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POPPLE VEGETATION MANAGEMENT PROJECT

Town of Jackson

Carroll County, New Hampshire

Environmental Assessment

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Popple Vegetation Management Project
Public Comment Package - Summary

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

- Even-aged and uneven-aged timber management on up to 1037 acres, producing approximately 5.0 million board feet of forest products;
- Pre-haul maintenance on up to approximately 5.3 miles of existing roads;
- Construct 3000 feet of new low standard three season classified road;
- Construct a total of 1450 feet of temporary road in three locations to access five individual Units (three landings), and decommission these temporary roads following logging activities;
- Place eight temporary skidder bridges and two permanent haul road bridges for access.
- Replace one temporary skidder bridge with the existing Nordic Ski Trail bridge upon completion of the project;
- Construct up to five new ¼- to 1-acre landings and use six existing landings;
- Add up to 2.8 miles of new Nordic Ski Trails;
- Place woody debris to improve aquatic and fisheries habitat on the upper section of Meserve Brook;
- Place rocks and logs to restore the original channel and stabilize streambanks along Meserve Brook;
- Replace an undersized culvert for an overflow channel on Miles Brook;
- Control non-native invasive species on 4 acres within the project area utilizing either herbicides or hand treatments, or both;
- Pre-commercially thinning or brushing on up to 20 acres to promote regeneration objectives.

Popple Project is located in the Town of Jackson, Carroll County, New Hampshire, on the Saco Ranger District of the White Mountain National Forest. Meserve Brook and Miles Brook, which lead to the Ellis River are the primary drainages in the Analysis Area. Spruce Brook, Otis Brook, and several small unnamed tributaries are also included in the Analysis Area. HMU 503 is 8530 total acres.

The following list describes the "need for change" and opportunities identified for the Popple Analysis Area that would implement the White Mountain National Forest Plan.

1. There is a need to increase acres of early successional habitat.
2. There is a need to increase softwood component in some stands.
3. There is a need to create a more desireable stocking of species, size, and quality of hardwood trees, while providing forest products.
4. There is a current and long term need to provide alternate Nordic Ski Trails as a mitigation for timber sale related road closures on Miles Brook and Meserve Brook roads, and the effect these temporary road closures would have on Nordic skiing during timber sale winter operations.
5. There is a need to improve aquatic and fish conditions and stabilize streambanks in Meserve Brook.

The Proposed Action (Alternative 2) may result in the following effects; Alternatives 3 and 4 reduce some of these effects as discussed in the document:

- Temporary winter restriction of Nordic Trail use on the North and South Hall Trail (NFSR 325 and 623) and on Maple Mountain Loop, and a possible restriction of Nordic Trail use on portions of the Wildcat Valley, Quail and U.S.T Ski Trails prior to December 31;
- Short-term localized sedimentation may occur at temporary stream crossings, bridge sites, and near new road construction sites;
- Release of existing advanced softwood regeneration in six single tree selection Units;
- A reduction of up to 205 acres of mature hardwood forest resulting in creation of early successional habitat and associated benefits to wildlife dependent on this habitat;
- An increase in new openings in the forest canopy as seen from nearby viewpoints;
- Minor, localized, and short-term direct and indirect effects to water quality, water quantity, and channel stability resulting from harvest and road construction activities, watershed rehabilitation projects and other potential Connected Actions;
- Temporary displacement of some wildlife during implementation; along with long term maintenance of diverse forested habitats and an increase in softwood in some stands;
- Removal of up to five million board feet of timber, providing jobs in harvesting and manufacturing;
- Improved health and growth of residual trees in treated stands.

This final Environmental Assessment provides the Deciding Officer (Saco District Ranger) with information needed to make informed decisions on the Popple Project and provides the basis for determining:

- Is the range of alternatives adequate to address relevant issues raised by the public and the interdisciplinary team and to meet the Purpose and Need for Action?
- Which of the alternatives best addresses relevant issues for this project?
- Would the Decision to implement an Alternative pose any significant environmental impact that would require an environmental impact statement?
- Does the decision to implement an Alternative meet applicable federal, state, and local laws and policies, including consistency with the Forest Plan?
- Do the proposed mitigation measures meet Forest Plan Standards and Guidelines?

Popple Vegetation Management Project

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Popple 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 laws and regulations as part of the Environmental Assessment process for Popple Project. This EA discloses the proposed action and connected actions, issues, Alternatives to the proposed action, and the affected environment and direct, indirect, and cumulative environmental impacts that would result under each of the alternatives. The document is organized into five parts:

- Chapter 1: 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 other pertinent information related to this project.
- Chapter 2: 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 anticipated and known public and agency issues. Chapter 2 also includes Connected Actions under All Action Alternatives, Alternatives Considered and Deferred from Detailed Study, and a Summary Table of the Comparison of Alternatives. The Summary Table briefly shows the environmental effects of implementing the proposed action and Alternatives.
- Chapter 3: Affected Environment and Environmental Consequences. This section describes the environmental effects of implementing the proposed action and other alternatives. Each resource is 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 EA.

Additional documentation regarding effects to the physical and biological resources may be found in the project planning record located at the Saco Ranger District Office, Conway, New Hampshire. The completed EA includes a detailed analysis and disclosure of effects, which is the basis for the Decision Notice by the Responsible Official.

In the past we asked for comments twice, once during project development, called the scoping period; and again after completion of the EA, called the 30-day comment period. For this project, we combined the two comment periods in order to provide a detailed project proposal and preliminary analysis of effects and held one comment period, from January 14 to February 14, 2005. This comment period and the associated Public Comment Package provided sufficient information to generate 60 letters with specific substantive comments. These comments were incorporated into the design of the project alternatives. Alternative 4 differs from the Proposed Action, and seeks a balanced responce to public concerns and to the purpose and need for this project which is based on Forest Plan direction.

B. Background

The **Analysis Area** for Popple Project contains approximately 8530 acres of National Forest land within Habitat Management Unit (HMU) 503. Of this, approximately 7445 acres of Management Area (MA) 2.1 and 3.1 are included in the analysis area. Vegetation management activities are prescribed in MA 2.1 and 3.1 to achieve the goals and objectives of the White Mountain National Forest Land and Resource Management Plan (LRMP, 1986). The **Project Area** is that portion of the Analysis Area where proposed vegetative management and connected actions (activities involving roads, landings, watershed and stand improvements and ski trails) would occur. The Project Area for the Proposed Action includes 1037 acres of stand treatments on National Forest land, within Jackson Township, in Carroll County, New Hampshire.

Meserve Brook and Miles Brook drain into to the Ellis River and are the primary drainages for the Project Area. Spruce Brook and other small unnamed tributaries are included in the Analysis Area.

Timber management activities from the 1950's to the present led to the construction of the existing road systems within and surrounding the Project Area. Evidence of past logging includes truck roads and skid roads, thinned stands, young pole stands, and regenerating stands can be observed throughout much of the Analysis Area. Some of these old logging and skid roads extend beyond areas proposed for treatment in this project.

There have been two recent timber sales in the Miles Brook drainage; Miles Brook and Miles Brook II. The Miles Brook sale sold twice. The first Miles Brook sale sold in the early 1980's and was not completed. The contractor defaulted after completing just a few units. The untreated Units, minus two Units determined to be in-operable, were again sold, also as the Miles Brook Sale, in 1988. This sale was completed in 1991 and included 96 acres of clearcuts, 65 acres of overstory removal, and a 44 acre thin for a total of 1.8 MMBF. This sale re-constructed Miles Brook Road to its current condition.

Miles Brook II sale was sold in 1994, and was completed in 1998. Four treatment Units harvested approximately 1 million board feet from approximately 75 acres. Both of these two sales were approximately 86 % pulp, 14 % sawtimber. This is a result of the overall type of wood available in this Analysis Area.

In the southern portion of the Analysis Area, Popple Mountain Sale sold in March 1985 and was completed in November, 1989. It harvested 46 acres in regeneration treatments and 134 acres in single tree selection, and built the classified road to a landing and harvest unit, now known as the "Scenic Vista Nordic Trail".

Since these sales, Nordic skiers have enjoyed the recreation these haul roads provide for winter travel. Use of Miles Brook and Meserve Brook roads for groomed Nordic skiing is permitted to Jackson Ski Touring Foundation, a non-profit organization based in Jackson, New Hampshire. Summer and fall use of these two roads is also popular for a few individuals who enjoy regular walks there.

The area known as Greys field, and the surrounding area near Units 29 – 34 has long been impacted by modern uses. There are no rock walls or cellar foundations, although there is an apple orchard. The Forest Service is attempting to maintain the orchard and adjacent opening, however, efforts are hampered by buckthorn, an invasive species that is taking over the opening.

Jackson Water Precinct owns a parcel of land on Meserve Brook above Greys field, and two water impoundments remain, apparently as a back up water source for the town of Jackson. Below these impoundments lie old trash dumps, an old apple orchard, and other evidence of past uses.

The northeastern section of the Analysis Area, where two Units (35 and 36) are proposed for treatment, are near the Marsh Brook timber sale. Marsh Brook sale was planned in the early 1990s and was implemented from 1992 to 1994. Marsh Brook Sale constructed 0.4 miles of new road through Town of Jackson property (NFSR 512) to improve access to the area for logging. Two million board feet of timber was harvested from one 85 acre group selection and seven clearcuts totaling 129 acres. NFSR 512 connected Forest Road 233 (Carter Notch Road) with existing roads used for timber harvest since the 1950's.

C. Description of Popple Analysis Area

The project is located in the Town of Jackson, Carroll County, New Hampshire. The Analysis Area lies south of Rocky Branch Trail near Highway 16, west of Highway 16, east of the Presidential - Dry River Wilderness Area, north of Iron Mountain, and includes two Units northeast of Marsh Brook and the Hutmans Trail, near Town of Jacksons' Prospect Farm.

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

(a) MA 2.1 and 3.1 - Multiple-Use Forest, Higher Intensity of Management, 7445 acres;

(b) MA 6.1 - Semi-Primitive Non-Motorized Recreation, 1085 acres;

(c) MA 5.1 – Wilderness, 186 acres.

Forest Plan goals and objectives for these management areas are to (a) provide high quality hardwood sawtimber on a sustained yield basis and other timber products through intensive timber management practices; and (b) Increase wildlife habitat diversity for the full range of wildlife species with emphasis on early successional species;

One sixty five acre stand within the adjacent HMU 506 is included in this project.

A roads analysis has been conducted for HMU 503 to identify long term needs for transportation access. The primary access to the Analysis Area is National Forest System Roads (NFSR) 325 and 623, also known as Meserve Brook and Miles Brook roads. These roads are accessed from State Highway 16 in Jackson, NH. These roads are gated, but remain open to non-motorized traffic.

There are several groomed Nordic Ski Trails in the Analysis Area. A large section of the eight mile "Hall Trail" lies on National Forest System Roads (NFSR) 325 and 623, and is under Special Use Permit to Jackson Ski Touring Foundation. The Maple Mountain Loop is a groomed Nordic Ski Trail off the Hall Trail in the southeast corner of the Analysis Area. The un-groomed Avalanche Brook Trail continues north out of the Analysis Area toward Pinkham Notch, with a short section between NFSR 623 and the Ellis River Trail that is being considered for re-location in Alternatives 2 and 3. The Ellis River Trail is used primarily as a Nordic Ski Trail, and runs along the Ellis River from Jackson to near the Dana Place Inn. The High Water Trail then continues up the Ellis River to Rocky Branch Trailhead.

Nordic Trails off Carter Notch Road include the Dana Place Trail, U.S.T, Quail Trail, and Wildcat Valley Trail.

Hiking near the Project Area includes Rocky Branch Trail, which originates at the junction of NFSR 623 and State Highway 16, Iron Mountain, Hutmens, and Winniweta Falls Trails.

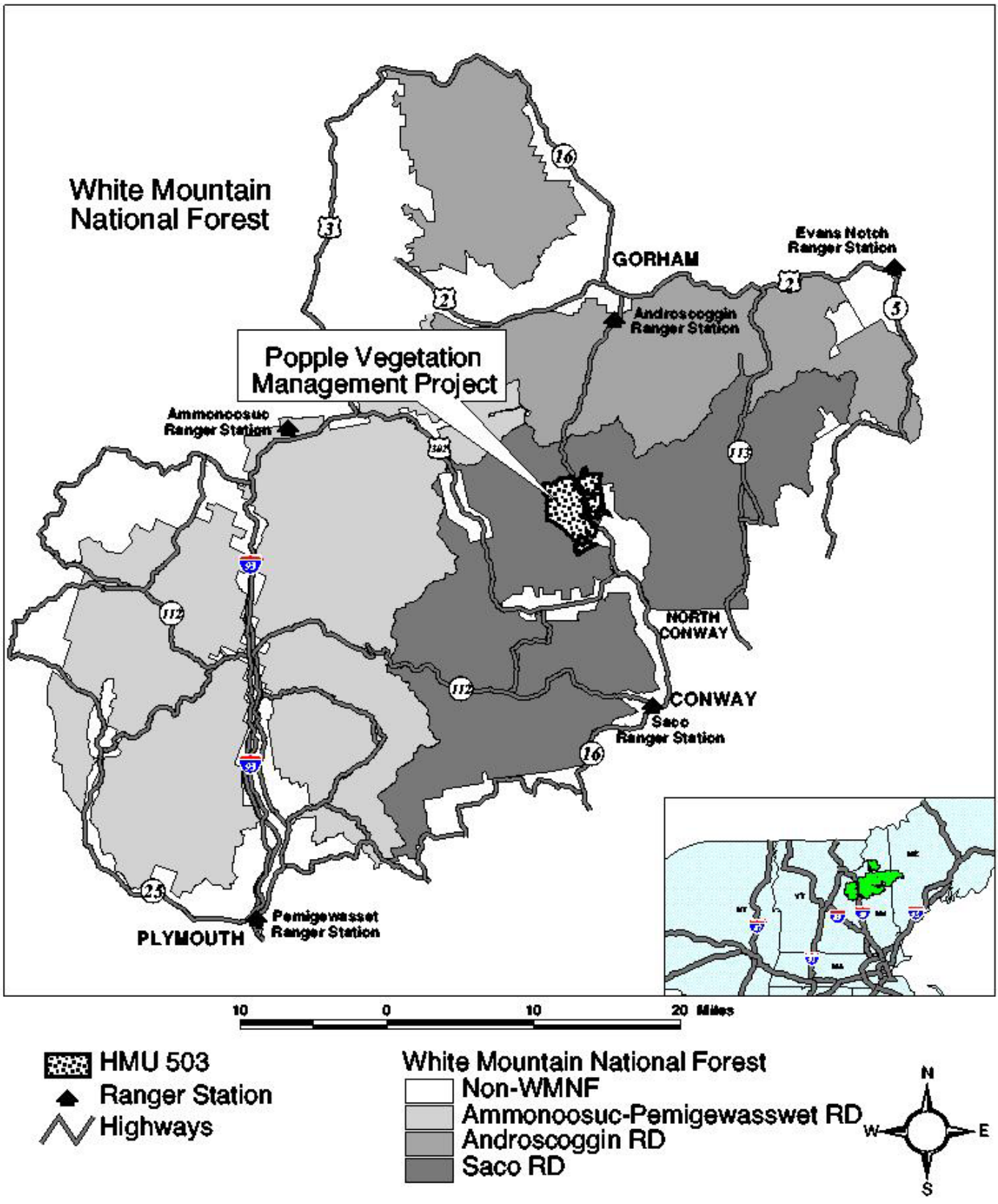

Figure 1:
Popple Vegetation Management Project Location

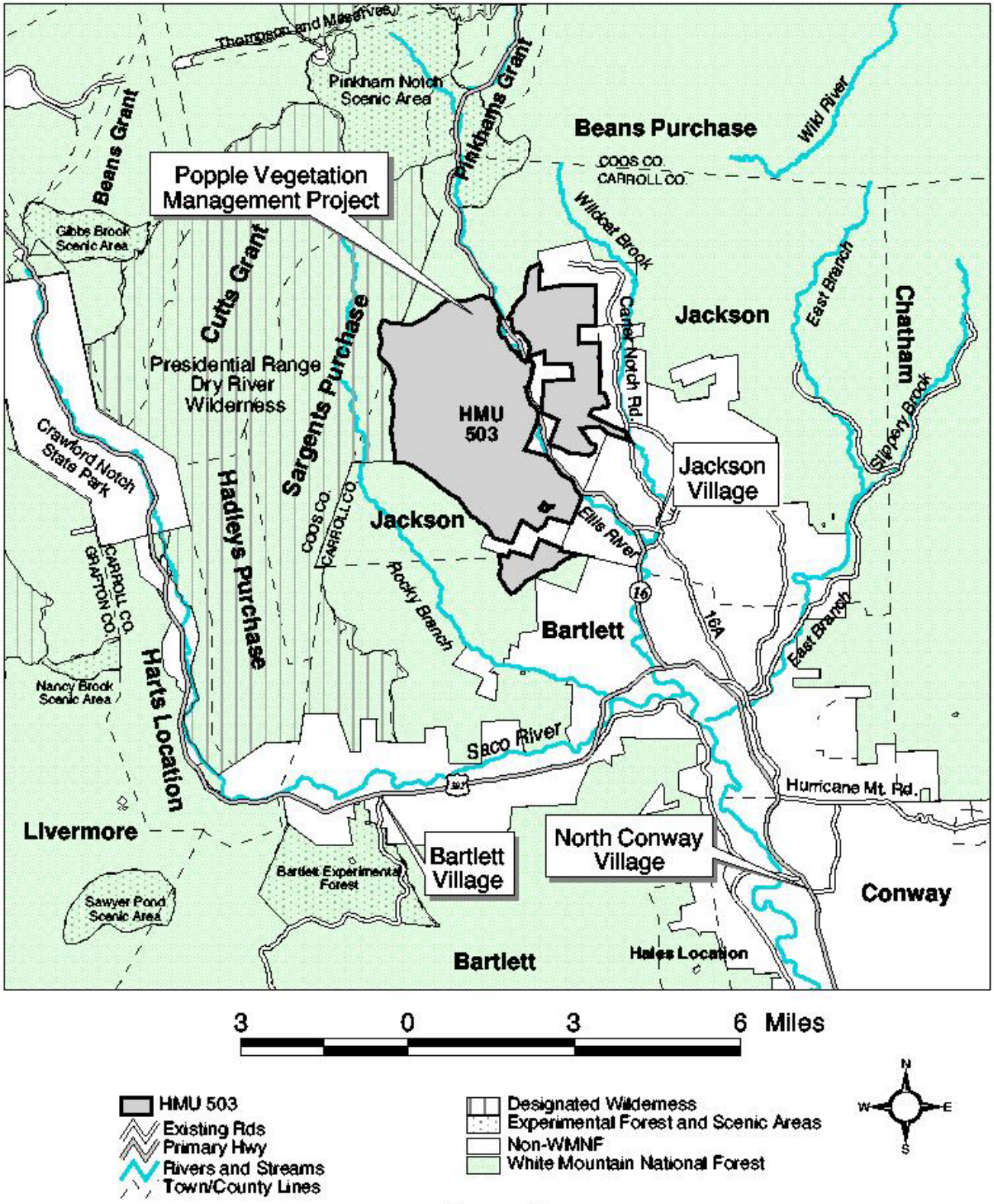

Figure 2:
Popple Vegetation Management Project Vicinity Map

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

The White Mountain National Forest (WMNF) has prepared this Public Comment Package 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 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. It prescribes the standards, practices, and the approximate timing and vicinityof potential actions that are necessary to achieve these goals and objectives. The Forest Plan prescribes monitoring and evaluation needs 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.

In addition to allocating lands, the Forest Plan establishes a strategy to manage well-distributed and suitable wildlife habitat for maintaining viable populations of existing native and desired non-native vertebrate species. To provide the necessary habitat diversity for wildlife populations, the Forest Plan designated "Habitat Management Units" (HMUs) to distribute community types across the National Forest. Of the 780,000 acres comprising the White Mountain National Forest, approximately 345,000 acres are considered "suitable lands" where vegetative management is permitted through the use of commercial timber harvesting. Suitable lands are typically in lower elevations and include Management Areas 2.1 and 3.1 where timber management is used to maintain a variety of wildlife habitat conditions and generates timber products. Each HMU contains a substantial acreage of semi-primitive lands where no timber harvesting is allowed, and at least 4,000 acres of suitable lands in Management Areas 2.1 and/or 3.1. Semi-primitive lands include Management Areas 6.1 and 6.2, where non-motorized recreation is emphasized and timber harvest is either limited to salvage operations (6.1) or not permitted at all (6.2). Semi-primitive lands comprise nearly 410,000 acres of the Forest, providing a significant amount of mature and overmature wildlife habitat.

The Desired Future Condition (DFC) of an HMU is intended to provide a variety of habitat types and age classes (together defined as community types) that meet the life cycle needs for wildlife species inhabiting the National Forest (DeGraaf et al. 1992, DeGraaf and Yamasaki 2001). Examples of habitat types include "northern hardwood", "spruce-fir" and "paper birch". Age classes are based on stages of natural forest succession, ranging from "regeneration" (0-9 years) to "overmature" (beyond the age when growth begins to decline). Wildlife species that require or otherwise utilize "early-successional" openings will benefit from the availability of forest openings in the regeneration phase of growth. The same correlation is true for mature and overmature stands and for those species that require or otherwise utilize "late-successional" vegetation. Early-successional vegetation is characterized most often by dense, ground level plant cover in areas open to direct sunlight. Late-successional vegetation is more typically characterized by large, mature woody vegetation with a closed canopy (foliage) that blocks sunlight from the ground.

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 comment period for the Draft EIS has passed. The Final Environmental Impact Statement is expected in the fall of 2005.

E. Purpose for the Action

The Purpose for this project is to accomplish resource objectives to meet the overall management direction for the White Mountain National Forest, as established in the Forest Plan (USDA 1986a. Forest Plan, III 30-41). The Forest Plan establishes goals for Management Areas. This project does not propose any harvest activities within MAs 5.1, 6.1 and 6.2.

Forest Plan goals for MA 2.1 and 3.1 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.

F. Need for Change

The Forest Plan establishes a "Desired Future Condition" (DFC) for each Habitat Management Unit (HMU). The need for change within a particular HMU is determined by comparing the DFC with the existing condition. For MA 2.1 and 3.1 lands within HMU 503, the Interdisciplinary Team compared the existing conditions to the DFC to determine where change was needed.

The interdisciplinary team of specialists considered 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 an HMU. The Popple interdisciplinary team evaluated current conditions in HMU 503 during numerous on-site visits. Field observations include ice storm damage and related disease and mortality; stand structure, age, species, and health; past management and recreation use; evidence of wildlife; surveys for sensitive plants and animals, for Heritage resources, and for invasive species; road, trail and stream conditions; soil type and stability; and scenery.

Comparison of existing road and trail conditions with the roads analysis for HMU 503 has identified the need to maintain classified roads within the Project Area, and for additional short and long term access.

Openings in the forest canopy create new growth of "early-successional" plant species, and is often referred to as "early-successional habitat". Some wildlife species need early-successional habitat to survive, while other wildlife species utilize a variety of habitats including early-successional habitat.

Early-successional habitat is a critical component of a landscape that supports a variety of wildlife. In establishing the desired future conditions for HMUs the Forest Plan recognized the need for early-successional habitat and permited the use of commercial timber harvest to establish it. Harvest methods such as clearcuts, seed tree cuts and shelterwood cuts remove most of the existing woody vegetation from a stand and thus promote young regeneration. These cuts occur within a larger landscape of mostly mature, closed canopy forest. These "even-aged" harvests create early-successional stands with paper birch, yellow birch, aspen, ash, sugar maple, and red maple seedlings.

The Forest Plan also prescribes uneven-aged timber harvest to maintain stands in a forested condition. Un-evenaged treatments maintain a canopy layer and therefore plant species that thrive in shaded conditions. Uneven-aged management includes "single tree selection" and "group selection" treatments. Uneven-aged harvest apply in stands of sprucefir, hemlock, and shade tolerant hardwoods such as sugar maple and beech.

Uneven-aged management mimics natural mortality of individual trees or clumps of trees that naturally occurs from localized disturbances such as insect infestations, wind, and from natural disease and mortality. In the 1085 acres in HMU 503 within MA 6.1 and 6.2 lands, these natural processes are the only disturbances that create stand structure changes and regeneration.

Several areas within HMU 503 were moderately to severely affected by the 1998 ice storm, causing mortality and severe crown dieback. Subsequent localized downbursts and high winds have caused pockets of blowdown in some areas. None of the stands were flattened or experienced complete mortality. Extensive new growth of striped maple, hobblebush and beech is occurring but these ice damaged stands do not represent early successional habitat. Decay is rapidly setting in, and mortality is widespread, especially in paper birche. Extensive new mortality in paper birch was observed during 2004.

Table 1 shows existing and desired condition by vegetative community type, and potential need for change.

Table 1. Acres by Community Type in MA 2.1 and 3.1 for HMU 503

Community Type	Existing	Desired Future Condition	Need
Early-successional hardwood (aspen/birch)	266	800	534
Early-successional northern hardwoods	119	362	243
Spruce/Fir	264	1500	1236
Permanent Wildlife Openings	20	100	80

Table 1 shows that to meet the habitat and stand structure objectives of the Forest Plan in HMU 503 there is a need to establish regenerating stands of aspen, paper birch and northern hardwoods. Even-aged harvest methods can be used to convert some of the mature and overmature northern hardwood, aspen and paper birch stands to a regenerating age class (0-9 years). The table also shows the need to release understory and co-dominant spruce, fir and hemlock trees from competing hardwoods in mixedwood stands. Uneven-aged harvest methods such as group selection or single tree selection is often used to remove some of the hardwood overstory trees from a spruce/fir understory and thereby increase the spruce and fir percentage in these stands. Harvesting mature and overmature trees would provide high quality sawtimber to area mills.

There is a need to maintain the range of recreation options in the Analysis Area. Adding loop trails could reduce temporary impacts to the existing Nordic Trail System, and trails could be relocated to eliminate wet sections of trail and allow for early-season grooming.

There is a need to restore streambanks and aquatic habitat in Meserve Brook. Historic uses have led to braiding of the stream channel, re-channelization and sedimentation. Past harvest activities led to a reduction of natural stream debris, removing pool habitat and decaying wood for aquatic organisms.

G. Proposed Action

The Saco Ranger District of the White Mountain National Forest proposes to manage forest vegetation to increase wildlife habitat diversity within the Popple Analysis Area with a commercial timber harvest.

The Proposed Action is designed to fulfill the Purpose and Need for Action as described above and to achieve the desired vegetative conditions described in the Forest Plan. These goals include creating regeneration age habitat, increasing softwood development, and providing high quality hardwood sawtimber and other forest products on a sustained yield basis. Connected Actions such as watershed stabilization and fisheries projects are needed to maintain or enhance resources conditions within the Analysis Area.

National Forest System Roads (NFSR) to be used include 325, 623, 233 and 512. These roads are currently closed and will remain closed to public motorized traffic. These roads were constructed in conjunction with past timber sales and have historically been used for timber hauling. Unit 28 is accessed on Town of Jacksons Iron Mountain Road (NFSR 119), a distance of approximately 2300 feet from its junction with Meserve Brook (NFSR 325) road.

The analysis area includes all of Habitat Management Unit (HMU) 503 (See Figure 1 through Figure 8 for Analysis Area Maps), and 65 acres within the adjacent HMU 506. Proposed harvest Units are below 2500 feet in elevation, with the majority of the Units at an elevation averaging 1900 feet. The proposed action includes three treatment Units within Management Area (MA) 2.1 and the remainder within MA 3.1.

The following Proposed Action is designed to respond to the Purpose and Need for action:

1. Promote the 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 up to 205 acres of hardwood regeneration habitat through clearcutting;
   - Enhance softwood habitat through approximately 80 acres of group and single-tree selection harvests; and enhance hardwood quality on an additonal 55 acres with these selection treatments.
   - Improve timber quality and species composition in hardwood stands through approximately 697 acres of commercial thinning, group selection and single-tree selection;
2. Provide needed access to the Project Area and manage National Forest lands, resources and facilities in accordance with the White Mountain National Forest Plan
   - Restore to current design standards through road maintenance the following existing National Forest System Roads, NFSR 325 – 2.0 miles; NFSR 623 – 1.7 miles; and NFSR 512 – 1.6 miles;
   - Construct 3000 feet of System Road new construction to access Units 29 – 34.

