. and F.H. Bormann, 1995. **Biogeochemistry of a Forested Ecosystem**. 2nd Edition. Springer-Verlag, New York, New York.
- Likens, G.E., F.H. Bormann, N.M Johnson, D.W. Fisher, and R.S. Pierce, 1970. **Effects of forest cutting and herbicide treatment on nutrient budgets in the Hubbard Brook watershed ecosystem**. Ecological Monograph, 40:23-47.
- Martin, C.W. and R.S. Pierce. 1980. **Clearcutting patterns affect nitrate and calcium in streams of New Hampshire**. Journal of Forestry, 78 (5).

May, C.W., R.R. Horner, J. Karr, B.W. Mar, and E.B. Welch. 1997. **Effects of Urbanization on Small Streams in the Puget Sound Lowland Ecoregion.** Watershed Protection Techniques 2(4): 483-493.

Neary, D.G. and J.W. Hornbeck. 1994. **Impacts of harvesting and associated practices on off-site environmental quality.** In W.J. Dyck, D.W. Cole, and N.B. Comerford (eds), Impacts of Forest Harvesting on Long-term Site Productivity, Chapman & Hall, London.

Patric, J.H. 1980. **Effects of wood products harvest on forest soil and water relations.** Journal of Environmental Quality, 11(4).

Pierce, R.S., and J.W. Hornbeck, and G.E. Likens, and F.H. Bormann. 1970. **Effect of Elimination of Vegetation on Stream Water Quality and Quality.** IASH-Unesco, Symposium on the Results of research on representative and experimental basin, Wellington, New Zealand. Purchased by the USDA Forest Service for official use.

Pierce, R.S., C.W. Martin, C.C. Reeves, G.F. Likens, and F.H. Borman. 1972. **Nutrient loss from clearcutting in New Hampshire,** in Proceedings of a Symposium on Watersheds in Transition. S.C. Csallany, T.G. McLaughlin, and W.D. Striffler (editors). American Water Resources Association and Colorado State University.

Richter, D. 2000. **Soil and water effects of modern forest harvest practices in North Carolina.** Individual White Paper associated with the "Economic and Ecologic Impacts Associated with Wood Chip Production in North Carolina Study," Durham, NC: Southern Center for Sustainable

Forests, Duke University. <http://www.env.duke.edu/scsf/>. Accessed October 2002.

Schumm, S.A. 1977. **The Fluvial System.** Wiley and Sons, New York, New York.

Stafford, C, M. Leathers, and R. Briggs, 1996. **Forestry Related Nonpoint Source Pollution in Maine: A Literature Review.** Maine Agricultural and Forest Experiment Station, College of Natural Resources, Forestry and Agriculture, University of Maine, Orono, ME, Misc Report,399.

Stone, E.L., W.T. Swank, and J.W. Hornbeck. 1978. **Impacts of Timber Harvest and Regeneration Systems on Stream Flow and Soils in the Eastern Deciduous Region.** Forest Soil and Land Use, Proc. 5th North American Forestry Soils Conference, Colorado State University, August 1978.

Swank, W.T. and D.A. Crossley (editors). 1988. **Forest Hydrology and Ecology at Coweeta.** Springer-Verlag, NY. pages 297-312.

References and Literature Cited

Wildlife and Fisheries

- Bat Conservation International. 1997. Forest and Tree Use by U.S. Bats. www.batcon.org/treebats.html. Visited March 25, 2003.
- Best, T.L. and J.B. Jennings. 1997. *Myotis leibii* *in* Mammalian Species. No. 547, pp. 1-6.
- Brady, J.T.; LaVal, R.K.; Kunz, T.H.; Tuttle, M.D.; Wilson, D.E.; Clawson, R.L. 1983. Recovery Plan for the Indiana Bat. Washington, D.C.; USDI Fish and Wildlife Service. 23 p. + 6 appendices.
- Brocke, R.H., J.L. Belant, and K.A. Gustafson. 1993. Lynx population and habitat survey in the White Mountain National Forest, New Hampshire. State University of New York, College of Environmental Science and Forestry. 93pp. (unpublished report to White Mountain National Forest).
- Chenger, John. 2002. Summer Survey for New Hampshire Woodland Bats. Bat Conservation and Management, Carlisle, PA. 47 pp.
- Clough, C.C.; Albright, J.J. 1987. Occurrence of the northern bog lemming, *Synaptomis borealis*, in the northeastern United States. Canadian Field-Naturalist. 101:611-613.
- DeGraaf, R. M., M. Yamasaki. 2001. New England Wildlife: Habitat Natural History and Distribution. University Press of New England, Hanover, NH. 482 pp.
- _____, M. Yamasaki, W. B. Leak, and J. W. Lanier. 1992. New England Wildlife: Management of Forested Habitats. USDA Northeastern Forest Experiment Station Gen. Tech. Rep. NE-144. 271pp.
- Endangered Species Act. 1972.
- Engstrom, B. E. and D. D. Sperduto. 1994. An ecological inventory of the White Mountain National Forest. Department of Resources and Economic Development. Concord, NH. pgs 58-58b.
- Erdle, S. Y. and C. S. Hobson. 2001. Current status and conservation strategy for the eastern small-footed myotis (*Myotis leibii*). Natural Heritage Technical Report #00-19. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. 17pp. plus Appendices.
- Forest Service Manual; 2672.42. Biological Evaluations.
- Foss C. R. 1994. Atlas of breeding birds in New Hampshire. Audubon Society of New Hampshire. Arcadia, an imprint of the Chalford Publishing House, Dover, NH. 414pp.
- Gardner, J.E.; Garner, J.D.; Hofmann, J. 1991. Summer roost selection and roosting behavior of *Myotis sodalis* (Indiana bat) in Illinois. Champaign, IL: Illinois Natural History Survey. Unpublished.
- Godin, A. J. 1977. Wild mammals of New England. The John Hopkins University Press, Baltimore and London. 304pp.

- Harrison, D. J. and T. G. Chapin. 1997. An assessment of potential habitat for eastern timber wolves in the northeastern United States and connectivity with occupied habitats in southeastern Canada. Prepared for the Wildlife Conservation Society by University of Maine, Orono. 12pp.
- Harvey, Michael J. 2002. Conservation Status and Conservation Strategy: *Myotis leibii* Tennessee Technological Univ.
- Hickenbottom, J. R., B. Summerfield, J. Amdahl, G. Hale, M. Hilliar, L. Jackson, D. Pervade, and J. Rupee. 1999. Biological assessment of the effects of National Forest Land and Resource Management Plans and Bureau of Land Management Plans on Canada lynx. United States Department of Agriculture Forest Service.
- Hitchcock, H.B. 1955. A summer colony of the least bat, *Myotis subulatus leibii* (Audubon and Bachman). *Can. Field-Nat.* 69:31.
- Hoving, C. L. 2001. Historical occurrence and habitat ecology of Canada lynx (*Lynx canadensis*) in eastern North America. M.S. Thesis. University of Maine, Orono. 200pp
- Hoy, J. 2001. *Listera auriculata* Wieg., Auricled twayblade. New England Wildflower Society, Framingham, MA. 38pp. plus Appendices.
- Humphrey, S.R.; Richter, A.R.; Cope, J.B. 1977. Summer Habitat and Ecology of the Endangered Indiana Bat, *Myotis sodalis*. *Journal of Mammalogy*. Vol. 58, No.3.
- Kingman, D.B. 1986. A search for the evidence of lynx (*Lynx canadensis*) in the White Mountains of New Hampshire. 4pp.mimeo.
- Kiser, J. S., R. R. Kiser, V. Brack, Jr., and E. R. Britzke. 2001. A survey for eastern forest bats on Green Mountain and Finger Lakes National Forests with emphasis on the federally endangered Indiana bat (*Myotis sodalis*). Environmental Solutions and Innovations, LLC. Cincinnati, Ohio. 60pp.
- Krusic, R. A. 1995. Habitat use and identification of bats in the White Mountain National Forest. M.S. Thesis, University of New Hampshire, Durham. 86pp.
- Krusic, R. A.; Yamasaki, M.; Neefus, C.D.; Pekin, P.J. 1996. Bat habitat use in White Mountain National Forest. *J. Wildl. Manage.* 60(3):625-631.
- Kurta, A.; King, D.; Teramino, J.A.; Stribley, J.M.; Williams, K.J. 1993. Summer roosts of the endangered Indiana Bat (*Myotis sodalis*) on the northern edge of its range. *Am. Midl. Nat.* 129:132-138.
- Kurta, A.; Williams, K.J.; Mies, R. 1996. Ecological, behavioral, and thermal observations of a peripheral population of Indiana bats (*Myotis sodalis*). Pgs. 102-117. In: Barclay, R.M.R.; Brigham, R.M. (editors). *Bats and forests symposium*, Oct. 19-21, 1995, Victoria, British Columbia, Canada. Research Branch, British Columbia Ministry of Forestry, Victoria, B.C. Work. Pap. 23/1996.
- Litvaitis, J.A., D. Kingman, Jr., J.Lanier, and E. Orff. 1987. Status of lynx in New Hampshire in 1995. New Hampshire Audubon Society.