- Construct 1000 feet of temporary road off of NFSR 623, including a small landing to access Units 9, 10 and 41.
- Construct 300 feet of temporary road off NFSR 623 to access Unit 7.
- Construct 150 feet of temporary road from Iron Mountain road to a landing in Unit 28;
- Place eight temporary skidder bridges and two permanent haul road bridges for access.
- Replace one temporary skidder bridge with the existing Nordic Ski Trail bridge upon completion of the project;
- Remove all temporary drainage structures, temporary bridges, and decommission new temporary roads during closure of this project;
- Previously closed roads opened for this project, will be treated for erosion control (seeded and waterbared) and returned to closed intermittent status.

H. Connected Actions

- Approximately six existing landings would be used and five new landings would be needed. In Alternative 3, two of the proposed new landings and 1300 feet of proposed temporary road would not be needed because Units 7, 9, 10 and 41 are dropped. A log landing is approximately one quarter to one acre in size where harvested trees are decked for loading onto log trucks and then transported to various mills. These existing landings sum to about six acres. The new proposed landings sum to about two acres under Alternative 2 and 4, and 1 and ½ acre under Alternative 3.

- To maintain the range of recreation options, the use of an unclassified road, existing and proposed skid road locations, and a half mile of additional new trail corridor, for a total of 2.8 miles of potential new Nordic Ski Trails for groomed Nordic skiing (see Figure 4) is needed. Any new Ski Trail corridors approved as part of this project would be financed and constructed by the Special Use Permitee. If approved, these trail corridors would require grading and clearing to accomodate a groomer, and would be maintained according to provisions in the Special Use Permit with Jackson Ski Touring Foundation.

- To improve fisheries habitat in the upper section of Meserve Brook, place woody material from Unit 40 downstream ½ to ¾ miles at a rate of 100 pieces per mile. Place wood at naturally occuring debris jam locations to increase aquatic habitat diversity by creating pools and cover, and increase nutrients through the collection and decomposition of debris. In addition to adding wood to the stream, downed wood would be added to the riparian area adjacent to the stream in this section. Downed wood slows water movement on hillsides.

- To stabilize streambanks and thus improve watershed stability and subsequent water quality, streamside stabilization projects are proposed below the private inholding and water impoundment on Meserve Brook. Historical uses in this location have led to braiding of the stream channel downstream and have led to subsequent re-channelization and sedimentation. The objective is to restore sections of Meserve Brook into its original channel and reduce braiding by placing rocks and logs in key downstream areas along a mile and a quarter of stream.

- To redirect water back into its original channel, place a ditch (waterbar) on an existing skid road within Unit 36 that has become an intermittent stream channel.

- To avoid adverse effects to water quality, and losing a section of classified road, replace the culvert for an overflow channel on Miles Brook at Miles Brook Road (NFSR 623). Debris

plugged the culvert during the summer of 2004 following heavy precipitation and needs to be replaced with a larger culvert to avoid a recurrence and damage to the road.

- To insure that regeneration objectives are met, pre-commercial thin or release (stand improvement) existing regeneration on up to 20 acres in group selection openings. Stand improvement would focus on those group selection units that promote softwood development. Up to 80 acres are proposed for group selection harvest in softwood areas. Timber stand improvement activities will treat the 25% of these acres that would be in 1/10th to 1/2 acre openings following harvest.
- To control invasive plant species (buckthorn, honeysuckle, autumn olive, and barberry), within approximately four acres in the Project Area, apply direct foliar or cut stump application of the herbicides Glyphosate and/or Triclopyr. Direct herbicides application would occur at two sites; Greys field (east of Unit 34) and at the Highwater Trail and Avalanche Trail intersection. Given the small extent of the population (currently only one individual), Japanese barberry would be removed manually by pulling the whole plant from the soil.

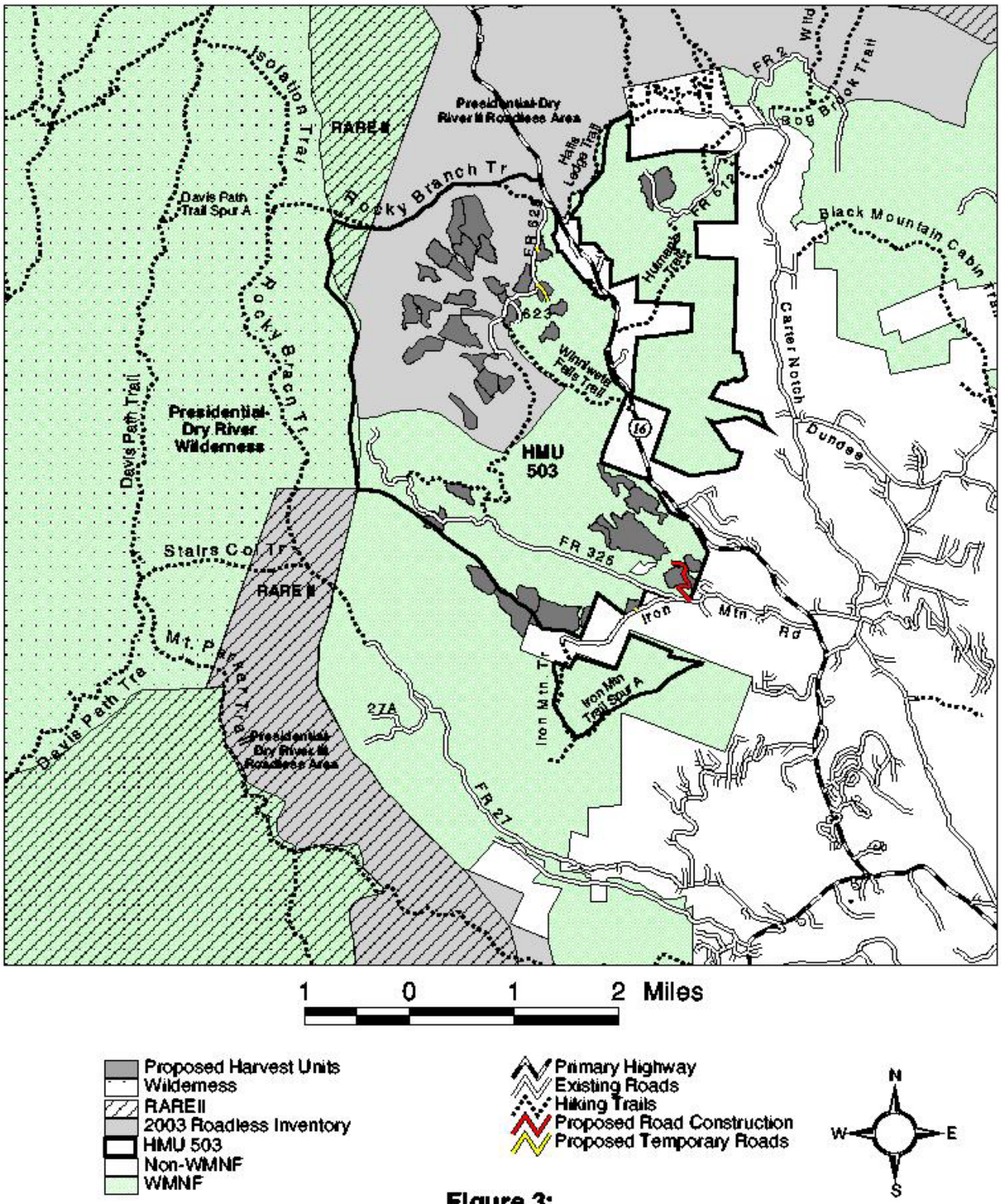

Figure 3:
Popple Vegetation Management Project
Roads and Hiking Trails

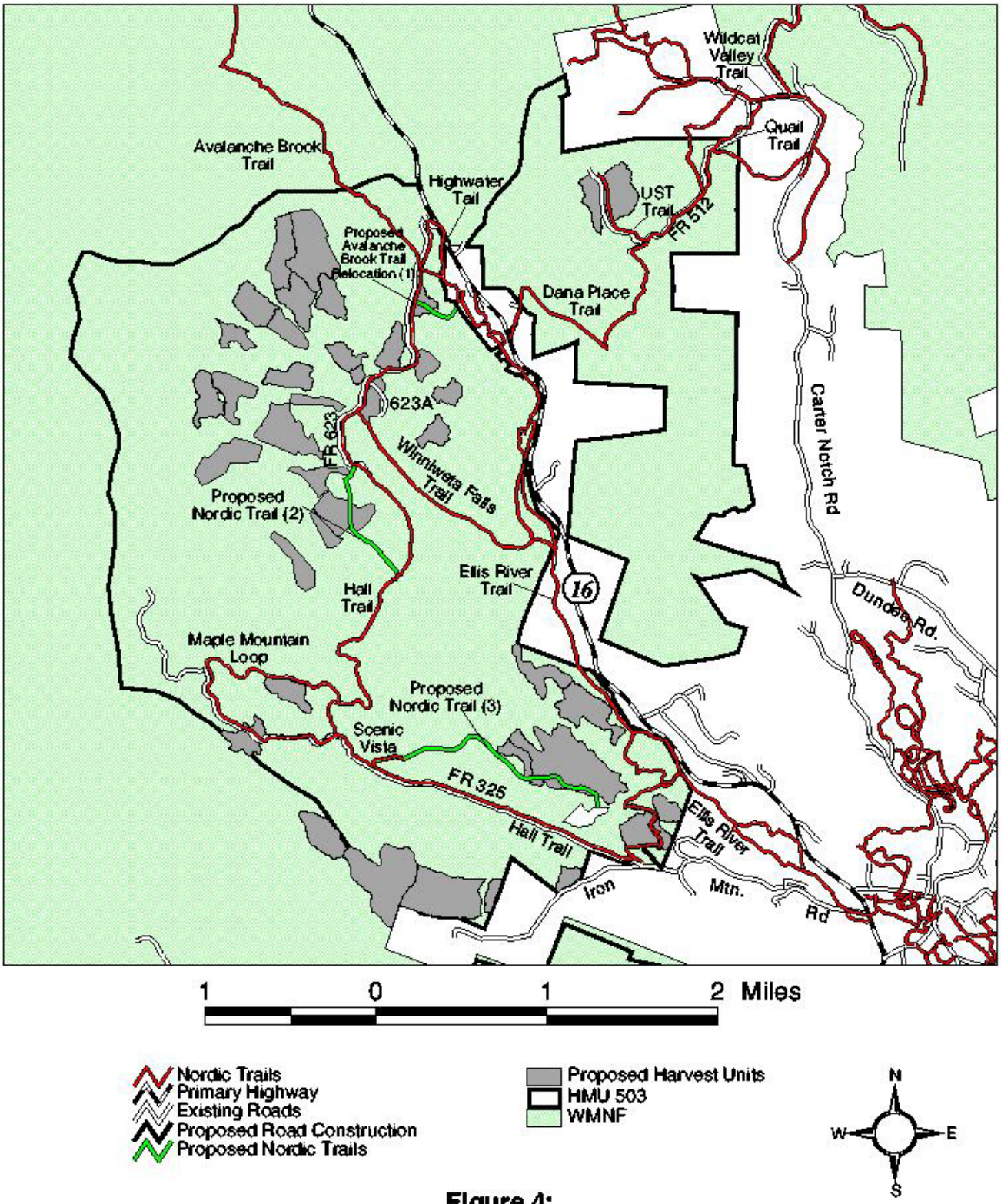

Figure 4:
Popple Vegetation Management Project
Nordic Trails

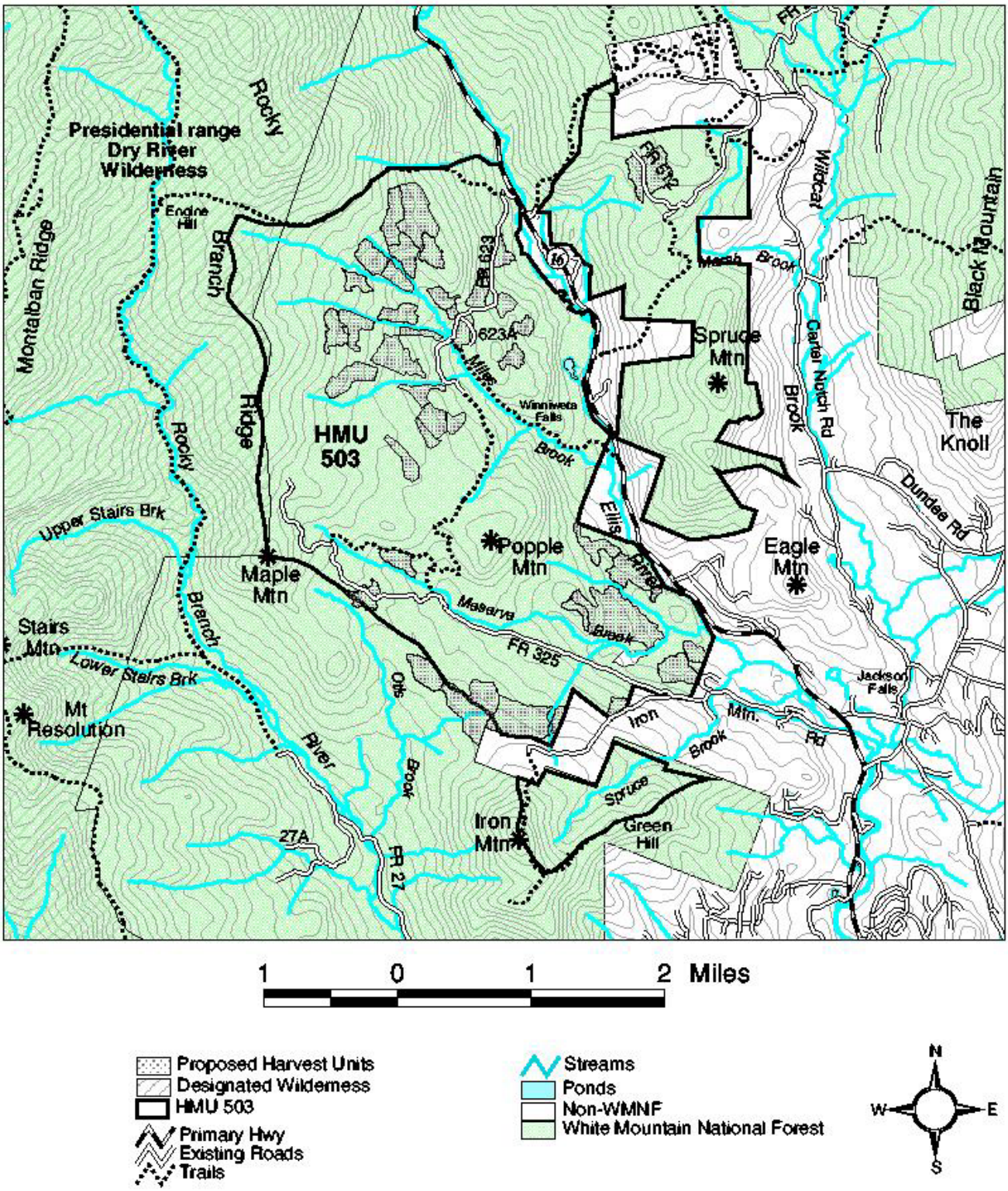

Figure 5:
Popple Vegetation Management Project
Land Features

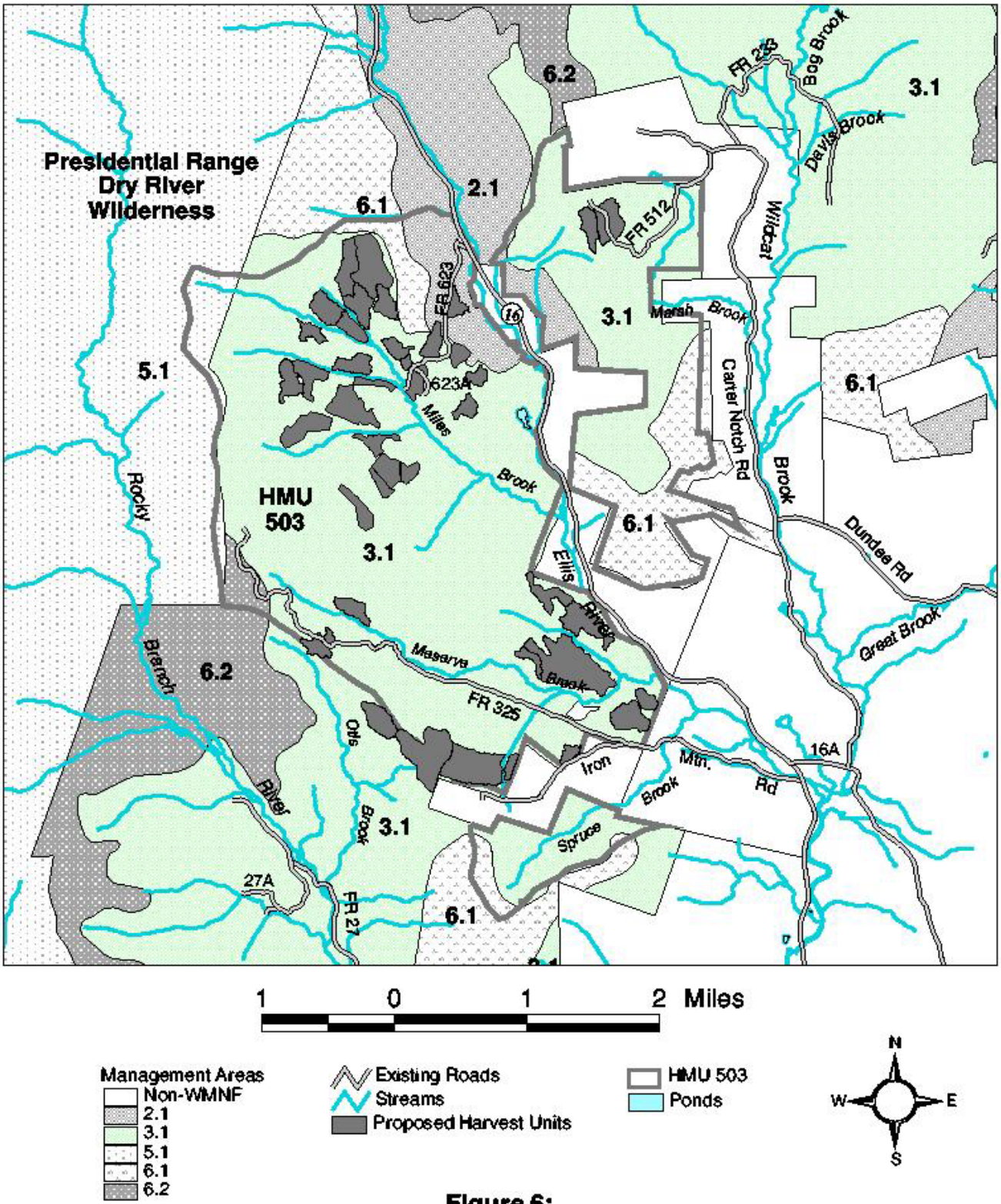

Figure 6:
Popple Vegetation Management Project
Management Areas

I. 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:

- Is the range of alternatives adequate to address relevant issues raised by the public and the interdisciplinary team and to meet the Purpose and Need for Action?
- Which of the alternatives best addresses relevant issues for this project?
- Would the Decision to implement an Alternative pose any significant environmental impact that would require an environmental impact statement?
- Does the decision to implement an Alternative meet applicable federal, state, and local laws and policies, including consistency with the Forest Plan?
- Do the proposed mitigation measures meet Forest Plan Standards and Guidelines?

J. Public Involvement

An announcement of the Public Comment period, and the availability of the "Public Comment Package" was published in the *Conway Daily Sun* and the legal notices section of the **Manchester Union Leader.** The "Public Comment Package" document was mailed to persons who are on our mailing list for vegetation management projects, to those who expressed interest in this project, and to adjacent and affected landowners**.** The Public Comment Package has already been posted on our web page, and this EA will be posted on our White Mountain National Forest web page (www.fs.fed.us/r9/white) soon after its completion. This project is listed in the Quarterly Schedule of Proposed Actions for the White Mountain National Forest, which is mailed to 500 people interested in White Mountain National Forest management activities. In addition we have informally discussed this project with Jackson Ski Touring Foundation and the Town of Jackson (Selectmen and Water Precinct) to help identify preliminary issues.

Public comments for this project were sought and are incorporated into the projects' design. The primary opportunity to comment on the project has passed. People who have commented on past projects should note that the public comment process has changed for this project. The scoping period and the formal public comment period are now combined into a single 30-day comment period. Reference Appendix D "Where this Project is in the Forest Service NEPA Process". This public involvement process, authorized under new planning regulations (36CFR 215 dated June 4, 2003), is designed to provide the public with a concise Public Comment Package. It was sent out on January 13th for public review and to provide the public opportunity to submit site specific substantive comments. Substantive comments received for this project have been considered and were used to improve project design especially pertaining to the development of Alternative 4, including project mitigations, location of proposed road construction (*where*), season of harvest for several units (*when*), and adjustments to proposed Nordic Ski Trail locations.

The Environmental Assessment, Decision Notice and Finding of No Significant Impacts, and Response to Comments will be sent to those who responded during the Public Comment Period. These documents will also be available on the White Mountain National Forest web page (www.fs.fed.us/r9/white).

K. Applicable Regulatory Requirements and Required Coordination

NFMA (National Forest Management Act)

NFMA gives direction for developing, maintaining and revising plans for individual units of the National Forest System. This includes direction for maintaining multiple use and sustained yield of forest products and services, insuring consideration of economic and environmental aspects of various systems of resource management, providing for diversity of plant and animal communities, and insuring that timber will be harvested only where suitable. This document is *tiered to* the 1986 White Mountain National Forest Land and Resource Management Plan, which provides direction for managing Forest resources and lands, including timber resources and wildlife habitat on the Forest.

NEPA (National Environmental Policy Act)

NEPA gives direction to analyze environmental conditions and consequences of planned and proposed actions. 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

The Cultural Resources report for this project has been sent to the State Historic Preservation Office (SHPO) for review. Concurrence from SHPO is expected within the next 6 weeks.

MBTA (Migratory Bird Treaty Act)

This project is consistent with the Migratory Bird Treaty Act. The White Mountain National Forest is actively involved with Partners in Flight program to protect neo-tropical migrants. Any concerns for species identified through the Species Viability Evaluation (SVE) process, or in the Biological Evaluation, including migratory birds, will be addressed in the projects final design.

USFWS (United States Fish and Wildlife Service)

The USFWS will be asked to review the biological evaluation (BE) for federally listed threatened and endangered species (TES) prior to any decision.

L. Preliminary Issues Used to Develop Alternatives

Preliminary issues were identified by the interdisciplinary team and through informal discussion with Jackson Ski Touring Foundation, Jackson Water Precinct, and the Town of Jackson. Additional issues may be identified during this public comment period and additional alternatives may still be developed.

Issues are presented in two groups: "Issues Used to Develop Alternatives" and "Other Issues Brought Forward during Public Involvement." Issues Used to Develop Alternatives are typically used to develop site-specific alternatives. Measurement indicators were developed for these two issues and are a means of comparing the Alternatives. "Other Issues Brought Forward During Public Involvement" are 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. NEPA regulations require 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)". These "other issues" are discussed in Chapter 3, under effects to resources, or in Appendix

The interdisciplinary team studied the known issues and identified the following **Issues Used to Develop Alternatives**. "Measurement Indicators" are identified for each issue and are used in Chapter 2, Section E for the Comparison of Alternatives table.

1. ***Effect that winter haul on Forest roads would have on Nordic Ski Trails, of proposed road construction to access units 29-34 on the existing Hall Trail Connector, and of additional proposed Nordic Ski Trails.***

Measurement Indicators:

- Effects on existing Nordic Ski Trails
- New Ski Trails proposed under each alternative.

2. ***Effect of harvest openings (clearcuts) on scenery;***

Evidence of openings created during harvest activities may be apparent to individuals viewing the Project Area from Iron Mountain, Doublehead Mountain, Bear Peak, from UST - Nordic Ski Trail near Spruce Mountain, and from private property in Dana Place Homeowners Association, at the base of Dana Place Trail (Dana Place Tr).

Measurement Indicators:

- Acres of new openings (clearcuts) viewed (seen) from the viewpoints listed above.

3. ***Control of Invasive Species in the Project Area (buckthorn, honeysuckle, autumn olive, and barberry).***

Measurement Indicators:

- Number of acres of infested land treated
- Potential for spread under each alternative

4. Water quality effects from the vegetation management project including the connected streambank, fisheries and Nordic Trail projects.

Restoration of Meserve Brook by stabilizing stream banks and redirecting streamflows, and introducing structure in an upper section (see Connected Actions), and harvest activities may effect water quality.

Measurement Indicators:

- Miles of stream restored and floodplain stabilized through restoration projects
- Stabilization projects for road and trail drainage features (culverts and ditches)
- Overall water quality effects resulting from the combination of timber harvest, haul road and ski trail construction, stream restoration, and invasive plant connected actions.

5. Wildlife and aquatic habitat enhancements and improvements to timber stands

The purpose and need for this project includes the need to create desired wildlife habitat, to enhance existing softwood habitat, to selective harvest some timber stands to increase overall health of these stands, and to enhance aquatic habitat.

Measurement Indicators:

- Acres of early successional habitat created
- Acres of softwood habitat enhanced
- Miles of stream receiving aquatic and riparian enhancement via placement of large wood.
- Acres of increased timber quality and improved species composition
- Miles of proposed Nordic Ski Trail within lynx habitat

M. Other Issues Brought Forward by the Forest Service

Following CEQ § 1500.4(c)(d) the following issues are incorporated into the EA in Chapter 3 under the related resource, or specifically addressed in Appendix C, public comments and Forest Service Responces. 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 are resolved by project design including mitigations.

Recreation Concerns:

- Avoid impacting historical roads within the Project Area.
- Avoid Sensitive plant populations in the Project Area.
- Visual and noise effects on Rocky Branch trail.
- The proposed logging road off of Meserve Brook road (to units 29 – 34) is too steep and represents too much use in one area.
- Insure driver safety on Iron Mountain Road and Green Hill Road, and the integrity of Spruce Brook Bridge. The purchaser or USFS should be responsible for maintenance and repairs.
- Don't expend public funds on improvements that benefit a private (permitted) party.
- Time harvests to avoid shutting down three important trails at one time.
- Why add dead end trails in Lynx habitat when other trails would have to be forgone.

Scenery Concerns:

- Conduct management activities with full appreciation for the appearance of the Forest.
- Views from residences in the Dana Place Association should be analyzed to meet standards.

Invasive species concerns:

- Permanent haul road bridges may increase motorized uses and subsequent spread of invasives.
- Use herbicides to treat invasives since cutting alone will not control them.

Water Concerns:

- Avoid impacting drinking water source from proposed activities, including use of equipment, refueling equipment, spilled hydraulic fluid, and application of herbicides.
- Analyze the effects of acid rain and deposition.
- Consider impacts on NH designated Outstanding Resource Waters.
- Avoid exacerbating the existing ongoing sedimentation in Ellis River.
- Winter logging is preferred to minimize sedimentation effects to water quality and road damage.

Wildlife and Habitat Concerns:

- Analyze impacts to Management Indicator Species (MIS).
- New Nordic trails would further fragment wildlife habitat and introduce more recreationists to the area.

Vegetation Concerns:

- Wildlife habitat early sucessional acres remains well below Forest Plan requirements.
- I disagree that the ice storm doesn't contribute to early successional growth.
- Why clearcut unit 40 and then enhance the brook below it?
- Other recent cuts have resulted in windthrown timber, will this project?

Economic Concerns:

- Minimize the economic impact on Jackson Ski Touring Foundation and the Town of Jackson.
- Analyze the economic effects to Jackson as compared to the value of the timber sale.
- Implement Alternative 2 which is most economical and efficient to implement contractually.

Chapter 2 - Alternatives

A. Formulation of Alternatives

This chapter provides a detailed description of the Proposed Action and Alternatives to the Proposed Action. Alternative 1, referred to as the "No Action" alternative, proposes that no vegetative management activities be conducted within the Popple Project Area. Consideration of the No Action Alternative is required by regulations implementing the National Environmental Policy Act (NEPA), and is intended to contrast the effects of no action to the effects of action alternatives. Alternatives 2, 3 and 4 are referred to as "Action Alternatives", and they each propose vegetative management and other projects within the Popple Project Area. Each action alternative responds to varying degrees to the "need for change" described in the Purpose and Need section of Chapter 1.