McFarland, K. P. 2002. DRAFT. Conservation assessment of two endemic butterflies (White Mountain Butterfly, *Oneis melissa semidea* and White Mountain Fritillary (*Boloria montinus montinus*) in the Presidential Range Alpine Zone, White Mountains, New Hampshire. Vermont Institute of Natural Science. 11pp. plus Appendices.

Mladenoff, D. J. and T. A. Sickley. 1998. Assessing potential gray wolf restoration in the northeastern United States: a spatial prediction of favorable habitat and potential population levels. *J. Wildl. Manage.* 62(1):1-10.

Newcomb, L. 1977. Newcomb's wildflower guide. Little, Brown, and Company. Boston. 490pp.

Nichols, W.F., D.D. Sperduto, 1996. Ecological Inventories of 1996 Project Areas on the WMNF in NH. Department of Resources and Economic Development. Concord, NH. pgs 52-53b and 60-62.

Pavulaan, H., Board of Director's of International Lepidoptera Society and editor of Virginia Butterfly Bulletin. 2000. Personal communication.

Ramstetter, J.M. 2001. Conservation Assessment of *Triphora trianthophora*. New England Plant Conservation Program for New England Wildflower Society, Framingham, MA. 66pp.

Rimmer, C. C., McFarland, K. P., and J. D. Lambert. 2001. Bicknell's thrush (*Catharus bicknellii*) Conservation Assessment. Vermont Institute of Natural Science, Woodstock, VT. 21 pp. plus Tables and Appendix.

Romme, R.C., K. Tyrell, and V. Brack, Jr. 1995. Literature summary and habitat suitability index model: components of summer habitat for the Indiana Bat, *Myotis sodalis*. Federal Aid Project E1-7, Indiana Dept. of Nat. Res., Bloomington, IN. 172pp.

Rowse, L. A. 1998. Biologist WMNF. Personal communication.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142pp.

Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000. Ecology and conservation of lynx in the United States. USDA Forest Service, Rocky Mountain Research Station Gen. Tech. Rep. RMRS-GTR-30WWW. 473pp plus Appendix.

Sasse, D.B. 1995. Summer roosting ecology of cavity-dwelling bats in the White Mountain National Forest. Durham, NH: Univ. of NH. MS thesis. 65 p.

Seymour, F. C. 1993. The Flora of New England. The Charles E. Tuttle Company; privately printed. 596pp.

- Sperduto, D. D. and B. E. Engstrom. 1995. An ecological inventory of the White Mountain National Forest. Fourth Year Summary Report. Department of Resources and Economic Development. Concord, NH. 346pp.
- Sperduto, D. D. 1997. A guide to the Natural Communities of New Hampshire, Review Draft – Parts I, Parts II and Upland Forest Portion of Part III. New Hampshire Natural Heritage Inventory. Department of resources and Economic Development, Concord, NH. 66pp.
- Sperduto, M. B. 1988. Use of geographic information system (GIS) to predict potential habitat for *Isotria medeoloides* (Pursh) RAF. in New Hampshire and Maine. M. S. Thesis. University of New Hampshire, Durham. 106pp.
- Storks, I. M. and G. E. Crow. 1979. Endangered, threatened, and rare plants of the White Mountain National Forest, New Hampshire. University of New Hampshire. Durham, NH. 186pp.
- Taylor, J. 1993. The amphibians and reptiles of New Hampshire. New Hampshire Fish and Game Department, Concord, NH. 71pp.
- USDA Forest Service. 1986a. Land and Resource Management Plan, White Mountain National Forest (and amendments). Laconia, NH.
- USFS. 1986b. Final Environmental Impact Statement Land and Resource Management Plan White Mountain National Forest. Laconia, NH. 93pp. plus appendices.
- USFS. 1993. White Mountain National Forest Monitoring Report. Laconia, NH 112pp.
- USFS. 1994. White Mountain National Forest Monitoring Report. Laconia, NH 36pp.
- USFS. 1996. White Mountain National Forest. 1996 Annual Report, Ten Year Monitoring Summary. 63pp.
- USFS. 1998. White Mountain National Forest Monitoring Report. Laconia, NH 36pp
- USFS. 1999a. Biological Assessment for threatened and endangered species on the White Mountain National Forest in the States of Maine and New Hampshire. USDA Forest Service, Eastern Region, Milwaukee, WI.
- USFS. 1999b. White Mountain National Forest Monitoring Report. Laconia, NH 45pp
- USFS. 2000. White Mountain National Forest Monitoring Report. Laconia, NH 61pp
- USFS. 2000a. Canada Lynx Conservation Strategy. USDA Forest Service, Region 1. Montana.
- USFS. 2000b. Eastern regional forester's sensitive species list and eastern region proposed threatened, or endangered taxa. USFS Endangered Species Program, Region 9. Milwaukee, WI.
- USFS. 2000c. Canada lynx conservation agreement. USFS agreement #00-MU-11015600-013. 12pp.
- USFS 2000d. Canada lynx analysis unit (LAU) mapping and habitat designation for the White Mountain National Forest, New Hampshire and Maine. (Updated 2001 and 2002). Unpublished Report, White Mountain National Forest, Laconia, NH 6pp.

- USFS 2000e. Lynx conservation strategy Standards and Guidelines (interpretations for the White Mountain National Forest). Unpublished Report, White Mountain National Forest, Laconia, NH. 15pp.
- USFS. 2001. White Mountain National Forest Monitoring Report (DRAFT). Laconia, NH.
- USFS. 2001a. Analysis of the Management Situation for Wildlife. White Mountain National Forest. Laconia, NH.
- USFS. 2001b. Evaluation of Wildlife Monitoring and Population Viability WMNF Management Indicator Species. White Mountain National Forest, NH.
- USFS. 2001c. Environmental Assessment for the Proposed Amendment to the White Mountain National Forest Land and Resource Management Plan for threatened, endangered, and sensitive species and Decision Notice (4/23/2001). Laconia, NH. 139pp.
- USFS. Various years. White Mountain National Forest survey and monitoring data. Unpublished.
- United States Department of Interior Fish and Wildlife Service (USFWS). 1982. Eastern Cougar Recovery Plan. Denver Wildlife Research Center, U. S. Fish and Wildlife Service. 17pp.
- USFWS. 1983. Northern states bald eagle recovery plan. 66pp plus Appendices.
- USFWS. 1991. Robbins' cinquefoil (*Potentilla robbinsiana*) Recovery Plan, First Update. U.S. Fish and Wildlife Service, Newton Corner, MA. 21pp.
- USFWS. 1991a. Peregrine Falcon (*Falco peregrinus*) Eastern Population Recovery Plan - 1991 Update. Newton Corner, MA. 28pp.
- USFWS. 1992. Recovery Plan for the Eastern timber wolf. U. S. Fish and Wildlife Service, Twin Cites, MN. 73pp.
- USFWS. 1992a. Small-whorled pogonia (*Isotria medeoloides*) Recovery Plan, First Revision. U. S. Fish and Wildlife Service, Newton Corner, MA. 59pp.
- USFWS. 1996. Technical draft Indiana bat (*Myotis sodalis*) recovery plan. Minneapolis, MN. 37pp. plus Appendices.
- USFWS. 2000. Conference report and Biological Opinion on the Effects of the Land and Resource Management Plan and other Activities on threatened and endangered species in the White Mountain National Forest and Incidental Take Statement. USDI Fish and Wildlife Service.
- von Oettingen, Susi. Personal communication. 2001,2002. Endangered species specialist. U.S. Fish and Wildlife Service. Northeast Region. Concord, NH.
- Yamasaki, M. 1996, 1998, 2003. Forest Service Research Biologist. Personal communication, unpublished data. Durham, NH.