Alternative 2 is the "Proposed Action" described in Chapter 1. Alternative 3 responds to public concern regarding impacts from winter logging on Nordic Skiing opportunities within the Analysis Area. This alternative reduces potential effects on Nordic skiing in the Analysis Area by limiting harvest activities to summer, fall and up to December 20 of each year. Alternative 4 blends the need to manage timber stands in the project area with concerns about impacts from winter logging - road closures on Nordic Skiing opportunities. Alternative 4 also mitigates to the extent possible, the need for access to units 29 – 34 with concerns about impacts to the Hall Trail Connector and provides the most responsive Nordic Ski Trail proposal to minimize conflicts with winter logging now and in the future. However, it does not avoid all conflicts in uses, either now or in the future.

Each Action Alternative meets to varying degrees, the Purpose and Need for Action described in Chapter 1. There are differences in the degree to which each alternative moves this HMU towards the Desired Future Condition described in the Forest Plan. Compartment records and field conditions in stands within HMU 503 were reviewed to identify stands that would benefit from silvicultural treatments. Site specific concerns related to other resources (soil, water, recreation, scenery and wildlife.) were identified and addressed through project design, including mitigating impacts with Unit placement, and restricting the season of harvest.

The Forest Plan lists specific mitigation measures, called Standards and Guidelines, for controlling or alleviating environmental effects resulting from timber harvesting, road construction, and road maintenance. These Standards and Guidelines direct activities on the White Mountain National Forest and are incorporated into this project.

Additional mitigation measures, which go above and beyond Forest Plan Standards and Guidelines, have been developed to address concerns specific to the Proposed Action and Alternatives. These site-specific measures described in Appendix A, mitigate specific resource effects and have been developed through ongoing research and as a result of monitoring and evaluation of similar actions on the White Mountain National Forest over the past 15 years.

B. Description of Alternatives

Alternative 1 - No Action Alternative

While this alternative does not meet the Purpose and Need for Action, it does provide a basis for analyzing the effects of conducting no vegetative management activities (No Action) in the Analysis Area, and comparing these effects with those alternatives that propose some level of vegetative management. This alternative is required by regulations implementing the National Environmental Policy Act (NEPA). This alternative would not harvest any trees, construct any roads or Ski Trails, or implement any other connected actions. This alternative would not meet Forest Plan expectations for sustained timber products and diverse wildlife habitat in HMU 503 for the foreseeable future.

There would be no change to the existing condition of the area except from natural occurrences, ongoing recreation activities, and road and trail maintenance. This alternative provides a foundation for describing and comparing the magnitude of environmental changes associated with the Action Alternatives against those that are occurring in the Analysis Area. This alternative responds to those who want no timber harvesting or active wildlife habitat management. The term "No-Action" means no management action at this time.

Alternative 2 –Proposed Action

The Proposed Action and its connected actions are developed to optimize the Purpose and Need for Action with the most current information available. It would move the HMU toward attaining wildlife habitat diversity objectives and other Forest Plan goals. These goals include creating early successional habitat, increasing softwood development, and providing for sustained timber production.

The Proposed Action is designed to respond to the Purpose and Need for action by:

1. Promote the 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 up to 205 acres of hardwood regeneration habitat through clearcutting;
- Enhance softwood habitat through approximately 80 acres of group and single-tree selection harvests; and enhance hardwood quality on an additonal 55 acres with these selection treatments.
- Improve timber quality and species composition in hardwood stands through approximately 697 acres of commercial thinning, group selection and single-tree selection;

2. Provide needed access to the Project Area and manage National Forest lands, resources and facilities in accordance with the White Mountain National Forest Plan.

- Restore to current design standards through road maintenance the following existing National Forest System Roads, NFSR 325 – 2.0 miles; NFSR 623 – 1.7 miles; and NFSR 512 – 1.6 miles;
- Construct 3000 feet of System Road new construction to access Units 29 – 34.

- Construct 1000 feet of temporary road off of NFSR 623, including a small landing to access Units 9, 10 and 41.
- Construct 300 feet of temporary road off NFSR 623 to access Unit 7.
- Place two permanent haul road bridges for access to units 29 – 34.
- Construct 150 feet of access road off of Iron Mountain Road to a landing in Unit 28;
- Place eight temporary skidder bridges on designated skid trail crossings to access landings.
- Restore existing Nordic Ski Trail bridges if crossing locations are used for harvest activities;
- Remove all temporary drainage structures, temporary bridges, and decommission temporary access to landings off of main roads at closure of this project;
- Previously closed roads opened for this project, landings, and new road construction would be seeded and waterbared and placed in closed intermittent status.

Connected Actions under Alternative 2 (also see Connected Actions for all Alternatives, below)

- Control of Invasive Species in the Project Area (buckthorn, honeysuckle, autumn olive, and barberry). Treatment would include the foliar or cut stump direct application of the herbicides Glyphosate and/or Triclopyr. Herbicide treatment would occur at two sites; Greys field (east of Unit 34) and at the Hall Trail and Avalanche Trail intersection, treating invasive plants within approximately four acres.

Under Alternative 2, a combined treatment regime (cutting with herbicide) would be used to control buckthorn, autumn olive, barberry, and Tatarian honeysuckle in the Project Area prior to the initiation of any harvest related activities. Two different techniques are considered feasible and suitable for these species in the project area: foliar application and cut stump.

1. **Foliar Application**- The population would first be cut in the spring and allowed to regrow for several months. The leaves of the resprouts would then be painted with an appropriate herbicide (see below) in the late summer/early fall, at which time the leaves would be translocating nutrients (and herbicide) to the roots in preparation for winter dormancy.
2. **Cut stump**-
   a. The stems would be cut close to the soil surface in late spring prior to flowering or seed set when root reserves are at their lowest, then followed with direct application of an appropriate herbicide to the exposed stem. Cutting the plant eliminates photosynthetic tissue and energy stores, and applies the herbicide closer to the root system.
   b. One study suggested that winter treatment was highly effective for glossy buckthorn, when the shoot was cut 5-15 cm above the ground surface then immediately treated with a 25% concentration of glyphosate (Reinartz 1997). While the cut-stump method is very target-specific during all seasons, winter application of the cut-and-herbicide control method would further protect dormant native vegetation.

c. The following herbicides are considered the most appropriate for use in the Project Area based on current science and management objectives (Sather and Eckardt 1987/2001; Reinartz 1997; Converse 1984; SE-EPPC, date unknown): Glyphosate[1], a non-selective, systemic herbicide with a short-residual life, and Triclopyr[2], which is selective for broad-leaf species. Dicamba, which has shown success with stem injection for autumn olive, is non-selective and persistent in the soil, and therefore, less desirable, and it would likely require a surfactant[3] for maximum effectiveness.

Estimated Outputs under Alternative 2

Alternative 2 would provide approximately 5.0 million board feet of sawtimber and pulpwood, and improve future stand quality and productivity. Approximately one mile of Meserve Brook would receive fisheries improvements, and stream stabilization actions and invasive plant eradication projects would occur in the lower reaches of Meserve Brook. Opportunity for up to 2.8 miles of new Nordic Ski Trail may occur, following completion of harvest activities and subsequent investment by the special use permittee to construct the trails.

This alternative responds to the need to create hardwood early successional habitat and to increase softwood component in mixedwood stands. This alternative would create 205 acres of early-successional habitat (forest stands 0-9 years old). Natural regeneration with paper birch, yellow birch, pin cherry, red and sugar maple, and aspen are expected in clearcut Units.

Using group and single tree selection treatments this alternative responds to the need to increase the softwood component on 80 acres. Thinning and single-tree selection in 752 acres of hardwood stands would reduce stand density while maintaining a forested stand and increasing tree size and vigor.

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[1] Rodeo® is the recommended formulation for this chemical, since it does not contain surfactants (see following page for definition) and is approved for use in aquatic environments. Applications would adhere to specimen label directions.

[2] Garlon 3a® is the recommended formulation of this chemical, since it does not require the use of a surfactant (see below for definition). Applications would adhere to specimen label directions.

[3] A surfactant is a type of adjuvant, which is a biologically active compound that can be added to an herbicide formulation to facilitate the mixing, application, or effectiveness of that herbicide. As active compounds, they have the potential to be mobile and pollute surface or groundwater sources (Tu et al. 2001). Surfactants, specifically, reduce surface tension, which ensures that the formulation spreads out and covers plants with a thin film rather than beading up, thus facilitating herbicide absorption into the plant.

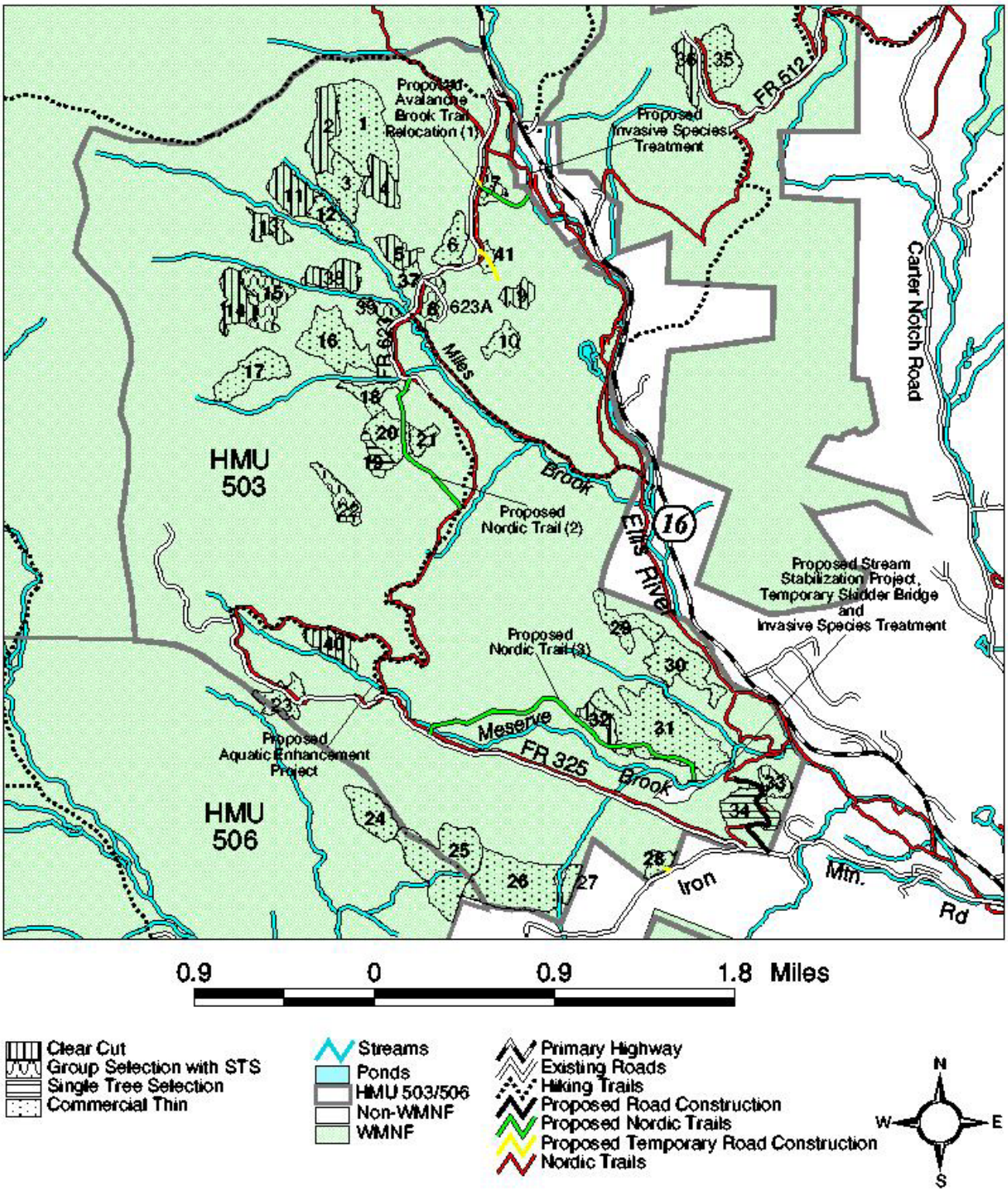

Figure 7:
Popple Vegetation Management Project
Alternative 2 - Proposed Action

Table 2. Popple Project Alternative 2 (Proposed Action)

Unit	Forest Type	Acre	Treatment Objective	Harvest Method	Operating Season
1	Hardwood	60	Hardwood Quality	Thin	Fall/Winter
2	Hardwood	30	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
3	Hardwood	27	Hardwood Quality	Thin	Fall/Winter
4	Hardwood	19	Hardwood regeneration	Clearcut	Summer/Fall/Winter
5	Hardwood	12	Hardwood regeneration	Clearcut	Summer/Fall/Winter
6	Hardwood	18	Hardwood Quality	Thin	Fall/Winter
7	Hardwood	14	Hardwood Quality	Group Selection / STS	Winter
8	Mixedwood	18	Softwood development	Group Selection / STS	Winter
9	Hardwood	11	Hardwood regeneration	Clear Cut	Winter
10	Hardwood	13	Hardwood Quality	Thin	Winter
11	Hardwood	25	Hardwood regeneration	Clear Cut	Fall/Winter
12	Hardwood	19	Hardwood Quality	Thin	Fall/Winter
13	Hardwood	13	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
14	Hardwood	23	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
15	Mixedwood	25	Softwood development	Group Selection / STS	Fall/Winter
16	Hardwood	42	Hardwood Quality	Thin	Fall/Winter
17	Hardwood	33	Hardwood Quality	Thin	Fall/Winter
18	Hardwood	15	Hardwood Quality	Thin	Fall/Winter
19	Mixedwood	9	Softwood development	STS	Winter
20	Hardwood	22	Hardwood Quality	Thin	Winter
21	Hardwood	11	Hardwood Quality	Thin	Winter
22	Mixedwood	19	Softwood development	Group Selection / STS	Winter
23	Hardwood	20	Hardwood Quality	Thin	Winter
24	Hardwood	24	Hardwood Quality	Thin	Fall/Winter
25	Hardwood	89	Hardwood Quality	Thin	Fall/Winter
26	Hardwood	79	Hardwood Quality	Thin	Fall/Winter
27	Hardwood	8	Hardwood Quality	Thin	Fall/Winter
28	Hardwood	9	Hardwood Quality	Thin	Fall/Winter
29	Hardwood	25	Hardwood Quality	Thin	Fall/Winter
30	Hardwood	38	Hardwood Quality	Thin	Fall/Winter
31	Hardwood	99	Hardwood Quality	Thin	Fall/Winter
32	Hardwood	10	Hardwood regeneration	Clear Cut	Summer/Fall/Winter
33	Mixedwood	12	Softwood and Oak devel	Group Selection / STS	Fall/winter
34	Hardwood	30	Hardwood Quality	STS	Fall/winter
35	Hardwood	34	Hardwood Quality	Thin	Fall
36	Hardwood	19	Hardwood Regeneration	Clear Cut	Summer/Fall
37	Hardwood	5	Hardwood Quality	Thin	Fall/Winter
38	Hardwood	20	Hardwood Regeneration	Clearcut	Summer/Fall/Winter
39	Mixedwood	9	Softwood Development	Group Selection / STS	Fall /Winter
40	Hardwood	23	Hardwood Regeneration	Clearcut	Winter
41	Hardwood	6	Hardwood Quality	Thin	Winter
Sum		1037			

Table KEY:

Harvest Method: the silvicultural prescription, or type of harvest proposed for a given Unit.

Group Selection= small openings up to 1/2 acre, spaced throughout the Unit, and treating 20 to 30 percent of the Unit

STS= Single Tree Selection, an uneven age management system that retains trees to a specified density

Thin = Thinning a stand by removing smaller trees, damaged trees and low value or short lived trees

Forest Type – represents the primary species composition of the Unit

Treatment objective –harvest methods are designed to meet the Purpose and Need for treatment in each Unit, resulting in development of a particular type of vegetative habitat.

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.

Alternative 3

Alternative 3 responds to concern about impacts from winter logging on Nordic Skiing opportunities within the Analysis Area. This alternative reduces potential effects on Nordic skiing in the Analysis Area by limiting harvest activities to summer and fall, up to December 20 of each year. The restriction on winter harvest would extend the contract period over a greater number of years.

To a lesser degree than the Proposed Action, it would move the HMU toward attaining wildlife habitat diversity objectives and other Forest Plan goals. These goals include creating early successional habitat, increasing softwood development, and providing for sustained timber production.

Alternative 3 responds to the Purpose and Need for action by:

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 up to 171 acres of hardwood regeneration habitat through clearcutting;
- Enhance softwood habitat through approximately 36 acres of group and single-tree selection harvests;
- Improve timber quality and species composition in hardwood stands through approximately 624 acres of commercial thinning and 40 acres of group and single-tree selection

2. Provide access to the Analysis Area and manage National Forest lands and resources in accordance with the White Mountain National Forest Plan.

- Restore to current design standards through road maintenance the following existing National Forest System Roads, NFSR 325 – 2.0 miles; NFSR 623 – 1.7 miles; and NFSR 512 – 1.6 miles;
- Construct 3000 feet of new classified road to access Units 29 – 34.
- Place two permanent haul road bridges on access to Units 29 – 34.
- Construct 150 feet of access road off of Iron Mountain Road to a landing in Unit 28;
- Place seven temporary skidder bridges on designated skid trail crossings to access landings.
- Restore existing Nordic Ski Trail bridges if crossing locations are used for harvest activities;
- Remove all temporary drainage structures, temporary bridges, and decommission temporary access to landings at closure of this project;
- Previously closed roads opened for this project, landings, and new road construction would be seeded and waterbared and placed in closed intermittent status.

Connected Actions under Alternative 3 (also see Connected Actions for All Alternatives, below)

- Control of Invasive Species in the Project Area (buckthorn, honeysuckle, autumn olive, and barberry). Treatment under this alternative would only consist of manual treatments such as hand pulling or brushing (ie. Cutting near the ground). Invasive plants would be treated at the same two sites along the Hall and Avalanche Trails, covering four acres.

Estimated Outputs

Alternative 3 would provide approximately 4.0 million board feet of sawtimber and pulpwood, and improve future stand quality and productivity. Approximately one mile of Meserve Brook would receive fisheries improvements, and stream stabilization actions and invasive plant eradication projects would occur in the lower reaches of Meserve Brook. Opportunity for up to 2.8 miles of new Nordic Ski Trail may occur, following completion of harvest activities and subsequent investment by the special use permittee to construct the trails.

This alternative responds to the need to create hardwood early successional habitat and to increase softwood component in mixedwood stands. This alternative would create 171 acres of early-successional habitat (forest stands 0-9 years old). Natural regeneration with paper birch, yellow birch, pin cherry, and aspen are expected in clearcut Units. Using group and single tree selection treatments this alternative responds to the need to increase the softwood component on 36 acres. Thinning and single-tree selection in 664 acres of hardwood stands would reduce stand density while maintaining a forested stand and increasing tree size and vigor.

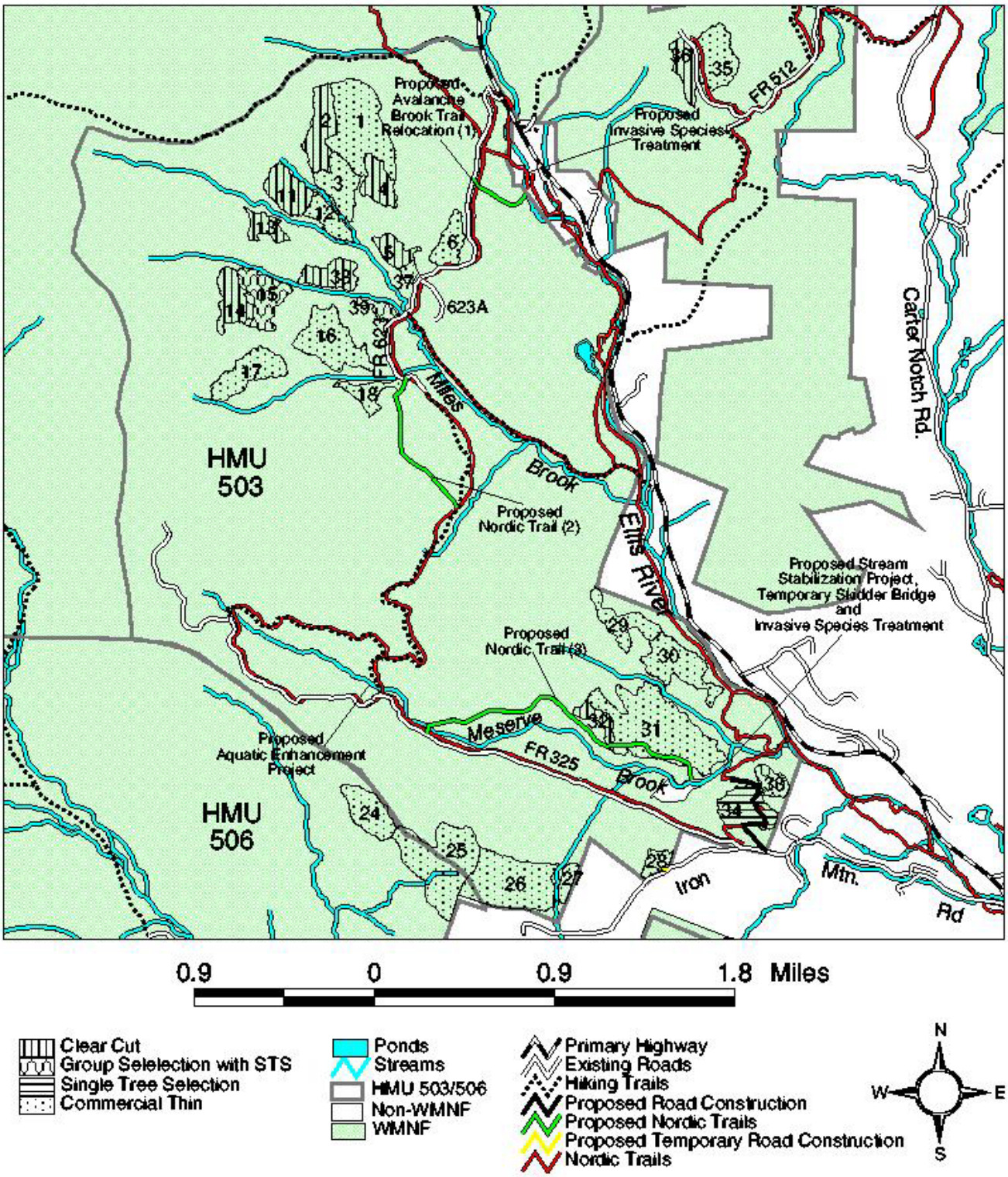

Figure 8:
Popple Vegetation Management Project
Alternative 3

Table 3. Popple Project Alternative 3

Unit	Forest Type	Acre	Treatment Objective	Harvest Method	Operating Season
1	Hardwood	60	Hardwood Quality	Thin	Fall
2	Hardwood	30	Hardwood regeneration	Clear Cut	Summer/Fall
3	Hardwood	27	Hardwood Quality	Thin	Fall
4	Hardwood	19	Hardwood regeneration	Clearcut	Summer/Fall
5	Hardwood	12	Hardwood regeneration	Clearcut	Summer/Fall
6	Hardwood	18	Hardwood Quality	Thin	Fall
11	Hardwood	25	Hardwood regeneration	Clear Cut	Fall
12	Hardwood	19	Hardwood Quality	Thin	Fall
13	Hardwood	13	Hardwood regeneration	Clear Cut	Summer/Fall
14	Hardwood	23	Hardwood regeneration	Clear Cut	Summer/Fall
15	Mixedwood	25	Softwood development	Group Selection / STS	Fall
16	Hardwood	42	Hardwood Quality	Thin	Fall
17	Hardwood	33	Hardwood Quality	Thin	Fall
18	Hardwood	15	Hardwood Quality	Thin	Fall
24	Hardwood	24	Hardwood Quality	Thin	Fall
25	Hardwood	89	Hardwood Quality	Thin	Fall
26	Hardwood	79	Hardwood Quality	Thin	Fall
27	Hardwood	8	Hardwood Quality	Thin	Fall
28	Hardwood	9	Hardwood Quality	Thin	Fall
29	Hardwood	25	Hardwood Quality	Thin	Fall
30	Hardwood	38	Hardwood Quality	Thin	Fall
31	Hardwood	99	Hardwood Quality	Thin	Fall
32	Hardwood	10	Hardwood regeneration	Clear Cut	Summer/Fall
33	Mixedwood	12	Softwood and Oak devel.	Group Selection / STS	Fall
34	Hardwood	30	Hardwood Qualitv	STS	Fall
35	Hardwood	34	Hardwood Quality	Thin	Fall
36	Hardwood	19	Hardwood Regeneration	Clear Cut	Summer/Fall
37	Hardwood	5	Hardwood Quality	Thin	Fall
38	Hardwood	20	Hardwood Regeneration	Clearcut	Summer/Fall
39	Mixedwood	9	Softwood Development	Group Selection / STS	Fall
Sum		871			

Harvest Method: the silvicultural prescription, or type of harvest proposed for a given Unit.

Group Selection= small openings up to 1/2 acre, spaced throughout, and treating 20 percent of the Unit

STS= Single Tree Selection, an uneven age management system that retains trees to a specified density

Thin = Thinning a stand by removing damaged trees, smaller trees and low value or short lived trees

Forest Type – represents the primary species composition of the Unit

Treatment objective –harvest methods are designed to meet the Purpose and Need for treatment in each Unit, resulting in development of a particular type of vegetative habitat.

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.

Alternative 4

This alternative is designed to respond to several public concerns raised during the public scooping period including concerns about the economic and social effects that Nordic Ski Trail closures would have and concerns about the proposed road for access to units 29-34. This alternative minimizes the impact to Nordic Skiing by restricting harvest seasons to summer and fall for a large percentage of the units, while allowing winter harvest in 12 units off Miles Brook road. All units accessed via Meserve Brook Road (NFSR 325 and Green Hill Road) are restricted to summer and fall harvest, eliminating winter logging use of that road. Alternative 4 includes nine winter units and 3 fall/winter units, all of which are accessed from Miles Brook Road - NFSR 623.

Another primary difference from Alternatives 2 and 3 is the location of approximately 3000 feet of proposed new road construction to access Units 29 – 34. Alternative 4 proposes a similar road in a location that is off-set from the Hall Trail Connector (see map).

Under Alternative 4, the Fall harvest season would end December 15th of each year.

Alternative 4 and its connected actions optimize the Purpose and Need for Action, treating the proposed units to meet long term habitat and silvicultural objectives. Alternative 4 includes similar connected actions to improve fisheries and watershed conditions as Alternative 2 and 3, and includes a longer version of proposed Nordic Ski Trail # 3.

This alternative would move the HMU toward attaining wildlife habitat diversity objectives, timber resource management objectives, and other Forest Plan goals while maintaining the range of recreation options. This alternative strikes a balance between all of these goals.

Alternative 4 is designed to respond to the Purpose and Need for action by:

1. Promote the 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 up to 205 acres of hardwood regeneration habitat through clearcutting;
- Enhance softwood habitat through approximately 80 acres of group and single-tree selection harvests; and enhance hardwood quality on 55 acres with these selection treatments.
- Improve timber quality and species composition in hardwood stands through approximately 697 acres of commercial thinning, group selection and single-tree selection;

2. Provide needed access to the Project Area and manage National Forest lands, resources and facilities in accordance with the White Mountain National Forest Plan.

- Restore to current design standards the following existing National Forest System Roads, NFSR 325 – 2.0 miles; NFSR 623 – 1.7 miles; and NFSR 512 – 1.6 miles;
- Construct approximately 3000 feet of System Road off-set from the Hall Trail Connector, to access Units 29 – 34, including one temporary haul road bridge and a gate (see Map).
- Construct 1000 feet of access off of NFSR 623, and landing to access Units 9, 10 and 41.
- Construct 300 feet of access road off of NFSR 623 to a landing in Unit 7.

- Construct 150 feet of access road off of Iron Mountain Road to a landing in Unit 28;
- Place eight temporary skidder bridges on designated skid trail crossings to access landings.
- Restore existing Nordic Ski Trail bridges if crossing locations are used for harvest activities;
- Remove all temporary drainage structures, temporary bridges, and decommission temporary access to landings at closure of this project;
- Previously closed roads opened for this project, landings, and new road construction would be seeded and waterbared and placed again into a closed status.

Connected Actions under Alternative 4 (also see Connected Actions for all Alternatives, below)

- Control of Invasive Species in the Project Area (buckthorn, honeysuckle, autumn olive, and barberry). Treatment would include the foliar or cut stump direct application of the herbicides Glyphosate and/or Triclopyr. Herbicide treatment would occur at two sites; Greys field (east of Unit 34) and at the Hall Trail and Avalanche Trail intersection, treating invasive plants within approximately four acres.

Under Alternative 4, a combined treatment regime (cutting with herbicide) would be used to control buckthorn, autumn olive, barberry, and Tatarian honeysuckle in the Project Area prior to the initiation of any harvest related activities. Two different techniques are considered feasible and suitable for these species in the project area: foliar application and cut stump.

1. **Foliar Application**- The population would first be cut in the spring and allowed to regrow for several months. The leaves of the resprouts would then be painted with an appropriate herbicide (see below) in the late summer/early fall, at which time the leaves would be translocating nutrients (and herbicide) to the roots in preparation for winter dormancy.
2. **Cut stump**-
   a. The stems would be cut close to the soil surface in late spring prior to flowering or seed set when root reserves are at their lowest, then followed with direct application of an appropriate herbicide to the exposed stem. Cutting the plant eliminates photosynthetic tissue and energy stores, and applies the herbicide closer to the root system.
   b. One study suggested that winter treatment was highly effective for glossy buckthorn, when the shoot was cut 5-15 cm above the ground surface then immediately treated with a 25% concentration of glyphosate (Reinartz 1997). While the cut-stump method is very target-specific during all seasons, winter application of the cut-and-herbicide control method would further protect dormant native vegetation.

c. The following herbicides are considered the most appropriate for use in the Project Area based on current science and management objectives (Sather and Eckardt 1987/2001; Reinartz 1997; Converse 1984; SE-EPPC, date unknown): Glyphosate[4], a non-selective, systemic herbicide with a short-residual life, and Triclopyr[5], which is selective for broad-leaf species. Dicamba is non-selective, persistent in the soil, and would likely require a surfactant[6] for maximum effectiveness.

- Correct design concerns on the upper section of the Hall Trail Connector, including re-placement of culverts, and correct ditching where soil erosion concerns exist. Correcting design concerns on the Hall Trail Connector would be the responsibility of the Special Use Permittee. In Alternatives 2 and 3, correcting design concerns would occur as part of the 3000 feet of proposed new road construction. Alternative 4 crosses, but does not use the Hall Trail Connector in the location where these design concerns require attention.

Estimated Outputs under Alternative 4

Alternative 4 would provide approximately 5.0 million board feet of sawtimber and pulpwood, and improve future stand quality and productivity. Approximately one mile of Meserve Brook would receive fisheries improvements, and stream stabilization actions and invasive plant eradication projects would occur in the lower reaches of Meserve Brook. Opportunity for up to 2.4 miles of new Nordic Ski Trail may occur, following completion of harvest activities and subsequent investment by the special use permittee to convert skid trails to ski trails.

This alternative responds to the need to create hardwood early successional habitat, to increase softwood component in mixedwood stands, to protect identified forest resources, to manage timber stands for hardwood quality, and to minimize effects to other uses to the extent practical. This alternative would create 205 acres of early-successional habitat (forest stands 0-9 years old). Natural regeneration with paper birch, yellow birch, pin cherry, red and sugar maple, and aspen are expected in clearcut Units. Using group and single tree selection treatments this alternative responds to the need to increase the softwood component on 80 acres. Thinning and single-tree selection in 752 acres of hardwood stands would reduce stand density while maintaining a forested stand and increasing tree size and vigor.

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[4] Rodeo® is the recommended formulation for this chemical, since it does not contain surfactants (see following page for definition) and is approved for use in aquatic environments. Applications would adhere to specimen label directions.

[5] Garlon 3a® is the recommended formulation of this chemical, since it does not require the use of a surfactant (see below for definition). Applications would adhere to specimen label directions.

[6] A surfactant is a type of adjuvant, which is a biologically active compound that can be added to an herbicide formulation to facilitate the mixing, application, or effectiveness of that herbicide. As active compounds, they have the potential to be mobile and pollute surface or groundwater sources (Tu et al. 2001). Surfactants, specifically, reduce surface tension, which ensures that the formulation spreads out and covers plants with a thin film rather than beading up, thus facilitating herbicide absorption into the plant.

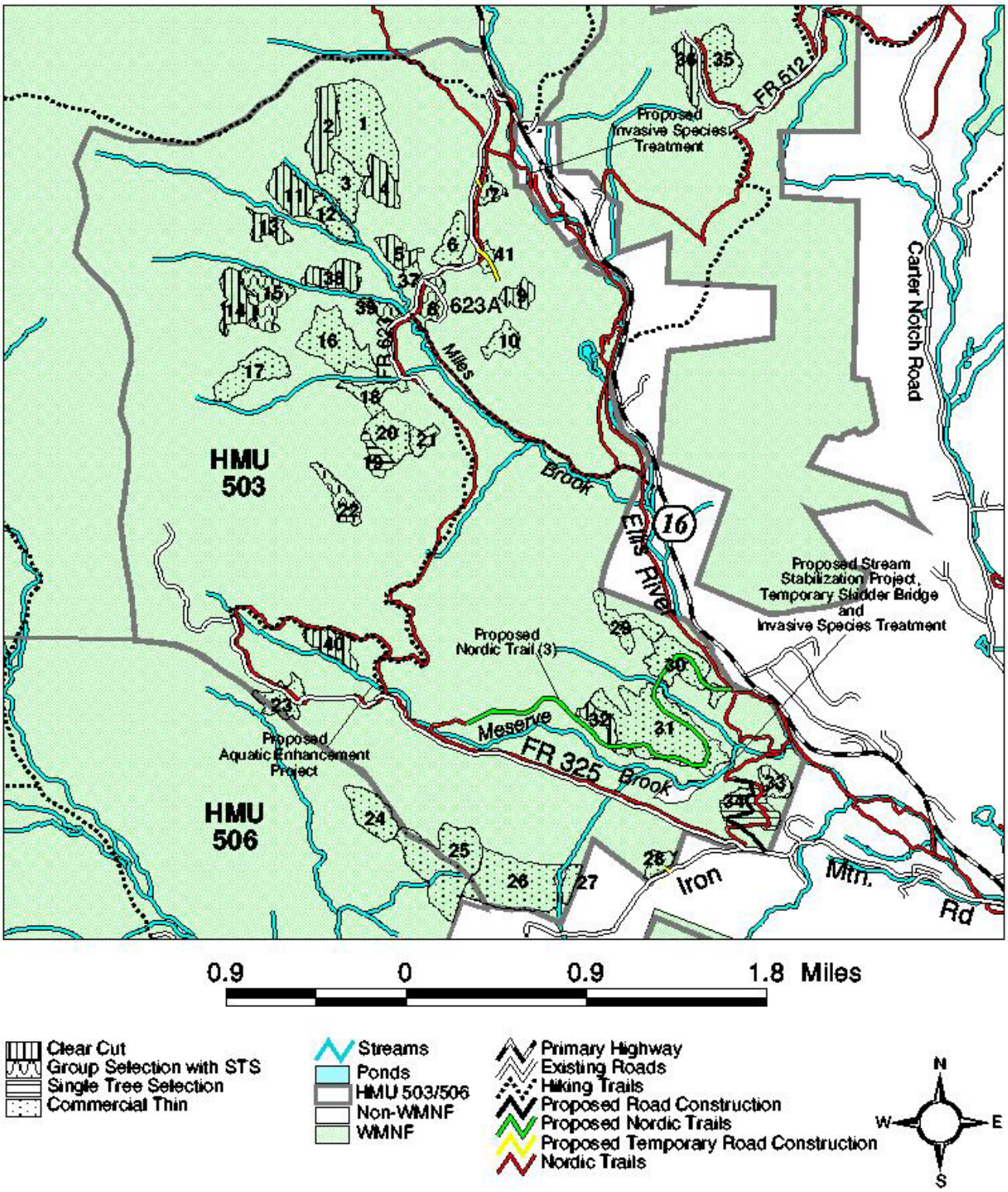

Figure 9:
Popple Vegetation Management Project
Alternative 4

Table 4. Popple Project Alternative 4

Unit	Forest Type	Acre	Treatment Objective	Harvest Method	Operating Season
1	Hardwood	60	Hardwood Quality	Thin	Fall
2	Hardwood	30	Hardwood regeneration	Clear Cut	Summer/Fall
3	Hardwood	27	Hardwood Quality	Thin	Fall
4	Hardwood	19	Hardwood regeneration	Clearcut	Summer/Fall
5	Hardwood	12	Hardwood regeneration	Clearcut	Winter
6	Hardwood	18	Hardwood Quality	Thin	Fall/Winter
7	Hardwood	14	Hardwood Quality	Group Selection / STS	Fall
8	Mixedwood	18	Softwood development	Group Selection / STS	Winter
9	Hardwood	11	Hardwood regeneration	Clear Cut	Winter
10	Hardwood	13	Hardwood Quality	Thin	Winter
11	Hardwood	25	Hardwood regeneration	Clear Cut	Fall
12	Hardwood	19	Hardwood Quality	Thin	Fall
13	Hardwood	13	Hardwood regeneration	Clear Cut	Summer/Fall
14	Hardwood	23	Hardwood regeneration	Clear Cut	Summer/Fall
15	Mixedwood	25	Softwood development	Group Selection / STS	Fall
16	Hardwood	42	Hardwood Quality	Thin	Fall
17	Hardwood	33	Hardwood Quality	Thin	Fall
18	Hardwood	15	Hardwood Quality	Thin	Fall/Winter
19	Mixedwood	9	Softwood development	STS	Winter
20	Hardwood	22	Hardwood Quality	Thin	Winter
21	Hardwood	11	Hardwood Quality	Thin	Winter
22	Mixedwood	19	Softwood development	Group Selection / STS	Winter
23	Hardwood	20	Hardwood Quality	Thin	Fall
24	Hardwood	24	Hardwood Quality	Thin	Fall
25	Hardwood	89	Hardwood Quality	Thin	Fall
26	Hardwood	79	Hardwood Quality	Thin	Fall
27	Hardwood	8	Hardwood Quality	Thin	Fall
28	Hardwood	9	Hardwood Quality	Thin	Fall
29	Hardwood	25	Hardwood Quality	Thin	Fall
30	Hardwood	38	Hardwood Quality	Thin	Fall
31	Hardwood	99	Hardwood Quality	Thin	Fall
32	Hardwood	10	Hardwood regeneration	Clear Cut	Summer/Fall
33	Mixedwood	12	Softwood and Oak devel	Group Selection / STS	Fall
34	Hardwood	30	Hardwood Quality	STS	Fall
35	Hardwood	34	Hardwood Quality	Thin	Fall
36	Hardwood	19	Hardwood Regeneration	Clear Cut	Summer/Fall
37	Hardwood	5	Hardwood Quality	Thin	Fall/Winter
38	Hardwood	20	Hardwood Regeneration	Clearcut	Summer/Fall
39	Mixedwood	9	Softwood Development	Group Selection / STS	Fall
40	Hardwood	23	Hardwood Regeneration	Clearcut	Summer/Fall
41	Hardwood	6	Hardwood Quality	Thin	Winter
Sum		1037			

Table KEY:

Harvest Method: the silvicultural prescription, or type of harvest proposed for a given Unit.

Group Selection= small openings up to 1/2 acre, spaced throughout the Unit, and treating 20 to 30 percent of the Unit

STS= Single Tree Selection, an uneven age management system that retains trees to a specified density

Thin = Thinning a stand by removing smaller trees, damaged trees and low value or short lived trees

Forest Type – represents the primary species composition of the Unit

Treatment objective –harvest methods are designed to meet the Purpose and Need for treatment in each Unit, resulting in development of a particular type of vegetative habitat.

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.

C. Connected Actions under ALL of the Action Alternatives

- Approximately six existing landings would be used and five new landings would be needed. In Alternative 3, two of the proposed new landings and 1300 feet of proposed temporary road would not be needed because Units 7, 9, 10 and 41 are dropped. A log landing is approximately one quarter to one acre in size where harvested trees are decked for loading onto log trucks and then transported to various mills. These existing landings sum to about six acres. The new proposed landings sum to about two acres under Alternatives 2 and 4, and 1 and ½ acre under Alternative 3.

- In Alternatives 2 and 3, existing and new skid trails and logging roads would be used as the location for up to 2.8 miles of potential new Ski Trails (see Table 5 and Alternative maps). Approximately one half mile of new ski trail that is not part of the skidd trail system would be needed to complete trail #1. Trail #2 requires approximately 300 feet of new construction. Construction and maintenance of these trails would be the responsibility of the Special Use Permittee and would meet Forest Service trail design requirements, Forest Plan Standards and Special Use Permit requirements. Alternative 4 does not include trail #1 and #2, and instead connects Nordic trail #3 to the Ellis River Trail, creating a loop trail and avoiding a ski trail bridge across Meserve Brook.

- To improve fisheries habitat in the upper section of Meserve Brook, place and anchor woody material from Unit 40 downstream ½ to ¾ miles at a rate of 100 pieces per mile. Place wood at naturally occuring debris jam locations to increase aquatic habitat diversity by creating pools and cover, and increase nutrients through the collection and decomposition of debris. In addition to adding wood to the stream, downed wood would be added to the riparian area adjacent to the stream in this section. Downed wood slows water movement on hillsides and as water descends brooks.

- To stabilize streambanks and thus improve watershed stability and subsequent water quality, streamside stabilization projects are proposed below the private inholding and water impoundment on Meserve Brook. Historical uses in this location have led to braiding of the stream channel downstream and have led to subsequent re-channelization and sedimentation. The objective is to restore Meserve Brook into its original channel and thereby eliminate continued braiding. To do this, rocks and logs would be placed in key areas along a mile and a quarter of stream downstream from the impoundment.

- In alternatives 2 and 3, correct design concerns on the upper section of the Hall Trail Connector when constructing access for timber haul. Work includes re-placement of culverts, and improved ditching where soil erosion concerns exist. Reparing these drainage features is incorporated into Alternatives 2 and 3 where the road overlays the ski trail. This repair would be the responsibility of the Special Use Permittee under Alternative 4.

- Ditch an existing skid road within Unit 36 that has become an intermittent stream channel to redirect water back into its original channel.

- Replace the culvert for an overflow channel on Miles Brook at Miles Brook Road (NFSR 623). Debris plugged the culvert during the summer of 2004 following heavy precipitation and needs to be replaced with a larger culvert to avoid a recurrance and damage to the road.

- Precommercial thin or release softwood in group selection openings to promote softwood development. Treat up to 25 % of the 80 acres proposed for group selection harvest.

Table 5: Site-Specific Activities on Roads and Trails Under All Action Alternatives

Saco Ranger District			
Road Number	**Area Accessed by Road or Trail**	**Work Proposed**	**Length***
NFSR 325	Units 23-34, 40	Pre-haul Maintenance Construct 2 landings, ¼ to ½ acre	2.0 miles
NFSR 623	Units 1 – 22	Pre-haul Maintenance Replace one culvert Use three existing landings	1.7 miles
NFSR 512	Unit 35-36	Pre-haul Maintenance Place four culverts, spot rocking Use existing landing	1.6 miles
NFSR 119	Unit 28	Construct ¼ acre landing in Unit 28	Town road
New Classified Road to Units 29-34	Provides road access to Units 29-34	Construct 3000 feet of new road with two haul road bridges (alt 2 and 3). Similar length in Alternative 4, but on different location and only one (temporary) haul bridge is needed.	3000 feet
Avalanche Brook Ski Trail Relocation	Associated with temporary road and skid trail within Unit 7 plus 1/2 mile of new construction	Design and construction to be accomplished by Special Use Permittee if approved in the Decision. Alternative 4 omits this trail from consideration at this time.	1700 feet; approx 800 feet is proposed skid trail and road within Unit 7.
Proposed new Nordic Ski Trail #2 (under Alternatives 2 and 3)	Associated w/ Units 20 – 22 and skid roads for harvest Units from previous timber sales	Design and construction to be accomplished by Special Use Permittee if approved in the Decision. Alternative 4 omits this trail from consideration at this time.	4200 feet; 95% is existing skid trail used previously for harvest operations.
Proposed Nordic Ski Trail #3	Associated with skid roads in Units 30 thru 32, and old roads from Scenic Vista Trail south, and ties into Hall Trail Connector (alt 2, 3), or Ellis River Trail	Design and construction to be done by Permittee if approved. Alternative 4 extends trail #3 northward, out of unit 31 into unit 30 and connects to the Ellis River Trail. This provides an alternate Trail system that may remain open when NFSR 325 is plowed for harvest activities.	8000 feet of new trail under Alternatives 2 and 3, 12,800 feet (2.4 miles) of trail is proposed under Alternative 4.

* (all road and trail lengths, and landing sizes are estimates)

D. Alternatives Considered and Deferred from Detailed Study at this Time

- ***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. One of the goals for MA 2.1 and 3.1 lands is to provide a balanced mix of habitats for all wildlife species. The Purpose and Need for Action for this project specifically includes creation of early successional habitat. A detailed discussion regarding the need for early successional habitat is presented in the Need for Action and Need for Change sections of Chapter 1. The Wildlife effects section in Chapter 3 discusses effects of the No Action Alternative and the anticipated habitat diversity that even-aged and uneven-aged management would have. Harvest treatments in the HMU during the 1950's thru the 1970's are well-stocked hardwood pole sized stands. Young merchantable stands are dense and contain mature paper birch and aspen, or are northern hardwood stands that would benefit from a thinning. This need for action within these stands eliminated an un-evenaged management alternative from further detailed study.

- ***Design permanent access to Meserve Brook in the vicinity of Units 29 –*** 34.

Three alternative access routes were considered. By constructing 1.7 miles of new road on an old (unclassified road) template and avoiding crossing Meserve Brook, the old road location could be used for permanent access. Portions of this old road were previous used for logging, and would be used for skidding in Units 31 and 32. This old road location, while eliminated from detailed study for logging access, is under consideration for a possible Nordic Ski Trail (Trail #3). Consideration for truck road use was dropped because of the distance of new construction needed (7000 feet), and the length of adverse haul required to reach Meserve Brook road (NFSR 325) at the Scenic Vista intersection. Several locations would require extensive work to rebuild, including cut and fill slopes and numerous culverts. And, there are several sections that would approach 18% adverse slope which is steep for logging trucks.

The second access would ascend a steep sidehill from near Meserve Brook up to NFSR 325 adjacent to the private in-holding on an old road that runs along the National Forest and the private in-holding boundary. This old road has not been used in several decades, is covered with young saplings that have stabilized this road. Its "wrong way" entry onto Meserve Brook road, requiring an additional turn around area, the fact that a section of it runs along the private in-holding, and the potential for erosion concerns on this road just above Jackson Water Precinct impoundment, led the team to discard it as a viable long term access to this area.

A third route that would access the area through private property on Spruce Brook road was considered. This would require landowner agreement for acquisition of a permanent Right of Way. The landowner was unwilling to grant this.

These three alternate routes were closely examined during project development by project planners and a road engineer. In each case, the team of specialists agreed that potential adverse resource effects of re-constructing the first two routes far outweighed the perceived benefit of avoiding the proposed new road construction near or on the Hall Connecter trail as proposed in Alternatives 2 and 3 and 4. The third access proposal through private land was not an option.

E. Comparison of Alternatives

The following table compares the Alternatives by measurement indicators.

Table 6. Summary of Potential Effects

Measurement Indicators	Alterna-tive 1	Alternative 2	Alternative 3	Alternative 4
Nordic Ski Trails				
Trail Closures on Hall Trail, and Maple Mountain Loop Ski Trail	No Winter Closures	Potential winter long closures on these ski trails for three seasons	No winter closures on these ski trails after December 20th , Sale may take four seasons	None on South Hall or Maple Loop, Harvest ends December 15 for all fall units. Winter units = 148 acres on Miles Brook Road.
Effects on Wildcat Valley, Quail and UST off Carter Notch Road	No Trail Closures	No Trail Closures after December 31 of each year	No Trail Closures after December 20th of each year	No Trail Closures after December 15th of each year
New Ski Trails	None	3 trails, 2.8 miles	3 trails, 2.8 miles	1 trail, 2.4 miles
Scenery				
Acres of Openings seen from identified viewpoints *	None	Iron Mountain: 126 ac Doublehead: 76 ac U.S.T: 57 acres (3) Bear Peak: 34 acres Dana Place Tr: 6 ac	Iron Mountain: 108 Doublehead: 76 ac U. S. T: 50 acres (3) Bear Peak: 29 Acres Dana Place Tr: 3 ac	Iron Mountain: 126 Doublehead: 76 ac U. S. T: 57 acres (3) Bear Peak: 34 Acres Dana Place Tr: 6 ac
Invasive Species				
Infested land treated**	None	4 acres	3 acres	4 acres
Potential for Spread #	Moderate	Low	Moderate to High	Low
Streambank Restoration				
Stream restored and floodplain stabilized	None	1¼ miles of Meserve Brook below private land restored	1¼ miles of Meserve Brook below private land restored	1¼ miles of Meserve Brook below private land restored
Stabilize roads & trails	None	Four Locations (2)	Four Locations (2)	Four Locations (2)
Overall Water Quality Effects from activities, including Herbicides (4)	Problem areas persist	Improved drainage features offset project localized short term water quality effects.	Improved drainage features offset project localized short term water quality effects	Improved drainage features offset project localized short term water quality effects
Wildlife and Fishery				
Early Successional Habitat created ##	None	205 acres	171 acres	205 acres
Softwood created###	None	80 acres	36 acres	80 acres
Aquatic / Riparian Habitat enhanced	None	½ to ¾ miles improved stream	½ to ¾ miles improved stream	½ to ¾ miles improved stream
lynx habitat (1) affected	None	Net gain of 2.3 miles oversnow	Net gain of 2.3 miles oversnow	Net gain of 2.4 miles oversnow

* The most critical viewpoint was used to estimate openings seen under each alternative. The **sum** of all openings (clearcuts) seen are shown. These estimates are less than the Unit size due to screening by topographic features and by timber stands at the front edge of viewed openings, and by reserve patches required in these openings.

** Acres infested is the gross area and may include some invasive-free zones. Infestations at Greys Field wildlife opening are three acres, and along Avalanche Brook Trail, 1 acre.

Potential for spread is defined as follows:

Low- Project activities and proposed invasive species mitigations (use of herbicides on 4 acres) in Alternatives 2 and 4 would likely prevent the spread of undesirable plants on disturbed sites throughout the Project Area.

Moderate- Project activities and proposed invasive species mitigations (manual treatments) in Alternative 3 are likely to result in some areas becoming infested with undesirable plants on disturbed sites even when preventative actions are followed. Strict control measures would be essential to prevent the spread of undesirable plants within the Project Area.

High- Project activities and proposed invasive species mitigations, even with preventative actions (manual treatments in Alternative 3), are likely to spread invasive plants to disturbed sites as a result of harvest activities and other activities along Ski Trails in the Project Area.

Of the early successional habitat acres created, 68 acres are expected to convert to paper birch forest type and 12 acres are expected to convert to aspen forest type, the remainder to hardwood type.

Softwood habitat improvement benefits snowshoe hare, deer, many bird species, marten, and lynx.

(1) Proposed Nordic Ski Trails # 2 and 3, are partly located in lynx habitat. The rule for over snow routes in lynx habitat is 'no net gain'. However, trail #3 is within the Core Area of Jackson Ski Touring Foundations' permit boundary and is excluded from the rule. Therefore, only the proposed Ski Trail #2 under Alternatives 2 and 3 would need to be offset with removal of an equivalent length of existing Ski Trail within the same lynx analysis unit (LAU).

(2) See "Connected Actions" listed in Chapter 2 for descriptions of projects to stabilize Miles Brook road culvert, Hall Connector Nordic Ski Trail, Meserve Brook, and a skid road within Unit 36.

(3) The viewed acres reported for the U.S.T observation viewpoint includes 75 acres from four existing openings from the Miles Brook II sale completed in 1998. These recently created openings are relatively indistinguishable from other natural landscape patterns and features seen from the other three viewpoints shown in the table.

(4) Risk Assessments for the herbicides proposed for this project are available from the Saco Ranger District. These Risk Assessments will guide application and are incorporated by reference.

Chapter 3 – Affected Environment and Environmental Consequences

Introduction

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

Specific issues regarding resources that were raised during the public involvement process are addressed in this chapter. Each resource section is organized as follows:

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

3.1 Effects on Nordic Skiing and Other Recreation

Issues Related to Recreation

Effects of winter haul on existing Nordic Ski Trails, of proposed road construction to access units 29-34 on the existing Hall Trail Connector Trail, of additional proposed Nordic Ski Trails, and effects on Hiking.

Affected Environment

Recreation resources within and adjacent to the Popple Project include trailheads, hiking trails, Nordic ski trails, and roads used for various recreation activities. Nordic ski trails are generally located on roads also used by hikers, hunters and mountain bikers, however, use levels are much lower.

Hiking Trails

Four hiking trails lie nearby the Popple Project Area: Rocky Branch, Winneweta Falls, Hutmen's, and Iron Mountain trails. None of the proposed harvest units lie immediately on or adjacent to the hiking trails. The northern Rocky Branch Trailhead lies to the north of the project area and provides access to the Presidential Range-Dry River Wilderness. The 9.8 mile trail traverses the Presidential Range-Dry River Wilderness to the southern Rocky Branch Trailhead off of Jericho Road. The northern trailhead and Miles Brook Road (NFSR 623) share the same entrance point off of NH-16.

Winneweta Falls Trail begins on private land on the west side of NH-16 to the east of the project area.

The trail quickly enters National Forest land and the terminus of the hiking trail occurs in less than a mile at a waterfall. A Nordic ski trail continues on from the falls up to FR 623 (also Hall Ski Trail).

Hutmen's Trail lies on the east side of NH-16 providing a 3.1 mile trail from NH-16 to Carter Notch Road. The Hutmen's Trail provides views of Mt. Washington, Carter Notch and Wildcat River.

Iron Mountain Trail provides views from the southern end of the project area, including a portion of the project area, the Presidentials, and Rocky Branch Valley. The trail begins on private land off of Iron Mountain Road (FR 119) and the summit is reached in under a mile on National Forest Land.

Rocky Branch, Winneweta Falls and Hutmen's trails are considered low use (WMNF Trail Use Level Data). Low use is defined as zero to six people utilizing the trail per day during peak use season. Field visits conducted during 2004 support this level of use. The Iron Mountain Trail receives moderate use meaning 7 to 25 people per day are expected during the peak hiking times.

Nordic Ski Trails

Several Nordic ski trails lie within and adjacent to the project area. All, except for the Avalanche Brook Trail, are maintained by the Jackson Ski Touring Foundation (JSTF) as a part of their Nordic ski area special use permit. JSTF also maintains trails on private and Town of Jackson lands. Approximately 41% of JSTF's 98 mile trail system is located on National Forest lands administered under a Special Use Permit.

3.1.1 Direct and Indirect Effects on Recreation

The **Analysis Area for direct and indirect effects** on recreation is defined as HMU 503. The time frame is the duration of the Popple Project, expected to be 2-4 years. Table 7 below provides a summary of the direct and indirect effects on recreation by alternative.

Recreation settings are described by the Recreation Opportunity Spectrum (ROS) which defines a range of unique recreation experiences as Primitive, Semi-Primitive Nonmotorized, Semi-Primitive Motorized, Roaded Natural and Rural (Forest Plan, pp VI-9). The ROS goal for MA 2.1 are Roaded Natural recreation opportunities. MA 3.1 is classified primarily as Semi-Primitive Motorized, but may provide Semi-Primitive Non-motorized and Roaded Natural recreation opportunities.

Table 7 Summary of Direct & Indirect Effects on Recreation

Alternative 1	▪ Would not alter current recreation opportunities; ▪ No additional Nordic ski trails.
Alternative 2	▪ Temporary interruption of access to approximately 10 miles of Nordic ski trails (Hall Trail, Maple Mountain Loop) during logging operations; ▪ Possibly add up to 2.8 miles of new Nordic ski trails in 3 locations; ▪ Increased noise and traffic associated with harvesting; ▪ Changes to forest landscape along some roads and trails; ▪ Improved habitat and browse for some game species.
Alternative 3	▪ Significantly less impact to Nordic ski trails than Alternative 2 by restricting logging operations to summer through December 20th; ▪ Possibly add up to 2.8 miles of new Nordic ski trails in 3 locations; ▪ Less noise, traffic and changes to forest landscape than Alternative 2 due to reduced acres treated and no winter harvest; ▪ Less improved habitat and browse for some game species than Alternative 2.

Alternative 4	▪ Temporary interruption of access to approximately 1.8 miles of Nordic Ski Trail (northern portion of Hall Trail) during winter logging operations; ▪ Possibly add up to 2.4 miles of new Nordic ski trails in one location; ▪ Other effects are nearly identical to Alternative 2. ▪ Hall Trail Connector is bisected rather than overlain by the proposed road

Alternative 1: No Action

Alternative 1 would not alter or enhance current recreation opportunities.