REFERENCES AND LITERATURE CITED

SOIL

- Adams, M.B., J.A. Burger, A.B. Jenkins and L.Zelazny. 2000. Impact of harvesting and atmospheric pollution on nutrient depletion of eastern US hardwood forests. *Forest Ecol. and Mgt.* 138: 301-319.
- Bailey, S.W. 2002 (*In press*) Implications of sodium mass balance for interpreting the calcium cycle of a northern hardwood ecosystem. *Ecology*.
- Cronan, C.S. and D.F. Grigal. 1995. Use of Calcium/Aluminum Ratios as Indicators of Stress in Forest Ecosystems. *J. Environ. Qual.* 24:209-226.
- Driscoll, C.T., G.B. Lawrence, A.J. Bulger, T.J. Butler, C.S. Cronin, C. Eagar, K.F. Lambert, G.E. Likens, J.L. Stoddard, and K.C. Weathers. 2001. Acidic Deposition in the Northeastern United States: Sources and Inputs, Ecosystem Effects, and Management Strategies. *BioScience* Vol.5 No.3.180-198.
- EPA. 1991. Monitoring guidelines to evaluate effects of forestry activities on streams in the PNW and Alaska. U. S. Environmental Protection Agency. Seattle, WA. 166 pp.
- Federer, C., Hornbeck, J., Tritton, L., C. Martin. 1989. Long-term depletion of calcium and other nutrients in eastern forests. In *Birch Symposium Proceedings*. USDA Forest Service, Durham, NH.
- Goodale, C. 1999. The Long-Term Effects of Disturbance on Nitrogen Cycling and Loss in the White Mountains, New Hampshire. PhD Dissertation.
- Hornbeck, J.W., M.B. Adams, E.S. Corbett, E.S. Verry, J.A. Lynch. 1993. Long-term impacts of forest treatments on water yield: a summary for northeastern USA. *Journal of Hydrology*. 150(1993):323-344.
- Hyman, M.E., C.E. Johnson, S.W. Bailey, R.H. April, and J.W. Hornbeck. 1998. Chemical Weathering and cation loss in a base poor watershed. *GSA Bulletin*, v. 110, pp.85-95.
- Johnson, C.E. and C.T. Driscoll, T.G. Siccama and G.E. Likens. 1998. Element Fluxes and Landscape Position in a Northern Hardwood Forest Watershed Ecosystem. *Ecosystems* 3: 159-184.
- Likens, G.E., C.T. Driscoll and D.C. Buso. 1996. Long-Term Effects of Acid Rain: Response and Recovery of a Forest Ecosystem. *Science*. Vol. 272, 244-246.
- National Acid Precipitation Assessment Program Report to Congress: An Intergrated Assessment. 1998. National Science and Technology Council, Committee on Environment and Natural Resources.
- NHDES (New Hampshire Department of Environmental Services). 2001. Title 50, water management and protection, chapter 485A, water pollution and waste disposal, classification of waters, section 485-A:8. Concord, NH.
- Nuengsigkapan, P. 1998. Personal communication with Steve Fay, Laconia, NH.
- _____. 1986a. Land and resource management plan. WMNF, Laconia, NH. 98 pp.
- _____. 2000. WMNF: Monitoring Report 2000. WMNF. Loconia, NH. 61 pp.
- _____. 2000a. Forest Statistics for New Hampshire:1983 and 1997. Forest Service, Northeastern Research Station, Resource Bulletin NE-146
- Wingate, S.K. 9/9/02. Personal Communication