Alternative 2: Proposed Action

This alternative would have the most short-term, direct and indirect effects on winter recreation in the analysis area because all proposed units are included and no winter logging restrictions are proposed**.** Short-term effects of harvesting would impact hikers, Nordic skiers, and other users. However, timber harvest has occurred in the analysis area numerous times in the past and the long-term recreation experience is not expected to change from this project.

Hiking Trails

None of the four hiking trails are directly impacted by this alternative. The nearest harvest unit to a hiking trail is greater than 500 feet distant. Logging activities would add to existing noise levels from traffic on Highway 16, and traffic volume on Forest Roads. Forest visitors and residents along Green Hill Road would experience increased vehicular noise during harvest seasons. Signs would be installed to notify the public of logging activity and truck traffic.

Nordic Ski Trails

This alternative would have the most effect on existing Nordic ski trails because no seasonal operating restrictions are included. Use of NFSR 325 and 623 (Hall Trail and a portion of Maple Mountain Loop) for timber hauling during the Nordic ski season would preclude grooming and use of up to ten miles of Nordic trails during timber harvesting (Hall, Maple Mountain Loop, and Scenic Vista trails) for up to four years.

Temporary closure of the Hall Trail would impact loop skiing opportunities from Winneweta Falls Trail, restricting it to ‘up and back’ only trail experience.

Effects to Nordic skiing on NFSR 512 would be mitigated by limiting the operating season to summer through December 31 in this alternative, so the impact on the UST, Dana Place, Quail and Wildcat Valley trails would be limited only during the early ski season.

The resulting change in forest appearance along Nordic ski trails with nearby harvest units (see Table 8 below) would not be noticeably different over the long term than current conditions. This is because several previous timber sales have occurred along these trails, including clearcuts, and therefore the current landscape includes variations of tree sizes, and stand densities, stand ages, and even / uneven aged management. The majority of harvest units adjacent to Nordic trails are thins and single tree selection. Units 36 and 40 are clearcuts further discussed below. Slash would be removed within a 50-foot zone along the Nordic trails.

Table 8 Nordic Ski Trails Adjacent to Harvest Units				
Trail	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**
Avalanche Brook	None	7	None	7
Hall	None	6-8, 33, 34, 37, 41	6, 33, 34, 37	6-8, 33, 34, 37, 41
High Water	None	None	None	None
Ellis River	None	30	30	30
Winneweta Falls	None	8	None	8
Maple Mountain Loop	None	23, 40	None	23, 40
Scenic Vista	None	None	None	None
UST	None	35, 36	35, 36	35, 36

Proposed harvest units 40 and 36 are the only units with clearcut prescriptions that lie immediately adjacent to Nordic trails. Openings created would also provide scenic viewing opportunities similar to several Scenic Vistas on the JSTF's Trail System. Unit 40 would provide a view from Maple Mountain Loop Trail toward Iron Mountain. Unit 36 would provide a view from the terminus of the UST trail, which is closing in due to re-foresting of the existing viewpoint. Therefore, cutting for these two units is proposed without buffers to create vistas.

Under this alternative, 3000 feet of the Hall Trail Connector Trail would be used for access to units 29–34. The Hall Trail Connector would be re-constructed to straighten curves and dips to accommodate log truck traffic. Following harvest operations, the road would be maintained by the National Forest.

Three Nordic Ski Trails adding 2.8 miles of Nordic skiing opportunities are proposed. These proposed trails are in JSTF's Master Development Plan. If these new trails were constructed by JSTF after vegetation management is complete, skiing opportunities would increase.

Other Recreation Uses

Throughout the year, roads and trails would remain open to foot travel. Logging traffic and consequently noise would increase on the road. Noise associated with harvest activity may be audible to visitors within one or two miles of logging operations. Future habitat and browse and therefore non-game and game species would likely increase following the vegetation treatments.

While constructed primarily for Nordic skiing the three proposed ski trails would also provide additional walking opportunities.

Alternative 3

This alternative would have slightly less direct and indirect effects on recreation than Alternatives 2 and 4 because fewer acres are being treated. However, the duration of harvest activity would likely lengthen by 1-2 years because the harvest season would be restricted after December 20th each year. The long term recreation experience would increase as a result of vegetation management activities because the trend has been an increase in recreation use following timber harvest.

Hiking Trails

The short-term direct and indirect effects of this alternative on hiking trails is slightly less than Alternatives 2 and 4 because fewer acres are being treated.

Nordic Ski Trails

By limiting logging operations from summer through December 20th, the effects of this alternative on Nordic ski trails would be much less than Alternative 2. Ski trail closures would not be necessary. Hall Trail, Maple Mountain Loop, Scenic Vista and Quail trails (NFSR 325, 623 and 512) would remain available for groomed skiing after December 20 of each year.

Change in forest appearance would be less noticeable than in Alternative 2 because units 8, 23, 40 and 41 are omitted. Unit 36 would be the only clearcut adjacent to a trail. Impacts to the Hall Trail Connector, described under Alternative 2 above, would be the same.

The direct and indirect effects of the proposed ski trails are the same as for Alternative 2.

Other Recreation Uses

Adverse effects from noise and traffic, scenery, and also new opportunities for wildlife browse, would be slightly less than for Alternative 2 because fewer acres being treated. Throughout the year, roads and trails would remain open to foot travel. While constructed primarily for Nordic skiing the three proposed ski trails would also provide additional walking opportunities.

Alternative 4

Hiking Trails

This alternative extends the amount of fall harvesting that would occur due to the restriction on winter harvesting on all but 12 units. Forest visitors and residents along Green Hill Road would experience increased noise during harvest seasons. Since winter harvesting is reduced, more local residents may be affected. This makes Alternative 2 more desirable for hikers, because more winter logging would occur. However, this must also be weighted against effects to the much heavier Nordic use in the analysis area.

Nordic Ski Trails

This Alternative has fewer short-term direct and indirect effects on Nordic skiing than Alternatives 2 or 3 because operating season is restricted beyond December 15 on Meserve Brook Road, and an alternate location (off the Hall Trail Connector) would be constructed for logging access. Twelve units accessed via Miles Brook Road allow for winter harvesting and road closures during harvest. All units accessed from Meserve Brook Road (NFSR 325) would be harvested prior to December 15 of each year. Hence, Nordic skiing on the south Hall Trail, Hall Trail Connector, and Maple Mountain Loop would not be impacted.

New road construction to access units 29-34 would bisect the Hall Trail Connector, and therefore maintain its character, but create an additional road noticeable to skiers. Despite this new road location, the existing Hall Trail Connector would still need improvements to correct existing drainage concerns.

For this alternative, the northern portion of the Hall Trail would be the only trail closures that would occur. Only 12 harvest units allow winter harvesting perhaps minimizing the need for multiple year closures. The Winneweta Falls and Avalanche Brook Trails would remain open however, ski access to the remainder of north Hall trail on NFSR 623 when it is plowed, would remain limited.

The other significant difference from the other action Alternatives is the proposal for Nordic trail #3,

and eliminating Trails #1 and #2. Trail #3 is extended 0.6 miles to connect to the Ellis River Trail. This would connect the Hall Trail to the Ellis River Trail, on a flatter grade than the Hall Trail Connector which would benefit intermediate skiers. The new trail would follow existing historic road and skid trails from within units 30 and 31. This Trail (#3) would provide an additional connection from the Ellis River Trail to the interior section of the Hall Trail. Once constructed by JSTF, this trail may eliminate conflicts with future harvest activities on NFSR 325 (Meserve Brook Road) because Trail #3 would bypass much of NFSR 325.

Log haul on NFSR 512 (Carter Notch Road) would be limited to prior to December 15th annually. Therefore, the impact on the UST, Dana Place, Quail and Wildcat Valley Trails would be limited only to early snow season. This would effect early Nordic skiing less than Alternatives 2 and 3, which allowed for harvesting until December 31 and December 20, respectively.

The resulting change in forest appearance along Nordic ski trails from harvesting would be identical to those described for Alternative 2 because the unit treatments are the same.

All Other Recreation Uses

The direct and indirect effects on all other existing recreation uses are very similar to those identified for Alternative 2.

3.1.2 Cumulative Effects on Recreation

The Analysis Area for cumulative effects on recreation is all of HMU 503 plus an area of approximately 13,147 additional acres of public and private lands east of NH-16, encompassing Jackson Ski Touring Foundations' permitted trail system. This broad area was chosen in order to analyze cumulative effects to the primary use and users, Nordic Skiers on and off JSTFs permitted trail system. The time frame is the present and foreseeable future (10 years). Table 9 summarizes the cumulative effects to JSTF's trail system from Popple Project and Than project, accessed via Carter Notch Road and NFSR 233 (Wildcat Brook Road).

Table 9 Summary of Cumulative Effects on Nordic Ski Trails

Nordic Ski Trail Closures	Alt 1	Alt 2	Alt 3	Alt 4
Closures with Popple Project (miles)	0	10	0	1.8
Percent of JSTF trail network	0	13.5%	0	2.5%
Trail closures as a result of foreseeable future actions (miles)	2.8 miles			
Total miles potentially impacted by Popple Project and foreseeable future actions (Than Project)	2.8	12.8	2.8	4.6
Percent of JSTF trail network	3.8%	17.3%	3.8%	6.2%

None of the action alternatives would have a long term adverse cumulative affect on recreation opportunities. Hiking, Nordic Skiing and other dispersed recreation has co-existed in this area with periodic vegetation management projects for several decades. This is evidenced by the use of logging roads and landings constructed for timber harvest as ski trails, and designation of several clearcut openings and associated log landings as scenic vistas along these ski trails.

Short term cumulative effects from noise and traffic associated with harvest activities would have short term, seasonal, and localized effects until vegetation management and associated activities, connected stream improvement projects, and Nordic trail construction is completed.

A long-term benefit to Nordic skiing includes the construction and maintenance of new Nordic ski trails under each alternative. None of the proposed ski trails conflicts with the ROS classification. However, the recreation experience may be perceived to decline for individuals who prefer non-trail trekking and/or wildlife viewing in areas well separated from developed trails.

Minor cumulative effects on Nordic Ski Trails from this project may occur if a proposed vegetation management project on National Forest land in the upper Wildcat River drainage is approved in a separate analysis and decision. Called the Than project, this project lies northeast of Carter Notch Road (NH 16B) and would utilize Forest Road 233 (Wildcat Brook Road). This may affect the 2.8 mile Boggy Brook Ski Trail, which lies on Forest Road 233. The Than project would also utilize a half mile of NH-16B on which lies a section of the Wildcat Valley Trail.

Boggy Brook Ski Trail is a non-fee trail, used by dispersed recreation users and JSTF customers. Unless an unusually poor snow season occurs, this trail is traditionally groomed only during the early and late ski season. Use levels on this trail are low once the remainder of the trail system is open, at which time JSTF concentrates grooming efforts on other trails. Of the approximately 98 mile ski trail system maintained by JSTF, 40 miles (41%) is on National Forest with the remainder on Town of Jackson property and private lands. Boggy Brook Trail represents less than 3% of JSTF's trail system.

Nordic trails such as the Quail and Dana Place Trail, which connect to the Wildcat Valley Trail would not be impacted by Popple Project, and would remain accessible via other connecting trails on Town of Jackson's property, and possibly from the end of NH 16B under the Than Project. Access via the Dana Place Trail from NH-16 would not be impacted by either project. No other trails or trail facilities are known to be impacted now or in the foreseeable future. No designated snowmobile trails are present in the Cumulative Effects Analysis Area for Recreation.

Cumulatively, Alternative 2 would have the greatest adverse effect on Nordic skiing followed by Alternative 4 and then 3. If the results of future planning and cooperative efforts allow for winter public vehicular use on NH-16B when plowed by a timber sale contractor, then the cumulative effects would be limited to those identified in Table 9. However, if such an option is determined to be infeasible, then the indirect effects of plowing NH-16B and NFSR 233 would be greater, resulting in reduced access to the Town of Jackson's Prospect Farm ski trail system.

Cumulative effects on hiking and other recreation opportunities are not anticipated, even with multiple vegetation projects co-occurring, since trails remain open to foot travel during harvesting operations.

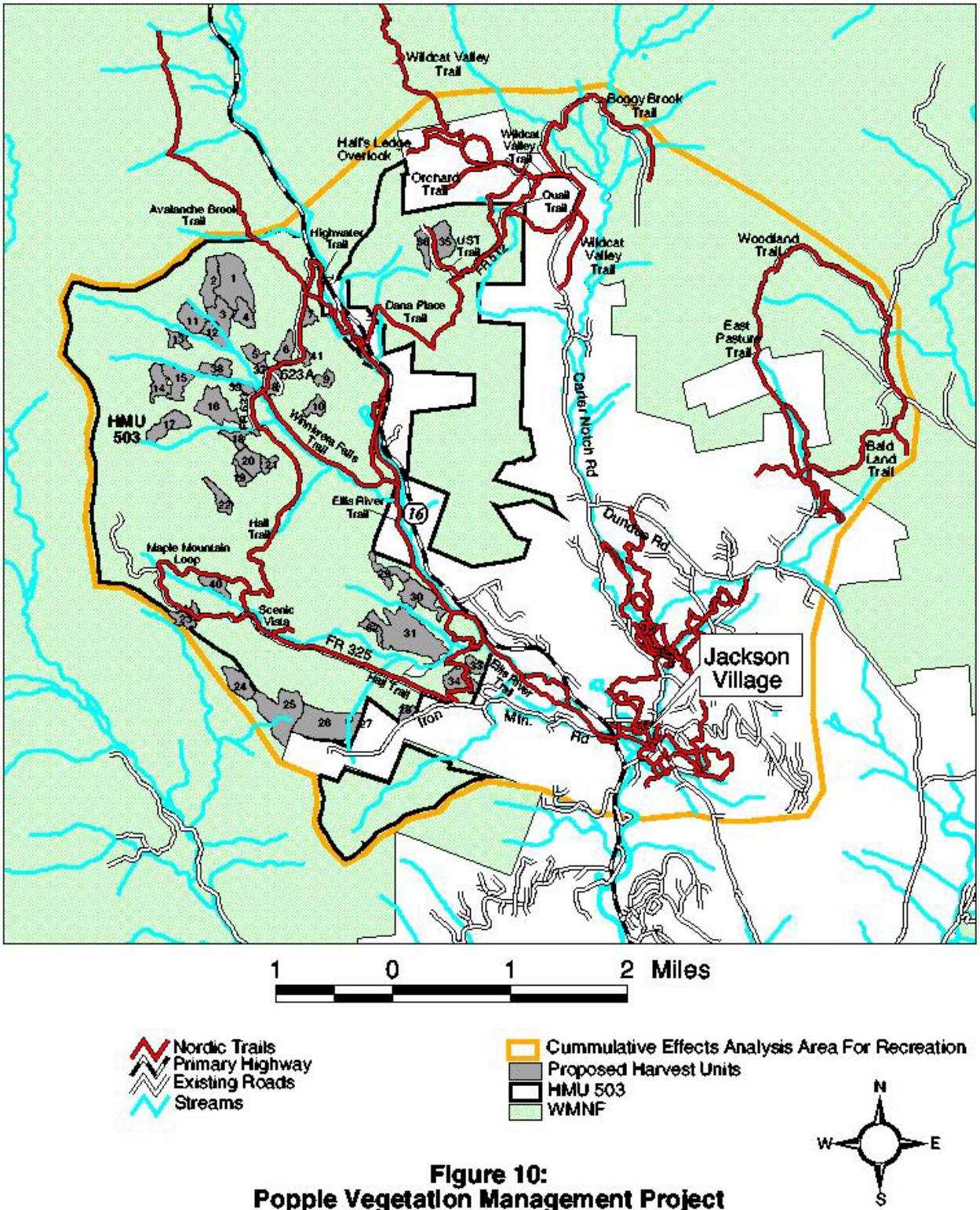

Figure 10:
Popple Vegetation Management Project
Recreation Cumulative Effects
Analysis Area

3.2 Effect of Clearcutting on Scenery

Issue: *Evidence of openings created during harvest activities may be apparent to individuals viewing the project area from from Iron Mountain, Doublehead Mountain, Attitash/Bear Peak, and from the UST Nordic Ski Trail near Spruce Mountain.*

Affected Environment

The analysis area is the HMU, although some of the viewpoints analzed are outside this area. The project is located on National Forest lands mapped primarily as 'Common' or 'Minimial'. Refer to Forest Plan Chapter VII-I for detailed description of these levels. The scenic quality of the landscape is based on characteristics of the land, vegetation, water, and rock ledges. The analysis area has moderate terrain with rounded hills or ridges that are not visually dominant and river valleys with moderate relief. Geologic and vegetation features are common. Vegetation textures are a mosaic pattern stemming from past vegetation management and offers a visual variety. Water features exhibit common characteristics. Use within the project area is very light, except in winter along the Nordic trails, especially along the Ellis River Trail.

Evidence of past management activities are present, including several former openings that now have young trees 15 to 20 feet tall, and four existing openings with early successional regeneration (75 acres harvested in 1996 and 1997). Most of these existing and former openings, evident because of their smooth texture, are now approaching ten to twenty years of age. Past thinning, single tree and group selection harvests are not seen because textural changes in the canopy are not apparent.

Seen area differs from different vantage points due to the angle of repose and aspect of viewed landscape. Views are often blocked by dense vegetation. Visibility of harvest units from peaks is primarily a concern when involving views of clearcuts. Viewed openings are reduced from their true size due to the edge effect of adjacent vegetation, topography and aspect, and because of reserve patches placed in key areas.

Use levels on Iron Mountain are moderate during non-snow season and very low to non-existent during winter. Private land owners recently clearcut harvested 110 acres in the foreground zone as viewed from Iron Mountain.

Doublehead Mountain has a strong vegetation (spruce trees) barrier that blocks views of the project area. Views from Doublehead are toward Mount Washington and Carter Notch, and an expansive view to the east toward Mountain Pond and Maine. Field observations and photos were taken from these viewpoints in summer of 2004 and winter 2005.

UST trail is groomed to a viewpoint that is getting "outgrown" by the foreground vegetation, a previous clearcut, and will soon block the view. The trees are approaching 12 – 15 feet tall. The views into the project area are at a distance of 1.5 to 2.5 miles. UST and the similar Quail Trail scenic viewpoint are not considered critical viewpoints because visitor use is normally low.

Clearcut units 2, 4, 5 and 11 may be seen from Bear Peak and Little Attitash Mountain. The views are comparable to views from Iron Mountain, except these two viewpoints are 9 miles from the treatment areas. Iron Mountain blocks the view of all other proposed clearcut units. Existing clearcut units in early successional condition (75 acres) are not visible from these viewpoints due to the flat angle of repose.

3.2.1 Effect on Scenery under Alternatives 2, 3 and 4

Table 10 displays the allowable 'seen' opening size for a given Visual Quality Objective (VQO) and view point, and the corresponding clearcut units that are seen. Each unit was evaluated using Visual Effects (VFX) digital analysis to determine the 'seen' area. Clearcut units are the only units evaluated in this Visual Analysis because partial harvest units are not expected to be noticeable on the landscape as seen from a distance. "Seen area allowed" for each viewpoint is the recommended maximum number of acres that should be seen of an individual opening. The viewed opening size can be reduced with buffers and reserve patches that partially block views. The last column shows the units from each viewpoint where reserve patches would be increased and placed to buffer views. Not all openings need buffers, but this depends on actual opening size and on land features such as angle of repose and topography. The table is generated from the VFX computerized visual analysis and is further interpreted with on-site visits and photos. The analysis assists in determining if buffers are needed from certain viewpoints.

Thinning and single tree selection treatments would result in naturally appearing stands that would regain foliar density within a few years as tree limbs and forest floor vegetation grows. The table therefore concentrates on clearcuts.

Table 10. Allowable Observed Acres of New Individual Openings

(Forest Plan Visual Quality Guidelines, observed from stationary viewpoints)

VQO	Distance Zone	Seen area-allowed	Applicable Units	Units with increased Reserves (15%)
Retention	Foreground from Nordic Trails	1 acre	Thin units 29, 30	N/A
Partial Retention	Foreground from Nordic Trails	1-3 acres	Thin/STS units 7, 28, 33, 34, 41	N/A
Modification	Foreground from Nordic Trails	5 acres	Thin units 6, 8, 23, 37, 39	N/A
Partial Retention	Middleground from UST	10 acres	Clearcuts 2, 9	2
Modification	Middleground from UST	15 acres	Clearcuts 11, 13, 14	11 14
Partial Retention	Middleground from Iron Mountain	10 acres	Clearcuts 32, 40	40
Partial Retention	Background from Iron Mountain	15 acres	Clearcuts 2, 36	2, 36
Modification	Background from Iron Mountain	25 acres	Clearcuts 2, 4, 5, 11, 13, 14, 38, 40	2, 11, 14, 38, 40
Modification	Background	25 acres	Clearcuts 2, 4, 11,	2, 11, 14, 40

	from Bear Peak		14, 40	

Units 2, 11, 14, 36, 38, and 40 are identified for reserve patches that total 15% of the unit acres. Reserve patches in these units would total three to four ½ acres for each unit.

Reserve patches would be placed to minimize opening size seen from key viewpoints. Clear cuts that are not listed in the last column above are either smaller than the recommended 'seen' opening size, or cannot be viewed in entirety from the key viewpoints. These clearcuts would receive reserve patches equal to 5% of their acreage to meet Forest Plan wildlife habitat guidelines. Clearcut units listed in the last column above would receive reserve patches equal to 15% of their acreage placed to reduce the "seen" area and to provide other resource benefits such as wet area buffers or wildlife habitat features.

Proposed harvest units 40 and 36 are the only units with clearcut prescriptions that lie immediately adjacent to Nordic trails. Openings created would also provide scenic viewing opportunities similar to several Scenic Vistas on the JSTF's Trail System. Unit 40 would provide a view from Maple Mountain Loop Trail toward Iron Mountain. Unit 36 would provide a view from the terminus of the UST trail, which is closing in due to re-foresting of the existing viewpoint. Therefore, cutting for these two units is proposed without buffers to create vistas.

Individual viewpoints listed below would have the summed acres of new openings 'seen' under each Alternative as shown below. "Acres Seen Cumulatively" in the right hand column includes past actions that remain in an opening status (75 acres clearcut from 1997 – Miles Brook II Sale), and reports the acres viewed from each viewpoint cumulatively.

Table 11 Seen Acres in New Individual Openings by Alternative and Cumulatively

Viewpoint	Alt 1 acres	Alt 2 acres	Alternative 3 acres	Alternative 4 acres	Number of new openings seen	Maximum Acres Seen Cumulatively
Iron Mountain	0	126	111	126	10	126
Doublehead	0	76	76	76	8	151
UST	0	57	50	57	6	132
Bear Peak	0	34	29	34	6	34
Dana Place Trail	0	5	0	5	2	5

The differences between action alternatives is relatively small, differing by less than 16 acres, or about 12 percent. The total acres in opening status from any of the viewpoints is well below Forest Plan Standards.

3.2.2 Cumulative Effect on Scenery

Cumulative effect considers effects of past, present and foreseeable activities across a larger area including adjacent private lands. **The analysis area for cumulative effects is** the HMU and adjacent private land on Iron Mountain because this broad area encompasses the viewshed applicable to this action. Cumulative visual effects analysis is from the viewpoints listed in the table above.

Four existing clearcuts totaling 75 acres are seen from UST trail. Older former cuts within the HMU appear as lighter green patches on the landscape in middleground views from specified viewpoints and blend with existing landscape patterns.

Proposed thinning units 25- 27 are near the 110 acres of private land clearcut on Iron Mountain.

Other recent openings total 119 acres from Miles Brook (1988) and Miles Brook II sales (1998). Other textural changes from previous management activities such as thins and older clearcuts are marginally evident. Existing openings throughout the viewshed are recovering, and are primarily noticeable as textural changes, not color changes. These openings blend well with the existing texture variety across the landscape. Cumulatively, the visual affect as texture changes occur, and as new openings are created, is that of a dynamic landscape where vegetation changes blend with the landscape, and where reserve areas and other unit design mitigations minimize adverse visual affects. Project design, including mitigations would insure that any of the action alternatives would meet Forest Plan standards for scenery cumulatively with past and forseeable actions.

3.3 Invasive Species

The White Mountain National Forest has been working with The New England Wildflower Society to determine locations of Non-native invasive species (NNIS) on or near the WMNF. The resulting database was used, in conjunction with site-specific field surveys, to evaluate the likelihood of NNIS spreading to the project area and the environmental consequences of their potential establishment.

Background

Non-native invasive species (NNIS) pose a serious threat to plant and animal community health and diversity. Because exotic species, by definition, have been transplanted outside their original range, they often lack natural controls (e.g., disease, predators, parasites, or climate), which allows them to out-compete and eventually replace more sensitive native species. They compete with native species for resources, and also cause loss of habitat and food for wildlife, alter soil structure and chemistry, alter fire regimes and plant succession, serve as reservoirs for pathogens, and hybridize with natives to compromise local genetic diversity. Once NNIS become established, they are extremely difficult to eradicate, and the resulting change in community plant composition can alter ecosystem dynamics and functions over time. With any management activity that requires the use of heavy equipment brought in from off-site, disturbs the soil, and/or increases sunlight exposure to the ground, there is a risk of transporting and spreading NNIS to or from the Project area.

Affected Environment

The majority of Non-native invasive species (NNIS) locations observed within the vicinity of the WMNF are along roads and highways, and in developed areas (e.g., towns, housing developments, and recreation areas). Roads increase the amount of forest-edge habitat on the landscape. The resulting "road-effect zone" is subject to alterations of the microclimate (e.g., increases in light and temperature and a decrease in relative humidity), as well as disturbance activities (maintenance and traffic). The combined effects tend to favor the establishment and growth of opportunistic NNIS (Parendes and Jones 2000; Forman and Deblinger 2000).

Skid trails may also serve as conduits for non-native species invasion for the same reasons outlined above. The increase in non-natives is often due to elevated levels of sun light, and changes in soil moisture and compaction along the road edges. Studies have also found that riparian areas with high

native species richness also have high non-native species richness, due in part, to the availability of virtually unlimited resources (i.e., high levels of light and nutrients), as well as a relatively constant state of intermediate disturbance (via flooding and bank scouring) that results in continual structural and compositional changes (Stohlgren et al. 2001; Stohlgren et al. 1998, and Planty-Tabacchi et al. 1996). Moreover, streams and rivers form a connected network throughout the landscape, and thus, facilitate the spread of both native and non-native species at a large geographical scale. Disturbance in and around riparian areas therefore would greatly increase the risk of introducing and spreading non-natives through these riparian corridors.

Recent and past field surveys revealed the presence of non-native invasive species (NNIS) in the Popple Project Analysis Area. The area immediately within and around Grey's Field Wildlife Opening, which is along the proposed road that connects units 31 and 33, contains a sizeable population of glossy buckthorn (*Rhamnus frangula*), autumn olive (*Eleagnus umbellata*), and Tatarian honeysuckle (*Lonicera tatarica*). One Japanese barberry bush (*Berberis thunbergerii*) was also found in the opening. Buckthorn is also present along the Ellis River ski trail in at least 2 places: 1) where it intersects with an un-groomed connector to the Avalanche Brook Trail, and 2) in the Doliff Field Wildlife Opening.

Invasive Species present in the Project area are:

Glossy Buckthorn

Glossy buckthorn, a shrub native of North Africa, Asia, and Europe typically inhabits wet, open or edge areas. Seeds are produced during the summer and fall and are dispersed by birds and mammals. Although seedlings invade apparently stable habitats, recruitment is most successful where there is ample light and exposed soil. Glossy buckthorn makes a formidable pest due to its long growing season, rapid growth rate, dense shade, and ability to re-sprout rapidly after top removal (Converse 1984). Buckthorn can be controlled by both manual and chemical means with varying success depending on the treatment regime. Due to its ability to re-sprout vigorously after top removal, cutting and girdling are not likely to be successful unless the population is cut or mowed repeatedly, both within a season and over several years (Reinartz 1997; Schori 2004; Converse 1984). Excavation/pulling can be effective on small populations; however, this method can cause considerable ground disturbance and may even increase the population size by exposing soil for new seedling establishment. A variety of chemicals have been used to control buckthorn, including glyphosate, fosamine, Picloram, and 2,4-D. The success and suitability of these chemicals depends on the habitat, application rate and method, and time of year. The best treatment regime is often a combination of methods that includes both manual and chemical means (Reinartz 1997).

Autumn olive

Autumn olive is a shrub or small tree native to China, Korea, and Japan. It was introduced to the United States for cultivation, thrives in a wide range of habitat types and conditions, is drought tolerant, and can fix nitrogen on infertile soils. Fruits ripen in late summer and up to 400,000 seeds per tree are widely distributed by birds.

Hand-pulling seedlings and sprouts can be effective in the early spring when the ground is moist and the entire plant and root system can be removed. Other forms of control, such as mowing, girdling, and burning, without the application of an herbicide, usually contribute to a larger number of root sprouts (ODNAP 2003). A variety of chemicals have been used to treat this species with varying degrees of success, including, glyphosate, triclopyr, 2, 4-D, dicamba, and picloram. As with

buckthorn, the best treatment regime for this species is often a combination of methods that includes both manual and chemical means.

Tatarian honeysuckle

Tatarian honeysuckle is a multi-stemmed shrub native to western and central Russia that was introduced for wildlife and ornamental purposes. It is adapted to a wide variety of habitats, but favors disturbed sites and forest edges or openings. Reproduction of this species is almost entirely by seeds, which are produced in great abundance, dispersed by birds and small mammals, and are persistent on the plant through the middle of winter. It is an aggressive invader of lower elevation forests throughout the eastern United States, and so contributes to reduced richness of native herb communities and reduces tree regeneration in early to mid-successional forests (Batcher and Stiles, date unknown).

Bush honeysuckles can be effectively controlled by mechanical means, namely grubbing, pulling, or clipping/cutting. However, for such control techniques to be effective, the plants must be cut or pulled at least once a year for 3-5 years, since any portion of the root system not removed can re-sprout (Batcher and Stiles, date unknown). Mechanical treatments are most beneficial for small populations and/or young individuals. Due to re-sprouting, the use of herbicides may be the most effective control for larger infestations and/or infestations growing in optimal conditions (e.g., full sun). Both glyphosate and triclopyr have been used with success for bush honeysuckle eradication.

Japanese Barberry

Japanese barberry is a compact, woody shrub native to Asia that was introduced for ornamental purposes due to its colorful autumnal foliage, for wildlife, and for erosion control. This species is generally found in locations of partial sunlight such as woodland edges and roadsides, but can survive well under forest canopy. Reproduction is primarily sexual, but it can spread by creeping roots and drooping canes. Barberry flowers in May, with fruits maturing in mid-summer and remaining on the plant through fall and early winter. Seeds are dispersed by birds and small mammals.

Mechanical removal (i.e., extraction using a hoe, weed wrench, or hands) of small populations can be an effective control mechanism for this species; however, individuals can easily re-sprout from stem fragments left in the ground (Silander and Klepis 1999). Herbicides can be used for large populations or on plants that are difficult to remove mechanically. Both triclopyr and glyphosate have been used successfully with foliar and cut stump applications. Given the extent of the population (currently only one individual) this species would be removed manually.

Risk Rating

The risk assessment determined that there is a high risk that invasives would spread under the action Alternatives (2, 3 and 4), unless control mitigations are applied. There is a moderate risk under the No Action alternative (See Project Records for descriptions of the rating categories).

3.3.1 Direct and Indirect Effects of Alternatives 2-4

The analysis area for direct, indirect and cumulative effects for invasive species is defined as the locations within Popple Project Area where ground disturbing activities, road maintenance, and stream enhancement projects would occur. It includes those areas where proposed and existing Nordic ski trail activities (mowing and grooming) occur or would occur should any new trails be constructed. Cumulative effects analysis includes activities from ten years in the past to within the next 10 years.

Table 12: **Summary of effects for invasive species in the Project Analysis Area**.

Measurement Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Number of acres of infested* land treated	0 acres	4 acres	3 acres	4 acres
Potential for spread**	Moderate	Low	Moderate to High	Low

** Acres infested is the gross area and may include some invasive-free zones. Infestations at Greys Field wildlife opening are three acres, and along Avalanche Brook Trail, 1 acre.

Potential for spread is defined as follows:

Low- Project activities and proposed invasive species mitigations (use of herbicides on 4 acres) in Alternatives 2 and 4 would likely prevent the spread of undesirable plants on disturbed sites throughout the Project Area.

Moderate- Project activities and proposed invasive species mitigations (manual treatments) in Alternative 3 are likely to result in some areas becoming infested with undesirable plants on disturbed sites even when preventative actions are followed. Strict control measures would be essential to prevent the spread of undesirable plants within the Project Area.

High- Project activities and proposed invasive species mitigations, even with preventative actions (manual treatments in Alternative 3), are likely to spread invasive plants to disturbed sites as a result of harvest activities and other activities along Ski Trails in the Project Area.

Under the No Action Alternative, invasive plants (buckthorn, autumn olive, barberry and Tatarian honeysuckle) would continue to spread by natural processes such as seed dispersal by birds and wind, and from Ski Trail fall maintenance mowing. Ongoing annual use of mechanized equipment that occurs in areas where invasive plants are present is likely to transport invasive plants or seeds to new locations under the No Action Alternative.

The possibility for spread of invasives would be minimized by treating invasive plants in the affected area (4 acres) using herbicides under Alternatives 2 and 4. Likelihood of invasives spreading would be lowest in Alternatives 2 and 4. This treatment regime would be least likely to cause re-sprouting, and the most likely to irrevocably damage the roots of the target species. The herbicides proposed and the method of application chosen for this project are the most conservative with respect to water quality.

Under Alternative 3 potential adverse effects could be compounded because hand treatment of plants is temporary, causes re-sprouting, and requires regular re-treatments. Use of harvesting and seasonal mowing equipment in the Project Area without the benefit of herbicides would likely promote re-sprouting and the eventual seed dispersal and spread.

3.3.2 Cumulative Effects

The analysis area for cumulative effects for invasive species is the Popple Project Area where ground disturbing activities and stream enhancement projects would occur. This area was used because spread of invasives becomes a concern where mineral soil is exposed from activities. It includes proposed management actions and ongoing activities including areas where proposed and existing Nordic ski trail mowing and grooming occur, or would occur should new trails be constructed. The cumulative effects analysis includes activities from ten years past to the next 10 years.

The cumulative effect for each alternative is the same as that reported for direct and indirect effects in Table 12 above.

3.4 Water

3.4.1 Stream Condition

Affected Environment for Stream Condition

Popple Vegetative Management Project is located in the Ellis River and Otis Brook watersheds. Both watersheds are located in the headwaters of the Saco River. Their total acreage is approximately 19,900, and they encompass the area which will be analyzed for direct, indirect, and cumulative effects. This scale watershed was selected because it includes all the headwaters of the streams which flow through the proposed units, and at this scale the effects of multiple uses within the watershed could become additive and result in cumulative effects. There are no Wild and Scenic Rivers located within the Analysis Area.

The Ellis River watershed contains approximately 18,800 acres. It lies within the 12-digit hydrologic unit code (HUC) watershed (010600020105), and is aligned north to south with the outlet to the south. Elevations in the watershed range from 740 to 6,288 feet. The Cutler River, New River, Miles Brook, Meserve Brook, and Spruce Brook all enter the Ellis River from the west. Numerous unnamed perennial and intermittent channels also enter the Ellis River. Small unmapped intermittent and ephemeral channels also exist in the watershed. The watershed is bordered on the northwest by Mount Washington and by Spruce Mountain to the east. The southern border of the watershed is located where the Wildcat River flows into the Ellis River.

Otis Brook watershed contains approximately 1,100 acres. It lies within the 12-digit hydrologic unit code (HUC) Rocky Branch watershed (010600020103), and is aligned northeast to southwest with the outlet to the southwest. Elevations in the watershed range from 1,120 to over 2,700 feet. The watershed is bordered by Mount Maple to the north and Iron Mountain to the south. The southwestern border of the watershed is located where Otis Brook flows into Rocky Branch.

Historic logging occurred within the Ellis River and Otis Brook watersheds around the turn of the century. Trees were logged from riparian areas and woody material was removed from streams. Subsequent flooding and scour added to these effects and resulted in portions of the watersheds with less than potential levels of woody material and loss of diverse channel and floodplain characteristics. Although there is no specific knowledge of fire occurring in these watersheds, wildfire following extensive harvesting occurred throughout the White Mountains, further reducing vegetative material, which is integral in providing channel stability.

Channel instability is currently visible in sections of Meserve Brook and its tributaries. Side channels and headcuts have formed in the watershed. This instability has several known causes. In upper

Meserve Brook near unit 40, field review indicates that there is a lack of large woody material in the stream channel. As described above, a lack of woody material can result in a loss of channel stability.

The second cause of instability in the Meserve Brook watershed is related to a public water supply dam on private property. The lower of two dams on Meserve Brook has breached, causing a side channel to form around the dam. This channel splits into multiple channels which are causing erosion problems in the watershed.

Downstream of the water supply dams and upstream of Grey's Field, Meserve Brook has a large floodplain. During high-flow events, water overflows the banks of Meserve Brook and flows out onto the floodplain. What is believed to be the old Town of Jackson dump lies in this floodplain. Water is flowing towards the low ground at the dump, creating a headcut. The potential exists that a new channel of Meserve Brook could form and flow through the dump. The side channels of the dam are further contributing to this problem, as they are diverting more water towards the dump than would occur naturally.

In addition, the Hall Connector Nordic ski trail between NFSR 325 and Meserve Brook is causing channel instability in the tributaries of Meserve Brook. Culverts on this trail were improperly sized and installed, leading to headcuts forming in streams and stream instability. Drainage ditches along the trail and the slopes above them are also unstable.

The channel instability described in the Meserve Brook watershed can lead to increased sediment input to streams. This is particularly a problem since the dams on Meserve Brook are a backup public water supply source and the Ellis River has a surface water intake located less than two miles downstream from the lower dam.

Along the northeast border of unit 36, an intermittent stream is flowing on an old skid trail. This has eroded sections of the skid trail. The channel eventually leaves the skid trail and returns to a "natural" channel. However, in high flows the water overtops the banks of this natural channel, and some water continues to flow along the skid trail, eroding the trail.

Approximately 100 yards upstream of the bridge at Miles Brook and NFSR 623, Miles Brook has an overflow channel that flows during large storm events. This overflow channel crosses NFSR 623 through a culvert, and then re-enters the main stem of Miles Brook. In September, 2004, a large storm event caused water to flow in the overflow channel. Debris plugged the undersized culvert at NFSR 623, and the water in the overflow channel flowed into the road drainage ditch, eroding and enlarging this ditch. The drainage ditch was overtopped, and water flowed out onto NFSR 623. Debris was deposited on top of the Miles Brook bridge. Although the road surface itself was not damaged at this time, an undersized culvert may plug in the future, with the potential to wash out the road and have large sediment inputs to the brook.

Like most streams in the forest, there is less woody material in Miles Brook than would have existed historically. However, extensive field review of Miles Brook at its tributaries indicates that, aside from the effects of the undersized culvert, streams in the Miles Brook watershed are relatively stable. This may be attributed to larger substrate than that seen in the unstable reaches of Meserve Brook. Bedrock, boulders, and cobble, along with good vegetative buffers, allow for minimal lateral channel adjustment and increased stream stability.

3.4.1.1 Direct and Indirect Effects on Stream Condition

Alternative 1: No Action Alternative

There would be no new direct or indirect effects on channel stability from implementation of Alternative 1 (No Action). Streams and riparian areas would continue to function much in the same way as present. Forest Plan direction, Standards & Guidelines, and Best Management Practices would continue throughout the project area. Current and on-going management activities would continue, but no new federal management activities would be initiated.

Action Alternatives 2-4

There are two ways in which timber harvest can affect stream channels. One is by altering the physical stream characteristics, such as riparian buffers. Removal of stream riparian buffers would allow for greater lateral movement of the channel and a resulting decrease in channel stability. In addition, the extent of harvesting in a watershed can affect channels by changing the water quantity in a stream. If increases in water quantity are great enough there is the potential for these increases to affect the stability of the stream channel. The ability of increased water quantity to affect channel stability is determined both by the amount of water quantity increase and the current stream characteristics and stability. The riparian classification describes the stream and thus can be used to determine if it can withstand any predicted changes in water quantity. Riparian classification in the two watersheds indicate 3.3 miles of low gradient streams with small substrate, which are more susceptible to increases in flow. These streams rely heavily on riparian vegetation to protect stream banks.

Research has indicated that trees removed from a stream bank are more likely to affect the water quantity of a stream channel than trees removed from a location away from the stream channel. Riparian buffers are therefore effective at both minimizing increases in water quantity and protecting stream banks should any increases occur.

Buffers around streams and riparian areas protect channels from impacts to stream stability by retaining large woody material adjacent to these areas. The buffers become a source for future recruitment of this wood to the streams, providing for intact structural elements on the stream banks of watercourses, and allowing riparian areas to be intact for more effective filtering of runoff. In addition to the mitigations described in Forest Plan Standards and Guidelines, a minimum 25-foot no-cut buffer would be placed around perennial channels for all Action Alternatives. An additional 75-foot partial-cut buffer would require basal areas to be at least 70 square feet. All clearcuts would have a 100-ft no-cut buffer. These buffers should be more effective than those required by the current Forest Plan, as the Plan only requires partial-cut, not no-cut buffers. Around intermittent streams, trees which provide stability to the stream banks would be retained as well. Because the mitigations are expected to be implemented and effective regardless of the Action Alternative selected, long-term direct and indirect effects to channel stability are not expected to occur for any of the Action Alternatives, regardless of stream riparian classification.

Six watershed improvement projects are proposed in the Ellis River watershed for Alternatives 2 and 3. Five watershed improvement projects are proposed in the Ellis River watershed for Alternative 4. Near unit 40 there is a lack of large woody debris in the stream channel and riparian zone of Meserve Brook. Large woody debris would be added to a 0.5-0.75 mile reach at a rate of 100 pieces/mile for

the action alternatives. This not only would provide stability to the channel, but would increase fish habitat diversity by creating more pools and cover. In addition, the wood added collects and stores debris, which increases stream nutrients and macro-invertebrates. This wood would be anchored or cabled to ensure that movement downstream would not occur.

The breached dam on Meserve Brook was described as causing erosion through the formation of unstable side channels around the dam. The erosion issues created by the channel would be treated in all Action Alternatives by either returning all the overflow water in the side channels to the main stem of Meserve Brook, or by stabilizing the existing side channels through placement of large woody debris and boulders, as well as properly sized culverts.

Below the dams, Meserve Brook is topping its banks during high flows and flowing towards the old Town of Jackson dump. To avoid a new channel from forming through this dump, trees would be placed strategically in Meserve Brook to encourage the flow to stay in the current channel. In addition, some trees would be placed in the floodplain near the dump to add roughness to the floodplain. This roughness would help dissipate large flows and slow water velocities on the floodplain, reducing the likelihood of a new channel forming through the dump. This improvement project is proposed for all Action Alternatives.

Alternatives 2 and 3 propose to access harvest units 29-34 on the Hall Connector Nordic ski trail which is already as wide as a road. This would allow for the drainage issues along the trail to be resolved. The trail would be brought up to road specifications and would rectify the existing erosion and drainage problems. In addition, the section of ski trail between NFSR 325 and the logging road would be repaired by improving drainage, or the section would be obliterated and the Hall Connector trail would move entirely to the logging road location. Under Alternative 4, access to harvesting units would not utilize the Hall Connector trail. Improvements in drainage issues would not be addressed as part of the Popple Project. Drainage issues along this trail will be dealt with in a different project. Culverts will be sized and replaced if necessary, and cross drainage will be improved. All improvements along the trail will be made under the direction of an engineer.

The undersized culvert to the Miles Brook overflow channel described previously would be replaced in all Action Alternatives with a culvert properly sized to the banks that would not only allow for the passage of water, but the passage of debris. This would help prevent the culvert from plugging in the future and minimize the potential of NFSR 623 washing out in a large storm.

Along the northeast border of unit 36, an intermittent stream was described as flowing on an old skid trail. The skid trail likely intercepted enough water to form an intermittent channel. This skid trail is not proposed for use during the Popple Vegetative Management Project. Under all Action Alternatives, a small amount of woody debris would be placed along the stream to provide stability and structure to the channel in its current location. In addition, downhill of where the stream channel leaves the skid trail and has returned to a natural channel, waterbars would be installed on the skid trail to ensure that during high flow events water does not continue to flow along the skid trail.

3.4.2 Water Quantity

Affected Environment

Water quantity in streams in the proposed project area is directly related to the amount of precipitation that occurs throughout the year. Even though each summer evapotranspiration reduces the soil water content, the rains in the fall usually completely replenish this water. At Hubbard Brook, 62% of the precipitation becomes streamflow (Likens and Bormann, 1995) and most of the rest is lost to evapotranspiration. The research at Hubbard Brook is from a forested environment similar to the one found in the project area. Therefore, the results of this research are applied to the proposed project.

3.4.2.1 Direct and Indirect Effects on Water Quantity

Alternative 1: No Action Alternative

There would be no new direct or indirect effects on water quantity from implementation of Alternative 1 (No Action). Streams and riparian areas would continue to function much in the same way as present. Forest Plan direction, Standards & Guidelines, and Best Management Practices would continue throughout the project area. Current and on-going management activities would continue, but no new federal management activities would be initiated.

Action Alternatives 2-4

Reductions in vegetation can alter evapotranspiration rates. These altered evapotranspiration rates result in changes to streamflow. The magnitude of the change to streamflow depends on the extent of change to the vegetation (Hornbeck, et al 1997). Research at Hubbard Brook indicates that reductions in basal area must approach 25% to obtain measurable responses in annual water yield (Hornbeck et al., 1993). These increases became greatly reduced 3-4 years after timber harvest, and became undetectable 7-9 years after harvest. Peak flows are often increased during the growing season immediately after cutting, but not of an extent to cause flooding. Most of the increase in water yield occurs during the summer in periods of low flow (Hornbeck, et al 1997).

The discussion on water quantity references the Otis Brook watershed and smaller delineated watersheds within the Ellis River watershed. These smaller streams may adjust channel dimensions if water quantity increases are great enough. These effects may go unnoticed if too large of a watershed is analyzed. The Otis Brook watershed is already small (approximately 1,100 acres) and does not need to be divided further.

The measure for changes in water quantity is the percentage (%) of the basal area removed in each delineated small watershed of the Ellis River and Otis Brook. These percentages are based on each unit's current basal areas and their predicted post-harvest basal areas. Where less than a 25% reduction in basal area is determined, no measurable increase in discharge is expected in the channel associated with those watersheds.

The basal area reductions in the Ellis River and Otis Brook smaller delineated watersheds did not exceed the 25% threshold for any of the Action Alternatives (Table 13). No measurable increase in discharge is expected in the channels associated with either watershed. Therefore, no channel adjustment related to an increase in discharge from the proposed timber harvest is expected at this scale, regardless of the channel riparian classification and type.

Table 13. Basal Area Removed in Smaller Subwatersheds, by Alternative

Watershed	Subwatershed	Stream Type	Percent of Basal Area Removed by Proposed Alternative			
			1	2	3	4
Ellis River	Spruce Brook	Perennial	0	0.1	0.1	0.1
	Meserve Brook	Perennial	0	6	4	6
	Miles Brook	Perennial	0	7	6	7
	Tributary 1	Intermittent	0	1	1	1
	Tributary 2	Intermittent	0	2	2	2
	Tributary 3	Intermittent	0	6	6	6
	Sideslope draining to main stem Ellis River	Perennial	0	0.3	0.2	0.3
Otis Brook	Otis Brook	Perennial	0	3	3	3

Cutting near the stream channel has a larger impact on water quantity than scattering the cutting throughout the watershed (Hornbeck, et al, 1993). As a result, buffer strips play a large role in preventing changes in water quantity. The 25-foot no-cut and 75-foot partial-cut buffers along perennial channels should help minimize the potential for increases in water quantity in these channels.

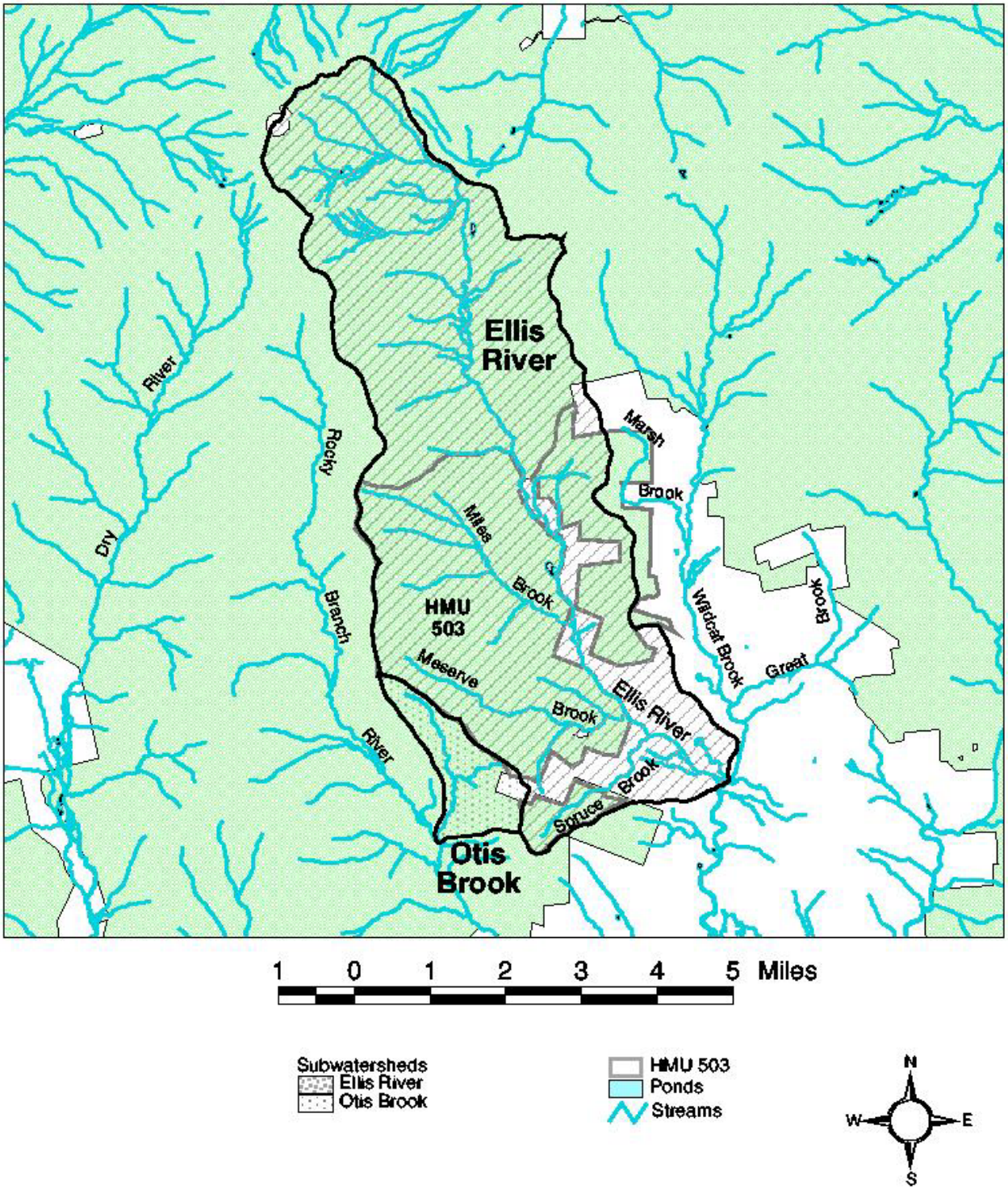

Figure 11:
Popple Vegetation Management Project
Subwatersheds

3.4.3 Water Quality

Affected Environment

In the Ellis River watershed, the State of New Hampshire designates Meserve Brook and its tributaries, from their sources to the lower dam of the Jackson public water supply system, as Class A. This dam is located approximately ½ mile upstream of the confluence of Meserve Brook and the Ellis River. There is no discharge of any sewage or wastes allowed into waters of this classification. In addition, Class A waters are considered potentially acceptable for water supply uses after adequate treatment. The remainder of the Ellis River watershed, as well as the entirety of the Otis Brook watershed is Class B. This classification indicates that these waters are considered acceptable for fishing, swimming, and other recreational purposes and, after adequate treatment, for use as water supplies. A public surface water supply intake for the Jackson Water Precinct is located on the main branch of the Ellis River, downstream of where Spruce Brook enters the Elllis River. Surface waters in the Otis Brook watershed are not currently used for public water supply purposes.

New Hampshire antidegradation provisions apply to all new and increased point and non-point source discharges of pollutants, 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, all waters of the National Forest are designated as "Outstanding Resource Waters" (ORW) and shall be maintained and protected (NHDES, 1999). Some limited point and nonpoint source discharges may be allowed, provided that they are of limited activity that results in no more than temporary and short-term changes in water quality. "Temporary and short-term" means that degradation is limited to the shortest possible time. Such activities shall not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORWs. Such temporary and short-term degradation shall only be allowed after *all practical means* of minimizing such degradation are implemented. Best Management Practices (BMPs) as described in this report and other mitigations elsewhere in the EA are 'all practical means' and would be used should an Action Alternative be selected. All waters in the project area on National Forest Land are considered Outstanding Resource Waters. This designation has higher water quality standards than Class A waters.

Water Chemistry and Temperature

Basic water quality data was collected in the Ellis River watershed on June 24, 2004. On the main branch of Miles Brook a pH of 6.59 was measured, as well as a temperature of 56.6°F, and a conductivity of 10µS/cm. More detailed water chemistry was conducted by the State of New Hampshire through the Ambient River Monitoring Program (ARMP) and the Volunteer River Monitoring Program (VRAP) between 1990 and 2003. These results indicate that chloride is the dominant anion, with an average concentration of 6.7 mg/L, and calcium and magnesium are the dominant cations, with a combined average concentration of 7.6 mg/L. Temperatures were cool and pH averaged 6.6. E.Coli bacteria averaged 120 counts/100mL (NHDES, 2004a; NHDES, 2004b).

No water quality data was found in the Otis Brook watershed. However, Otis Brook lies within the larger Rocky Branch watershed. The USEPA has minimal water quality data collected in the Rocky Branch watershed from 1975-1994 (USEPA, 2004). This data indicates an average pH of 6.18 and temperature of 55.9° F. The dominant cation was calcium, with an average concentration of 0.96 mg/L, and the dominant anion was sulfate, with an average concentration of 3.0 mg/L. No bacterial data was available in this watershed.

No waters in the Otis Brook or Ellis River watersheds are listed by the State of New Hampshire as not

meeting water quality standards for aquatic life, drinking water, recreation, or wildlife. However, in the State of New Hampshire, all surface waters are impaired for fish consumption and shellfishing due to statewide fish/shellfish consumption advisories due to mercury. The source of this mercury is atmospheric deposition (NHDES, 2004c).

Sediment

Turbidity is a measurement of the clarity of water. Turbidity measurements reported by ARMP and VRAP indicate an average turbidity of 0.14 NTU in the Ellis River watershed. No turbidity measurements were found for the Otis Brook watershed. Turbidity standards for Outstanding Resource Waters require waters to contain no turbidity, unless naturally occurring (NHDES, 1999).

Roads are a potential source of turbidity in the watersheds. In the Ellis River watershed, there are approximately 35 miles of existing classified and unclassified roads, with an average density of 10 feet per acre. Approximately 15% of these roads are within 100 feet of a mapped stream channel. Eleven percent of the watershed falls into management areas 5.1 and 6.2 which are protected from road construction. As a result, a full 11% of this watershed does not have roads that can contribute to the effect of increased sediment from roads during runoff events.

In the Otis Brook watershed, there are approximately 3.7 miles of existing classified and unclassified roads. Road density averages 18 feet per acre, and 11% of the roads are within 100 feet of a mapped stream channel. Approximately 10% of the watershed falls into management areas which are protected from road construction.

Research has indicated that turbidities increase during storms. This increase was traced to logging roads (Patric, 1980). Although turbidities may be near natural conditions during dry periods in the project watersheds, existing roads in the watersheds are likely causing increases during periods of runoff. These effects would be less when roads are well vegetated.

3.4.3.1 Direct and Indirect Effects on Water Quality

Alternative 1: No Action Alternative

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

Action Alternatives 2-4

Water Chemistry and Temperature

Nitrogen is the primary nutrient affected by vegetation harvest (Stuart and Dunshie, 1976). This makes nitrate a good indicator to detect effects of timber harvest on water chemistry. Monitoring on the WMNF has indicated that changes in nitrogen levels are isolated to the immediate area of treatment and may not even be evident depending on the extent of timber harvest in the watershed (Stuart and Dunshie, 1976). Research shows that at least 40% of the watershed must be harvested before increases in nitrogen are significant (Martin, et al, 1981). Stafford, et al. (1996) added that although nitrate concentrations may increase as a result of forest harvest, water quality standards were not exceeded. In addition, stream water from untreated areas dilutes this effect of increased nitrate and other chemical concentrations.

Research at Hubbard Brook has indicated that intensive forest harvesting practices have the potential to lower the pH of soil water, which, in turn, can mobilize soil aluminum. However, these results were

from a study in which 100% of a watershed was clearcut. The study also concluded that clearcutting about 15% of a watershed did not measurably change the chemistry of the major 1st and 2nd order streams in the watershed (Martin, et al., 1986). This size watershed studied is of similar scale to that used in the water quantity analysis of this report. As seen in Table 13 in the water quantity section of this report, no more than 7% of the basal area of a subwatershed is proposed for removal under any harvesting practice. This 7% basal area removal is in the Miles Brook subwatershed, which is the most heavily harvested of all the subwatersheds. In addition, selection of either Alternative 2 or 4 would result in only 4.3% of the Miles Brook subwatershed being harvested by clearcutting. Less clearcutting is proposed under Alternative 3 than Alternatives 2 and 4. It is therefore unlikely that changes in pH and increases in aluminum concentrations in the streams would result as a consequence of any of the proposed Action Alternatives.

Research has shown that the usual harvest practices, such as those used on the White Mountain National Forest, do not result in large nutrient losses and do not pose a risk to water quality (Brown, 1983). In addition to BMPs and Forest Plan Standards and Guidelines, the Popple Project is providing additional mitigation measures to further protect the water quality of streams. The mitigations for water chemistry and temperature provide for a 25-foot no-cut buffer on all perennial streams within the project area, as well as a 75-foot partial-cut buffer. In addition, no watershed would be entirely harvested, further reducing the potential for water quality impacts to streams.

Because the mitigations would be used regardless of the Action Alternative selected, loss of nutrients and changes in water chemistry and temperature related to the harvest of trees is not expected to deplete nutrient levels in the water or cause water quality standards to be exceeded for any of the Action Alternatives. Measurable water quality changes in perennial stream reaches related to timber harvest is unlikely to vary between alternatives since mitigations would be applied to any selected Action Alternative.

Best management practices would be adhered to so as to ensure that harvesting equipment does not cause negative water quality impacts in the project watersheds. Spill kits would be required on site. Should any spills occur, they would be cleaned up and removed from the site. In addition, any grease or oil containers on the site would be removed promptly after use. Harvesting equipment would not be allowed in streams. Vegetative buffer strip requirements would ensure that equipment stays away from stream channels and only comes within 25 feet of a perennial stream at designated stream crossings. All state and federal laws would be abided by at all times. By following best management practices and mitigations, it is unlikely that harvesting equipment would negatively impact water quality.

Non-native invasive species (NNIS) have been documented in the Ellis River watershed. These species, glossy buckthorn and autumn olive, are proposed for removal through herbicide use in Alternatives 2 and 4. Two herbicides have been selected as suitable to treat these species.

Glyphosate is an herbicide which binds readily with soil particles, which limits its movement in the environment. Studies have indicated that since it binds strongly to soils it is unlikely to enter waters through surface or subsurface runoff. It can reach waters when the soil itself is washed away, but it remains bound to soil particles and unavailable to plants (summarized by Tu et al., 2001). The recommended formulation for this chemical is sold as Rodeo® because it does not contain surfactants, which have the potential to be mobile and pollute surface or groundwater sources. Rodeo® is registered for aquatic use (Tu et al., 2001).

Garlon 3a® is the recommended formulation of the herbicide Triclopyr. This formulation binds well with soils, and therefore is not likely to be mobile in the environment (Tu et al., 2001). Like Rodeo®,

it does not contain surfactants. A study in southwest Oregon found that neither leaching nor long-distance overland flow contributed large amounts of Triclopyr into a nearby stream. The study concluded that, when used correctly, the use of Triclopyr posed little risk for non-target organisms or downstream water users (summarized by Tu et al., 2001).

Two herbicide application methods are considered suitable for the species in the project area. Foliar application would involve painting the leaves of the NNIS with the herbicide. Cut stump would involve cutting the stem of the plant, and then injecting the herbicide into the exposed stump. Both methods would avoid contact of the herbicide with surrounding soil or water and limit the amount applied. Spraying of herbicides is not proposed. State standards require that herbicides not be applied within 25 feet of surface waters to protect water quality. In addition, when herbicides are proposed for use within a 5-mile distance of a public water supply intake, further permitting is required by the state of New Hampshire. As part of the permitting process, the state of New Hampshire will determine the terms and conditions under which the proposed herbicide use is approved. Conditions may include providing notice of treatment, posting signs, monitoring water quality, adjusting application rates, etc. All state standards would be abided by and all permits would be obtained prior to the start of work.

By selecting herbicides without surfactants and applying the herbicide in a way which specifically targets each individual plant, as well as not applying them within 25 feet of surface waters and following any additional terms and conditions required by the state of New Hampshire, the risk to water quality should be minimized. The specimen label on Rodeo® indicates that heavy rainfall within 2 hours of application may wash the product off the foliage (Rodeo® Specimen Label, 2002). To ensure that neither proposed herbicide has the potential to be washed off a plant, herbicides would not be applied when the forecast indicates a possibility of rain in the next forty-eight hours. This mitigation should further minimize the likelihood of the chemical reaching the surface water.

Sediment

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

In addition to the use of skid trails during the life of the sale, the Popple Vegetative Management Project proposes to allow the use of skid trails as Nordic ski trails in the future. Approximately 2.8 miles of Nordic ski trails may be added to the Ellis River watershed under Alternatives 2 and 3, of which 0.2 miles would be new trail construction, and the remainder would follow existing or proposed skid trails. Approximately 2.4 miles of Nordic ski trails may be added to the Ellis River watershed under Alternatives 4, of which 0.04 miles would be new trail construction. To avoid drainage and stream stability problems such as those seen on the Hall Connector trail, a hydrologist and/or engineer should be involved in refining the location and design of the trails.

The magnitude of effects caused by sediment transport is related to area of disturbance. These areas which lack vegetation and have disturbed soils become the source for sediment transport. This area can be measured by acres of ground disturbance resulting from skid trails and landings, miles of new road construction, and miles of pre-haul maintenance on existing roads. Table 14 summarizes these measures for comparison by alternative. Of the Action Alternatives, Alternative 3 disturbs the fewest acres (53.2 acres), and Alternative 2 disturbs the most acres (61.3 acres).

Table 14 *Summary of Water Quality Measures: Acres of Ground Disturbance from Landings, Skid Trails, Ski Trails, Road Construction, and Pre-Haul Road Maintenance*

Activity	Alt 1	Alt 2	Alt 3	Alt 4
Acres of landings	0	8.0	7.5	8.0
Roads Construction* (miles/acres)	0/0	0.6/1.4	0.6/1.4	0.6/1.4
Temporary Road Construction (miles/acre)**	0/0	0.3/0.7	<0.1/0.1	0.3/0.7
Pre-Haul Road Maintenance (miles/acres)	0/0	5.3/12.7	5.3/12.7	5.3/12.7
Skid Trails (miles/acres)***	0/0	16/38	13/31	16/38
New Construction of Nordic Ski Trails (miles/acres)	0/0	0.2/0.5	0.2/0.5	0.04/0.1
Total Disturbed Acres	0	61.3	53.2	60.9
Total % of Project Area Disturbed	0%	0.3%	0.3%	0.3%

*1 mile of road at an average disturbance width of 20' = 2.4 acres of disturbance/mile

**Temporary roads are roads which lead to a landing, but would be obliterated following sale closure

***Based on estimated length of skid trails (K. Konen, 2004) and average disturbance width =20'

Numerous permanent culverts would be needed on the new haul road that would roughly follow the Hall Connector trail under Alternatives 2 and 3. Some existing culverts may be kept in place, while others, if deemed too small, would be replaced. All culverts would be sized to ensure the proper passage of both water and sediment through the culvert. The two existing bridges on the ski trail would be replaced by haul road bridges which are capable of supporting the weight of a logging truck. Under Alternative 4, one bridge and numerous culverts would be needed on the road which replaces the use of the Hall Connector trail. All haul road bridges would be installed following Forest Plan Standards and Guidelines and would not constrict bankfull flows.

Numerous temporary culverts and 8 temporary skidder bridges would be installed along the skid trails for Alternative 2, and 7 temporary skidder bridges and numerous temporary culverts would be installed along the skid trails for Alternative 3. The same number of culverts and bridges are needed under Alternative 4 as under Alternative 2. However, one bridge and one culvert could be made permanent as past of the Nordic Ski Trail #3. Although placement of the culverts in the stream channel would initially cause some disturbance, properly sized culverts that are capable of passing bankfull flows can minimize future stream crossing impacts. Bridges cause less disturbance to the stream channel than culverts, as they are on the stream banks rather than the stream bed. Except along Nordic Ski Trail #3, all skidder bridges and culverts would be removed and stream banks stabilized following sale closure.

Bridge and culvert stream crossings result in increased sediment to streams. Following harvest, all temporary bridges and culverts would be removed, and stream banks would be restored. At this time, any increased sediment inputs would decrease or stop.

Instability in the stream channels within the project area were described in the Stream Conditions section of this report. Stream instability often leads to erosion issues and subsequent sediment inputs into streams. Six watershed improvement projects were recommended to improve channel stability in the watersheds under Alternatives 2 and 3, and five watershed improvement projects were recommended under Alternative 4. This would also improve the current condition of the Ellis River watershed in regards to sediment.

In addition to following Forest Plan Standards and Guidelines, the following mitigations are prescribed to prevent sediment inputs related to timber harvest and roads from reaching streams. The most effective factor for preventing nonpoint sources of sediment and nutrients from reaching a watercourse is a buffer strip (Gilliam, 1994). As described above, a 25-foot no-cut and 75-foot partial cut buffer would protect all perennial channels. Trees would be felled directionally away from streambeds, where possible. Skid trails, including stream crossings, would be laid out prior to harvesting to minimize the number of stream crossings, and harvest activities may be suspended during periods of thaw to protect soil and water resources. Waterbars or other cross-drainage structures would be installed to direct water off skid trails and roads at intervals required in Forest Plan Standards and Guidelines. Roads would be maintained throughout the sale. Where needed, silt fences or another effective method would be used prevent sediment from reaching a stream course disturbed by crossing areas. Temporary crossing structures such as box culverts, pipes, or temporary bridges would be installed wherever roads or skid trails cross flowing water. These crossing structures would be removed and channel banks restored as needed following logging activities. These mitigations are designed to protect the overall integrity of the stream. Most studies show that BMPs are effective at reducing or eliminating transport of sediments into watercourses (summarized by Stafford, et al, 1996).

Most water quality effects related to roads reopening and skid trails are short term in duration through the use of the mitigations described above. However, the effect of elevated turbidity during storm events would probably remain. Skid road contributions would decrease to near zero as the skid trails revegetated and stabilized after use. Turbidity increases during storms related to permanent roads would probably continue to occur as long as the roads are in place. Maintenance of roads in relation to the proposed action would probably contribute to this effect since disturbance and use of the roadbed allows sediment to mobilize and be removed in subsequent rainfall events. In addition, since the increases in turbidity occur only during storm events when turbidities are naturally elevated, it is not likely these increases would have an effect on aquatic life, stream morphologies, or overall water quality in the watershed. This effect of sediment transported from the forest road system is currently being monitored through the forest wide water quality monitoring plan that takes annual samples across the forest to track numerous water quality parameters, including turbidity.

Manual control of non-native invasive species (NNIS) is proposed under Alternative 3. This could include cutting, excavation, girdling, or mowing. Excavation can cause ground disturbance and subsequent sediment mobility. However, any increases in sediment would likely be small and the effects would be short-term.

Based on the previous discussion, the direct and indirect effects on water quality from the proposed Action Alternatives are anticipated to be short-term and localized. Existing landings are well vegetated and stable. All roads and skid trails proposed for use would meet Forest Service Standards and Guidelines. Localized erosion problems in the Ellis River watershed would be addressed as a connected action for the Action Alternatives, improving the existing condition of the watershed. In the project area, the proposed Action Alternatives would not violate the Outstanding Resource Waters standards because mitigations outlined above and in the Appendix would be implemented.

3.4.4Cumulative Effects on Stream Condition, Water Quantity, and Water Quality

The cumulative effects area (CEA) for water resources is the Ellis River and Otis Brook watersheds. This scale watershed was selected because it includes all the headwaters of the streams which flow through the proposed units, and at this scale the effects of multiple uses within the watershed could become additive and result in cumulative effects. As water flows downstream, pollutants are mobilized into the watershed, and changes in water yield and chemistry related to the project merge with other waters within the watershed. This scale is large enough to integrate processes within the watersheds and gather the result to a single point at the outlet of each watershed. The time period analyzed is from 1994 to 2014.

Past and present activities that occur in the CEA watersheds include timber sales, recreation, road maintenance and use, and activities on private land such as developments and roads. Future activities include the proposed action, additional activity on private lands, continued recreation use, and ongoing road maintenance and use. Atmospheric deposition also occurs throughout the Northeast, including the cumulative effects watersheds.

Stream Condition

As discussed in the direct/indirect effects section of this report, proposed levels of harvesting are not expected to contribute to the instability of Ellis River or Otis Brook watersheds. Mitigations such as vegetative buffer strips are expected to minimize the impacts of timber harvesting on stream stability.

Multiple watershed improvement projects are proposed as connected actions to the Popple Vegetative Management Project. These actions should address existing channel instability issues in the Ellis River watershed. Actions such as adding large woody debris to the stream and floodplains, addressing erosion problems related to the breaching of a water supply dam, properly sizing culverts, and improving drainage on a Nordic ski trail (Alternatives 2 and 3 only) should result in improved stream stability and overall stream condition in the watersheds.

Water Quantity

No cumulative effects related to water quantity are expected in the CEA. As discussed previously, the Popple Vegetative Management Project is not expected to cause increases in water quantity. Timber harvest has occurred in the watersheds in the last ten years. However, when combining past harvesting with the proposed level of harvest, basal area reductions do not exceed 25%. No additional timber sales are planned in the CEA in the next ten years. It is therefore unlikely that cumulative increases in water quantity would be observable as a result of the proposed project.

In addition, to protect against cumulative effects on water quantity from generation of additional runoff by timber harvest, the Forest Plan includes a standard and guideline that limits the amount of clearcutting in a 1,000-acre or larger watershed to 25% within a ten year period (LRMP p. III-17). None of the Action Alternatives would approach the 25% limit for clearcuts in either the Ellis River or Otis Brook watersheds. Alternatives 2 and 4 propose the largest amount of clearcutting. Selection of either of these alternatives would result in only 1% of the Ellis River watershed and 0% of the Otis Brook watershed being harvested by clearcutting. The extent of clearcutting on private land in the Ellis River and Otis Brook watersheds is unknown. However, if all of the private lands within the watersheds were clearcut, the Forest Standards and Guideline still would not be exceeded for either watershed. Therefore, private activities in the watershed should not cause Forest Standards and Guidelines to be exceeded.

Water Quality

Water Chemistry and Temperature

The water chemistry of a stream can be affected by atmospheric inputs as well as forest management practices. Both are described below.

Atmospheric deposition refers to all pollutants carried by the air and deposited on land and water causing numerous effects, including acid rain. Acid deposition refers to those components in the air that reduce the pH of precipitation. The main pollutants responsible are sulfur and nitrogen oxides primarily from the burning of fossil fuels by electric utilities and motor vehicles. Sulfur and nitrogen react with rainwater through chemical reactions, which lowers the pH of rain thereby increasing acidity (Likens and Borman, 1995). This rainwater reacts with soil, vegetation, and water resulting in changes in chemistry across the ecosystem (Driscoll, et al., 2001).

As reported in the summary, Acid Rain Revisited (Driscoll, et al., 2001), reductions of SO_2 emissions since 1970 have resulted in statistically significant decreases in sulfate in wet/bulk deposition and surface water. However, while sulfate concentrations in lakes and streams have decreased over the last 20 years, they remain high compared to background conditions (Driscoll, et al., 2001; WMNF, 1996). Long term data from Hubbard Brook shows that the concentration of nitrogen in precipitation has been relatively constant since the early 1960s when measurements began (Driscoll et al., 2001). No lakes within the cumulative effects area were listed by the State of New Hampshire as not meeting water quality standards for their designated uses due to low pH values from the effects of atmospheric deposition such as acid rain (NHDES, 2004c). However, not all lakes in the state have been assessed, so the true extent of acid deposition impacts on the 2 ponds in the CEA are unknown. As discussed previously, all surface waters in the State of New Hampshire are impaired for fish consumption and shellfishing due to statewide fish/shellfish consumption advisories due to mercury. The source of this mercury is atmospheric deposition (NHDES, 2004c).

As discussed in the water quantity section, the Popple Vegetative Management Project does not propose to harvest large portions of watersheds. Research shows that watersheds treated with methods similar to those proposed in the alternatives did not exceed water quality standards for nitrate (Stafford, et al., 1996). Previous timber sales have occurred in the Ellis River watershed in the past 10 years. If the acreage of clearcuts which have been harvested in the past 10 years are added to those proposed in any of the Action Alternatives, then the most heavily harvested watershed is the Miles Brook subwatershed, with a potential of 6% of the watershed being harvested by clearcutting. As described under direct/indirect effects, measurable changes in stream chemistry, including decreases in pH and increases in aluminum, are not seen unless at least 15% of a watershed is clearcut (Martin, et al., 1986). Because of this, the removal of vegetation proposed in this sale is not expected to worsen the existing cumulative effect due to atmospheric deposition.

Recreational use near a waterbody has the potential to increase the bacterial content of these waterbodies. However, none of the waters in the CEA are listed as not meeting water quality requirements for the state of New Hampshire. Continued recreation use at similar levels is not expected to cause water quality standards to be exceeded.

Private lands and inholdings constitute 13% of the cumulative effects area. At present, water quality and changes to runoff as a result of activities on private land are not causing the streams to exceed water quality standards. However, it is possible that future activities on this ownership could contribute to localized pollution effects if managed improperly.

Non-native invasive species in the CEA have not been treated with herbicides in the past. Should Alternative 2 or 4 be selected, herbicides would be applied to glossy buckthorn and autumn olive.

These sites would be revisited, and potentially retreated, in subsequent growing seasons to target seed bank germinates and/or resprouts. No other herbicide formulations or treatment locations are planned for use in the CEA at this time. By following the protocols and mitigations described in direct/indirect effects, it is unlikely that herbicide treatments in the CEA would cause water quality standards to be exceeded.

Sediment

As discussed previously, the open maintained 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 on the forest are expected to continue in much the same way as present. Road density in the watersheds is generally low since the roads are spaced throughout a 19,900-acre cumulative effects area, for an average of 10 feet of road per acre. Future road activity on private land is unknown. However, any future road activity has the potential to increase pollution locally, particularly if managed improperly.

Aside from the Hall Connector trail described previously, major erosion problems related to recreational activities in the CEA have not been observed or detected. Recreation use in this area is largely limited to roads, trails, and streams. About 44 miles of trails are located within the cumulative effects watersheds, with an average density of 12 feet of trail per acre. Trail lengths may be increased by approximately 2.4-2.8 miles by the addition of Nordic ski trails to the Ellis River watershed. The trails in the riparian area may be contributing to increased sediment loads into streams at localized areas despite mitigations such as water bars. However, there is no documentation as to what extent sediment loading is occurring and what the impacts are.

Research indicates that impervious surfaces in a watershed caused by pavement, gravel roads, sidewalks, trails, driveways, roofs, etc. is a good indicator of degradation of stream condition (Morse and Kahl, 2003). In Maine, no evaluated streams with greater than 10% imperviousness met state water quality standards (Maine DEP, 2005). In the CEA, roads (both existing and proposed), skid trails, hiking trails, snowmobile trails, nordic ski trails (both existing and proposed), and landings contribute to approximately 1% impervious surfaces in the CEA. Additional development beyond roads in the private land was unknown and therefore not calculated. Private land and inholdings constitute 13% of the CEA. It is unlikely, though possible, that development in the private land would cause the 10% threshold to be exceeded. It is therefore unlikely that cumulative effects on water quality as a result of impervious surfaces are occurring.

Watershed improvement projects designed to improve channel stability in the cumulative effects watershed would also address existing sediment problems in the watershed. Completion of these projects would result in reduced sediment loads to streams in the CEA.

Manual treatment of NNIS is proposed under Alternative 3. Should this alternative be selected, it is likely that the populations would need to be treated repeatedly, both within a season and over several years. Although one of the manual treatment methods, excavation, has the potential to disturb the soil, it is unlikely that this soil disturbance would be to the extent that water quality standards in the CEA would be exceeded.

In summary, there is a low risk of cumulative effects on watershed condition, water quantity, or water quality related to sediment in the CEA from the Action Alternatives, as these alternatives would create a small amount of new disturbance that would be mitigated as described in this report. A cumulative effect already exists in the CEA and throughout the state of New Hampshire due to atmospheric deposition. The proposed project is not expected to worsen this existing cumulative effect.

3.5 Vegetation

Affected Environment

Management Area 3.1 lands are divided into uneven-aged and even-aged management systems. Uneven-aged lands are managed with silvicultural prescriptions such as single tree selection or group selection. Even-aged lands are managed with thins or clearcut harvest prescriptions. See **Appendix C** for a description of the harvest treatments.

Compartments 7 - 11, 71 and 72 comprise HMU 503. This includes 7445 acres in Management Areas 2.1 and 3.1 lands. Additionally, 1085 acres lie in MA 6.1 and Wilderness, for a total of 8530 acres. There are no MA 6.2 lands within the HMU. Within the HMU the primary community type is northern hardwood, totaling 7790 acres. Of this 6858 acres are evenaged and 932 acres are classed as un-evenaged. Of the 7790 acres, only 119 acres are regeneration age (0-9 years old). Within some of the hardwood stands this HMU has an above average component of paper birch and aspen for the Saco District, but the stands typed as aspen/birch total 266 acres. Spruce/fir and hemlock are also present (289 acres), and are also at about average for the Saco District. Based on soil types, this HMU can support increased acres in the spruce/fir type.

The Analysis Area for direct and indirect effects on vegetation is HMU 503, encompassing 8530 acres. Of this, 8411 acres (98.6 percent) is closed-canopy forest of young, mature and overmature even-aged and uneven-aged stands, indicating a minimum amount of fragmentation of the forested landscape. The remaining 119 acres, (1.4 %) is in early successional habitat condition. More information regarding habitat types and age classes is available at the Saco Ranger District.

Units identified for treatment are overstocked mature stands, many of which contain a large percentage of low quality trees, and are in a condition where individual tree mortality is imminent resulting from ice storm damage and subsequent disease, decay and insects. In particular, paper birch is affected by these secondary agents.

In mixedwood stands, treatment is designed to remove mature overstory hardwoods that overtop a thrifty mid / understory softwood component. Several of these stands have moderate to severe crown damage. In accordance with the *Silvicultural Guide for Northern Hardwood Types in the Northeast* (Leak et al. 1987) and *Silvicultural Guide for Paper Birch in the Northeast (revised)* (Safford 1983), treating these stands would improve the quality and vigor of remaining trees.

The Analysis Area for cumulative effects on vegetation also encompasses HMU 503 and the adjacent cutover private lands. This area is analyzed because the Forest Plan is based on wildlife habitat requirements (vegetation types) as measured on a HMU basis. Desired conditions for vegetation (ie. Habitat) are managed for in each HMU. The cumulative effects analysis considers activities ten years past and ten years in the future (1995 to 2015). Ten years was the time period selected because it represents the length of time after a stand is harvested when it is considered in the regeneration phase, meaning the canopy is not fully closed and sunlight can reach the ground.

Within HMU 503, clearcut harvesting on National Forest MA 2.1 and 3.1 lands totaled 119 acres over the past 10 years, or 1.4 % of the allowable harvest acres. Additional acres have been thinned or selectively treated to achieve un-evenaged condition. Some proposed units show evidence of previous entry. Many stands are of uniform age, from twenty to fifty years old. Other stands that only show indirect evidence of previous entry include larger average tree sizes and ages. This evidence suggests that widespread harvesting in this area occurred about ninety years ago.

Table 15. Stand Objectives – Popple Project (HMU 503)

Units	Stand Type	Treatment Objective	Comments
8, 15, 19, 22, 33, 39	Even-aged Mature Mixedwood	Uneven aged - Enhance softwood regeneration and softwood and hardwood development	Apply small group selection openings, and single tree selection between openings to increase age diversity, promote softwood and quality hardwoods, and harvest high-risk trees.
7	Even-aged mature and overmature Hardwood	Uneven-aged hardwood release, and hardwood regeneration development	Group selection openings, and single tree selection between openings,would be applied to move this mature northern hardwood stand into uneven-aged condition, while removing high risk trees and creating desired species of hardwood regeneration.
1, 3, 6, 10, 12, 16-18, 20, 21, 23-31, 35, 37, 41	Even-aged Hardwood	Thin to increase development of quality hardwoods	Increase growing space and health of the stand, harvest high risk trees and low quality trees. Favor softwoods where found.
2, 4, 5, 9, 11, 13, 14, 32, 36, 38, 40	Even-aged Hardwood	Create even-aged hardwood regeneration and early successional habitat	Create early successional habitat with clearcuts; maintain ¼ acre reserve areas for each ten acres cut; and retain wildlife trees within units.

Overall stand conditions are poor in units 2, 4, 11, and 13 due to moderate ice damage and subsequent secondary agents. Natural advanced regeneration in these units includes beech, striped maple and hobblebush. Treatment objectives are to generate paper birch and hardwood regeneration in proposed openings.

With group selection/STS and thin prescriptions, the objective is to increase the softwood component (mixedwood stands), and/or to improve stand vigor and tree quality.

Existing natural regeneration of northern hardwood species at desired stocking levels within existing clearcuts and individual tree selection units is evident in previously treated stands.

Private lands that sum to approximately 160 acres near Iron Mountain include 110 acres of new regeneration cuts, with the remainder in a partially forested condition or meadow. Other private lands on Iron Mountain and Green Hill Roads that are within or near the HMU are in a forested condition, and include small openings for residences and landscaping.

3.5.1 Direct and Indirect Effects on Vegetation

Table 16: Summary of Direct & Indirect Effects on Vegetation

Analysis Area		Estimated Acres
National Forest lands designated as MA 2.1 and 3.1 in HMU 503		Approximately 7445 NF acres

Alternative	Summary of Direct & Indirect Effects
1	Natural processes continue, No effects from logging or road restoration, No change in age class or structural diversity
2	Even-aged regeneration on 205 acres of hardwood and paper birch stands; enhance softwood composition on 80 acres with single tree selection, and enhance timber quality and species composition on 44 acres using uneven-aged harvest and 708 acres using even-aged thinning.
3	Even-aged regeneration on 171 acres of hardwoods and paper birch; enhance softwood composition on 36 acres using single tree selection, and enhance timber quality and species composition on 30 acres using uneven-aged harvest and with 634 acres of even-aged thinning.
4	Even-aged regeneration on 205 acres of hardwoods and paper birch; enhance softwood composition on 80 acres using single tree selection and enhance timber quality and species composition on 44 acres using uneven-aged harvest and 708 acres of even-aged thinning

Alternative 1: No Action Alternative

There would be no direct effects from timber harvest such as thinning stands, creating openings in the forest canopy, damageing individual trees, or disturbing seedlings and saplings. Any openings in the forest canopy would be the result of natural mortality of standing trees or disturbance (wind event, infestation, individual tree mortality). There would be no indirect effects such as changes to species composition or stand structure from timber harvest. No new stands of regenerating hardwoods would be created. No increases in softwood composition or increased timber quality in residual stands would occur. Age class and species diversity, and changes in the canopy would only occur through natural processes.

Alternative 2: Proposed Action

Units with prescriptions for single tree selection and group selection harvest would create small openings up to ¼ acre in size to release existing trees and to regenerate softwoods and shade intolerant hardwood species. Group selection and single tree selection cuts are a typical harvest

method used in mixedwood or hardwood stands where un-even aged conditions are desired. On average, group selection openings would treat approximately 20 percent of the unit acreage. The treated areas would move these stands toward an uneven-aged condition. Subsequent entries over a one hundred year rotation would treat additional portions of these stands to create a multi-aged condition. Species composition would gradually diversity, and overall stand health and vigor would improve, resulting in increased growth and resistance to disease.

Single tree selection treatment between the group selection openings would maintain stand health and reduce basal area in these units. To create an uneven aged stand condition, trees of all age classes would be retained to meet the target basal area. This would remove some mature and understory trees, provide additional sunlight to new regeneration, enhance vertical structure, and promote softwood regeneration.

Clearcut prescriptions would create early-successional wildlife habitat by removing trees and creating regenerating openings. Clearcuts are located in areas where mature and high risk trees, and low quality trees comprise a large percentage of the stand.

Clearcutting northern hardwood stands can promote stump sprouts in species such as ash, sugar and red maple, paper and yellow birch, red oak, and basswood. According to a study on four sites in New England, *Whole-tree Clearcutting in New England: Manager's Guide to Impacts on Soils, Streams, and Regeneration* (Pierce et al. 1993*)*, stump sprouting and germination of new seedlings begins in the first growing season after harvest. Within five years after cutting, young, dense regenerating stands are established.

Harvest activities would scarify soils, which in combination with opening the canopy in clearcuts and to an extent in Group Selection openings, would increase regenerating species diversity and survival. Increased hemlock, sugar maple, yellow and paper birch seedling germination is expected in scarified areas. Many hardwood species and herbaceous plants including raspberry, which provide berries (soft mast) for birds and bears, and leaves for deer, re-colonize open areas a short time afterwards (Whitman and Hagan 2000).

Indirect effects include an increased risk of windthrow along the borders of clearcuts and group selection openings. Some residual tree damage would occur during harvesting operations from tree falling and from skidding the trees.

Alternative 3

The beneficial and potential adverse effects on vegetation under Alternative 3 are reduced from those shown for Alternative 2 because fewer acres are treated. The effects would apply to 871 acres proposed for harvest and the associated skid roads, and landings.

Alternative 4

The effects of Alternative 4 are nearly the same as Alternative 2 because the same number of acres are proposed for treatment. However, several units would be restricted to fall harvest only, suggesting that more ground scarification may occur than in Alternative 2. The effects would apply to the same 1037 acres proposed for harvest in Alternative 2.

3.5.2 Cumulative Effects on Vegetation

Table 17 Summary of Cumulative Effects on Vegetation

Analysis Area		Estimated Acres
Public lands within HMU 503, and nearby private lands	1995-2005 Present 2005-2015	Approximately 8530 acres of public land and 160 acres of private land near the HMU

Alternative	Summary of Cumulative Effects
1	Natural processes continue. No effects from logging or road maintenance. Continued succession to mature forest, with potential loss of species diversity.
2	Even-aged regeneration harvest on 205 acres combined with 110 acres on private land, contributes incrementally to fragmentation of closed forest canopy in Analysis Area, but within levels anticipated and analyzed in FEIS for 1986 Forest Plan. Cumulatively, early-successional habitat and increased species, age and structural diversity would occur on 1266 acres in and nearby the HMU.
3	Fewer acres of even-aged harvest than Alternatives 2 & 4 means less incremental fragmentation, fewer acres of early-successional habitat, and less acheivement of forest health, regeneration and softwood (species diversity) objectives in HMU 503. Cumulatively, early-successional habitat and increased species, age and structural diversity would occur on 1000 acres in and nearby the HMU
4	Identical treatments and acres to Alternative 2, with fewer acres treated in winter, therefore more ground scarification.

Other than the Proposed Action and its alternatives, the Forest Service does not anticipate other timber harvest within HMU 503 through 2015.

Alternatives 2 and 4, having the most acres proposed for harvest, still falls short of the Desired Future Conditions for early successional habitat and for development of softwood within MA 2.1 and 3.1 in HMU 503. As a result, even when considering timber harvest on lands outside the Analysis Area, the Proposed Action and its alternatives are well within the effects anticipated and analyzed in the Final Environmental Impact Statement for the 1986 Forest Plan.

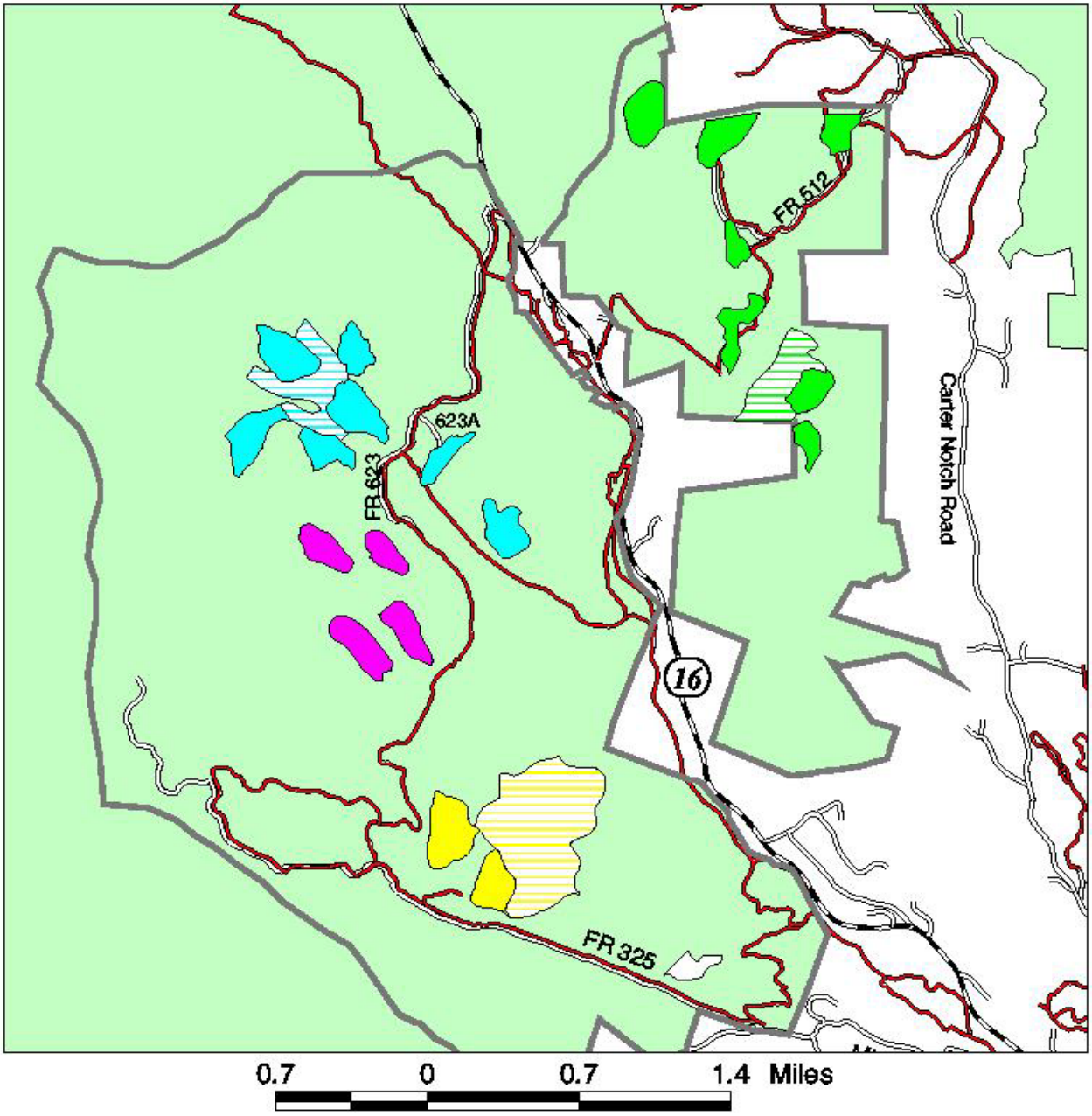

Figure 12:
Popple Vegetation Management Project
HMU 503 Past Harvest 1985 to 2005

Alternative 1: No Action Alternative

This alternative will not contribute incrementally to the effects of timber harvest or land clearing within the Analysis Area over the 20-year period from 1993-2014. Without timber harvest now or over the next 10 years; species, age class and structural diversity will develop naturally on National Forest lands within HMU 503. Diversity may be enhanced by natural disturbance, such as a weather event, fire, disease or infestation that can create forest openings and provide some limited opportunities for shade intolerant plant species. Currently regenerating and young stands within HMU 503 will continue to age and grow into a closed canopy condition. This will reduce early-successional habitat for wildlife, which is currently low. Mature stands of paper birch and aspen community types (233 acres presently) will continue to age and many will be replaced by the existing shade tolerant codominant and understory tree species in these stands.

Action Alternatives 2-4

The Forest Plan assigns 7445 acres to Management Area 2.1 and 3.1 lands within HMU 503. The primary community type is northern hardwoods totaling 7790 acres. Past silvicultural management within the HMU, and on private land within the HMU has opened portions of the canopy temporarily, providing a diversity of age classes and structure (clearcuts and thinning) within a forested landscape. The present 119 acres of National Forest harvested in 1993, and approximately 110 acres of private land harvested in 2001, are regenerating but remain as early successional habitat.

Cumulatively, in HMU 503, between 1995 through 2015, cumulatively, Alternative 2 and 4 would result in 434 acres of regeneration openings, which is 5% of the HMU (+ = including 160 acres of private land). Total cumulative acres treated sums to approximately 1,266 acres, or 14.5% of the HMU (+). This alternative would fall 161 acres short of the DFC for early-successional habitat in this HMU.

Alternative 3 would result in a cumulative total of 400 acres of regeneration openings, which is 4.6% of the HMU (+ = including 160 acres of private land). Total cumulative acres treated sums to approximately 1,100 acres, or 12.6% of the HMU (+). This alternative would fall 195 acres short of the DFC for early-successional habitat in this HMU.

The Action Alternatives will contribute incrementally to the effects of timber harvest and opening creation within the Analysis Area over the 20-year period from 1995-2015; however, these effects are well within the effects anticipated and analyzed in the Final Environmental Impact Statement for the 1986 Forest Plan.

3.6 Soils

3.6.1 Soil Erosion

Affected Environment

The Popple Project Area has soils common to the White Mountain National Forest. This project area is at elevations below 2500' where soils are deep, well and moderately well drained, sandy loam tills. The project area does not have dry debris slides or mass movement of soil. Field and photo review did not locate any soil slumps.

Soils near Miles Brook and Meserve Brook are a mix of well drained, and moderately well drained, fine sandy loams favorable for spruce, fir and hemlock. Pockets of poorly drained soil are intermingled in low-lying ground. Ecological type 105 favors northern hardwoods and is prevalent in the northern third of the project area. Soils on lower slopes are a mix of ecological types 115a, 115c and 115g. Soil erosion hazard is moderate on 105, 115c and 115g and high in 115a. There are no soils shallow to ledge in the proposed project area.

Where clear-cutting has occurred, regenerated stands clearly show adequate stocking. Whole tree harvest is **not** proposed in the Popple Project. All tops and limbs will remain in the forest.

The Analysis Area for direct and indirect effects on soil erosion is the MA 2.1 and 3.1 lands within HMU 503, encompassing 7445 NF acres. All proposed activities are within this land base. Dry debris slides are not a risk for this project because they occur at elevations significantly upslope of the proposed project area.

Roads and skid trails are a main source for soil erosion because they may have exposed mineral soil (Patric). The act of cutting trees is not a source of soil erosion because it does not expose mineral soil (Hornbeck). Permanent, all season roads in the Project Area are maintained to Forest Plan standards that help prevent concentration of water on the road surface.

Roads in the project area are properly maintained, with clean ditch lines and culverts and cut-banks are stable. One culvert plugged in 2004 and is included in this project for replacement. Other soil stabilization projects area also proposed as connected actions. There are no signs of accelerated soil erosion on Forest roads within the analysis area.

Previously used temporary roads and landings have stabilized, and several are re-vegetated. Water-bars are in place on skid trails and there is no evidence of accelerated soil erosion on them.

Overall, soil erosion in eastern forests is not a problem when Best Management Practices (BMPs) are applied in a timely way (Martin et al). Field monitoring on the White Mountain National Forest supports this conclusion (2000 Monitoring Report). Concentrations of water on road surfaces can lead to soil erosion but intermittent-seasonal use and permanent roads were properly closed following their last use and show no accelerated soil erosion, though there may be instances of localized surface erosion. This condition supports research findings that soil erosion at managed forestry operations can be controlled through timely application of standards and guidelines (Martin et al).

Harvest activities may expose 10 to 20 percent of the soils, intermittently throughout a treatment area, on skid trails or where trees were dragged to a skid trail. Research indicates that these trails normally have little effect on soils, or soil movement, but may affect the ability for species such as sugar maple, white ash, and red oak to establish within the stand, especially where canopy is left.

Units 2, 4, 11, 14, and 40 are in a semi-closed canopy condition due to moderate to severe ice damage. Natural regeneration in these units includes heavy numbers of advanced beech and striped maple regeneration that and thick hobblebush.

Sugar maple birch and ash seedlings, where present, are limited by canopy conditions. Soil scarification during non-frozen soil conditions would aid the germination and establishment of these species, and the stands eventual recovery to a diverse species mix. This is especially important in single tree selection units. Stand health and resistance to insects and disease is increased with species diversity, and over time provides a safety net against future catastrophic biotic events. To achieve this objective, harvest operating seasons should allow for soil scarification.

3.6.1.1 Direct & Indirect Effects on Soil Erosion

Table 18 Summary of Direct & Indirect Effects on Soil Erosion

Analysis Area	Time Period	Estimated Acres
National Forest lands within project area designated as MA 2.1/ 3.1 in HMU 503	Present	Approximately 7445 NF acres

Alternative	Summary of Direct & Indirect Effects
1	Some localized soil erosion due to ongoing maintenance of Forest roads
2	Soil erosion potential from 3000 feet of new road construction, and 1450 feet temporary road, road maintenance, from skid trails on less than 10% of harvest treatment acres where soil disturbance might occur (10% of 871 acres allowing summer and fall harvest) and 2.8 miles Ski trail construction.
3	Soil erosion potential from 3000 feet of new road construction, 150 feet temporary road, road maintenance, and from skid trails on less than 10% of 871 acres that allow summer and fall harvest, and from 2.8 miles of Ski trail construction
4	Similar to Alternative 2, but with 10% of 916 potential summer and fall harvest acres. This alternative has the same miles of road construction, temporary road, and road maintenance as Alternative 2. It proposes only 2.4 miles ski trail construction.

General effects of timber harvesting on soils can be found in the Forest Environmental Impact Statement, pp. IV-30 - 32.

Alternative 1: No Action Alternative

Alternative 1 may have localized soil erosion related to on-going maintenance of permanent Forest roads. Alternative 1 would have no other direct or indirect effects.

Alternative 2: Proposed Action

Direct effects

Existing roads will be used for timber haul, administrative uses, and Nordic Ski trails. In the snow-free season, some rutting of these roads may occur. Site-specific, localized soil erosion may occur temporarily during construction of new proposed roads and ski trails in each alternative. However, timely harvest and road construction administration will prevent this leading to accelerated soil erosion. Ditches, culverts and road locations are designed to successfully manage surface water to prevent stream sedimentation. Winter use on these roads will not lead to soil erosion. Proper closeout at sale completion would prevent soil erosion.

Stream bank and aquatic restoration activities may expose some mineral soils where equipment is needed or where large trees or rocks are moved and placed in Meserve Brook. These activities would likely cause limited, on-site and temporary soil erosion near streams.

Alternative 4 has the greatest potential magnitude for soil erosion. Alternatives 2 and 3 are similar in over all effects to soils. Alternative 1 has the least effect. Soil erosion is generally not an issue with proper road construction and use on these deep well-drained soils even considering the logging, road building and connected actions. There are no extraordinary soil hazards, such as debris slides or slumps, and Best Management Practices (BMPs) and Forest Plan Standards and Guides would mitigate much of the potential for adverse effects.

Indirect Effects

Sedimentation of streams is the most likely indirect effect from road construction, logging, and the connected actions. See *Water Quality Section* for water quality effects.

The potential effect of timber harvesting on forest productivity is indirect. The Forest Service has a responsibility for the long-term productivity of the land. Measurement of northern hardwood forest plots since 1931 at the nearby Bartlett Experimental Forest does not indicate statistically distinguishable change forest productivity due to human impacts, even including the impacts of acid deposition (Nuegenkapian, 1998).

All former clearcuts in the vicinity have regenerated following harvest and would be expected to do the same following this project. Sometimes there is a concern that organic matter may be lost, causing indirect nutrient consequences. However, it has been found that soil organic matter is not lost but rather is re-distributed in the upper mineral layers during harvest (Johnson et al 1991; Johnson et al 1997).

3.6.1.2 Cumulative Effects on Soil Erosion

Table 19 Summary of Cumulative Effects on Soil Erosion

Analysis Area	Time Period	Estimated Acres
Cumulative Effects Analysis Area for Water Resources (Miles Brook and Meserve Brook watersheds)	1995-2005 Present 2005-2015	Approximately 8,650 acres of private and public lands

Alternative	Summary of Cumulative Effects
1	Cumulative effects on soil erosion from past, present and planned future actions are considered low. No new activities would occur. Incremental impacts from ongoing road maintenance, trail use, and natural events on National Forest lands are likely to be very limited. Past projects show limited on site evidence of soil erosion.
2	Cumulative effects on soil erosion are estimated to be low due to project design and mitigation measures. No other future projects are planned and there is limited on-site evidence of past erosion from similar activities. Any incremental impacts from harvest and road construction and maintenance, ski trail construction and maintenance, and the stream stability projects would be within Forest Plan standards and guides and within Federal and state requirements including requirements for outstanding resourse waters. Mitigations including BMP's would further limit effects to those anticipated and analyzed in 1986 Forest Plan FEIS
3	Effects are essentially the same as in Alternative 2. Differences in acres treated and season of treatment, and minor differences in road construction would not constitute a measurable difference between this alternative and Alternative 2.
4	Effects are essentially the same as in Alternative 2. Differences in acres treated and season of treatment, and minor differences in road construction would not constitute a measurable difference between this alternative and Alternative 2.

The Analysis Area for cumulative effects on soil erosion is the 8,650 acres in HMU 503 including 120 acres of private land, and 75 acres in HMU 506. This area is analyzed because it exceeds the area where cumulative soil effects would occur, but is a logical area commensurate with the area used for other resources. Cumulative effects analysis includes activities from ten years past to 10 years future.

Land management activities such as harvesting, and road and trail construction typically result in site-specific soil erosion that is generally limited to the area of impact. However, since the effects of soil erosion are often of greatest concern in streams and rivers, this analysis of cumulative effects considers cumulative incremental impacts on watersheds. The proposed stream improvement projects

may have short term adverse effects on soils, causing erosion in some specific areas, however, the long term results of these projects is to stabilize the stream in locations where it has braided, and to improve stream pool rations. Both of these objectives would reduce the long term potential for stream bank erosion and subsequent downstream adverse effects from sedimentation and stream bed loading. Cumulative effects from the proposed vegetation management activities including road construction, when combined with on-going activities and road and trail features, would meet Forest Plan requirements assuming Best Management Practices (BMPs) and Forest Plan Standards and Guides are followed.

3.6.2 Soil Calcium

Affected Environment

Popple Mountain has soils common to the White Mountain National Forest. At elevations below about 2500', which is the case in this proposed sale, soils are deep, well and moderately well drained, sandy loam tills on 10-30% slopes. It is too low on the landscape to have dry debris slides, which lead to mass movement of soil. It is low enough on the landscape to have deep soil slumps; however, field and photo review indicate this soil hazard does not exist here.

For the most part, soils are a mix of well and moderately well drained sandy loam and fine sandy loam tills corresponding to ecological land types 105, 115c and 115g. These are typical soils on suitable lands on the White Mountain National Forest. These land types produce northern hardwood forest with differing mixtures of sugar maple, beech and white ash becoming common in the more mature stands. There are a few small areas of spruce-fir on moderately well to poorly drained fine sandy loams generally found on lower ground with surface drainages being fairly common. This is ecological land type 115a. Descriptions of geomorphology, soils and forest characteristics and interpretations are available at the District Office.

Early land use records indicate the Popple Mountain area in the early 1900's was a mix of lightly culled and second growth timber stands, including softwoods, and that at its upper reaches there had apparently been forest fires (Goodale 1999). The records do not indicate a history of intense timber harvesting, as is sometimes the case on other parts of the White Mountain National Forest. Early historical records do not exist for all parts of the proposed sale area, but examining the vicinity overall, the records available are representative.

Since these early times, there have been conventional, bole-only harvests in this vicinity. Bole-only harvest means the tops and limbs of the trees have been left in the forest, which in turn means that about 35% of the calcium that could be taken from the forest through harvest, has instead been left on site. Field examination, and on-site stocking surveys, indicate that all stands previously harvested to regenerate a new forest have met the agency requirements for adequacy (Admin. File). This is consistent with forestwide re-stocking surveys, which show that all clear cut and selection harvests on a variety of soils, aspects and topographic position, managed under the standards and guidelines of the 1986 Forest Plan, have adequately re-stocked to new forest (Admin. File). This is important because re-stocking is the first step in the re-accumulation of biomass, which is the agency measure used to assure that long term soil productivity has not been foregone. It is also indicative that the forest response to harvest treatment is consistent with the expectations of silvicultural guides described or referenced in the 1986 Forest Plan.

Concern has been raised about the potential impacts of acid deposition and timber harvest on soil productivity, and the need to consider the cumulative impacts of these factors. The main focus is on soil calcium based on early research about base cations (Federer 1989). Soil conditions are not leading to decline in forest productivity across the White Mountain National Forest, especially with

respect to those lands indentified as suitable for timber management. By agency definition (FSH 2509.18), soil productivity is defined as the inherent capacity of the soil to support the growth of specified plants, plant communities or sequences of plant communities. Soil productivity may be expressed in a variety of ways including volume or weight/unit area/year, percent plant cover, or other measures of biomass accumulation.

There has been no observable change in biomass accumulation trends for hardwood and softwood forest at the Bartlett Experimental Forest based on re-measurement of permanent plots since 1934, including other plots at the Hubbard Brook Experimental Forest, Bowl Research Natural Area and Campton fields (Nuegenkapian 1998). This is further confirmed by plot measurements done in support of research on rates of forest productivity at Bartlett Experimental Forest (Smith et al 2002). Radial annual increment studies of forest growth have so far not shown any change related to possible changes in soil productivity (Hornbeck et al 1988; Federer et al 1986; Smith et al 1990). Early forest cutting experiments at Hubbard Brook Experimental Forest (Watershed 4 strip cut in the early 1970's and Watershed 2 clearfell in the early 1960's) have resulted in normal or expected regeneration and biomass accumulation (Martin et al 1989; Reiners 1992) indicating no harmful impacts on forest productivity associated with leaching losses at Hubbard Brook Experimental Forest.

Studies that relate to potassium content in biomass over time include unpublished data (Siccama, Yale University) that examine biomass accumulation at Hubbard Brook Experimenal Forest; Biomass at the site has dropped about 3.1% since 1980, with sugar maple biomass down a bit and beech biomass up. These appear to be small changes overall.

Bormann (1979) indicates the stands at HBEF are typical of second growth forests in northern New England. It should be noted that after 1900 the entire HB watershed was logged; except for a scattering of large old culls and some smaller trees. It appears, therefore, that the stands are predominately 90 years old. Leveling off in biomass accumulation by this age is consistent with published biomass accumulation curves for a variety of forest types, including northern hardwood (Leak 1982). So the fact that biomass accumulation has leveled off at Hubbard Brook Experimental Forest is not a surprise.

There is a concern about forest health (red spruce decline) at high elevations above 3000' where the quantity of acid precipitation and acid mist may affect forest health. The quantity of acid deposition is 3-8 times greater at these elevations than downslope because the amount of precipitation rises with elevation and there is cloud water acidification (Miller 1993). Such high elevation areas are identified as sensitive soil systems (NAPAP 1998). Recent research has shown that soil based disruption affects red spruce cold tolerance (Schaberg 2002). Other research reveals that decline is primarily related to foliage damage, and it has a weak association with low calcium and high aluminum in the soil (Eagar 1992). Rates of acid deposition of sulfuric acid and nitric acid are moderate in the White Mountain National Forest, compared, for example to the Catskill and Adirondack Mountains of New York (http:/nadp.sws.uiuc.edu) other than the notable exception of these high elevation sites. A regional survey (Catskills to Maine) of the montane forest indicates that live and total basal area of balsam fir is greatest in the White Mountains, and decreases toward the Adirondacks and Maine.

There is no peer reviewed and published evidence of decline in northern hardwoods on the White Mountain National Forest. There is such evidence for hardwoods in western Pennsylvania and New York, where soils are much older and there are inciting factors (repeated defoliation) that predisposes the forest to health issues (Horsley 1999). Reports indicate that there have a number of episodic declines of sugar maple (Horsley 2000), but because they have been ephemeral, the causes are difficult to detect. The potential that individual species may be differentially affected by soil acidification does not suggest that forest productivity has been foregone.

No doubt exists that there has been depletion of soil calcium due to acid deposition (Federer et al 1989; Likens et al 1998; Bailey 2003). It has also been shown through experimental acidification of watersheds (Fernandez 2003) and retrospective soil analysis (Lawrence 1997; Bailey 2005). Despite this best evidence available, the magnitude of impact is not yet well understood because our knowledge of soil storage and release mechanisms has not yet allowed us to estimate the overall size of soil nutrient reserves (Bailey 2003). There is evidence of alternative sources of supply besides the traditionally considered soil exchange pool. These include calcium oxolate (Bailey 2003) and direct weathering of minerals by fungal activity (van Breeman 2000; Blum 2000). There is no peer reviewed published evidence in the literature that there has been a change in soil buffering capacity due to acid deposition or forest harvesting on the White Mountain National Forest. It has been suggested that exchangeable soil calcium has been depleted nearly 50% at Hubbard Brook Experimental Forest; however, data to support this was not found in the literature cited (Likens et al 1996) and review of the relevant literature revealed only one study that suggested loss and it was later revised (Yanai et al 1999).

Studies of calcium cycling have been underway for decades at the Hubbard Brook Experimental Forest. While it has been suggested that timber harvest exacerbates the effects of acid deposition, the evidence at Hubbard Brook Experimental Forest does not support this. Johnson (1997) measured exchangeable soil calcium pre- and post intense, whole-tree clearcut harvest and reported no change after eight years. This harvest intensity was substantially greater than any applied on the White Mountain National Forest or that proposed for Popple Project. Affirmation of the same results after fifteen years will become available (Johnson, Pers.Comm. 2004).

Johnson's findings underscore that the most important step to preserve soil productivity is to persist at improvement in air quality. As indicated by watershed modeling at Hubbard Brook Experimental Forest, "forest harvest has resulted in slight decreases in soil pools of exchangeable base cations" and "deposition of strong acid anions had the largest impacts on acid-base status of soil and streamwater (Gbondo-Tugbawa 2004). Various authors report on the likelihood of recovery of soil and waters related primarily to acid deposition. These include Likens (1996), Likens (1998); Kahl (2004); Driscoll (2004); and Gbondo-Tugbawa (2004). There is a general acknowledgment that the process may be slow, but there is also acknowledgment that it is not irreparable. There is no peer reviewed published data reporting that long term soil productivity has been permanently damaged.

A concern is sometimes expressed that sugar maple may be differentially affected by acid deposition. To date there is no published peer reviewed data to support this concern on the White Mountain National Forest. It is possible however, that changes in species composition could be used as an indicator of soil impacts from acidification (Leak 1992). Based on studies at the Bartlett Experimental Forest, evidence does not indicate that changes are occurring in species composition (Leak 1987; Leak 1996). In particular, Leak and Smith (1996) studied northern hardwood and softwood stands using data collected over a 60-year period from permanent plots, and their overall conclusion was that natural selection is the dominant factor affecting long term changes in these forested landscapes.

The analysis area for direct, indirect, and cumulative effects on soil productivity is the site specific stands proposed for treatment within Popple Mountain Vegetation Management Project because potential impacts on soil productivity and forest health at these sites is not expected to extend beyond the stand boundaries. The time span for this analysis is from early harvesting at the beginning of the 20th century to twenty years into the future, which is the reasonable planning horizon for a future harvest. Early harvesting is considered because land use may affect soil nutrients, including soil calcium (Hornbeck 1990). Future harvest and acid deposition are considered for the same reason.

3.6.2.1 Direct and Indirect Effects on Soil Calcium

No Action

The No Action Alternative has no direct impact on long term soil productivity or forest health. The indirect impact of no harvest is that calcium in the trees would not be removed from the site. Given that acid deposition is the primary mechanism affecting soil acidification, deferring treatment is likely to exert little impact on soil productivity or forest health. In a comparison of harvested and unharvested areas, Martin et al (1999) reported finding in watersheds in and adjoining the Bowl Research Natural Area that within 100 years following heavy forest cutting in northern hardwood stands, natural forest regeneration and re-growth produces numbers of stems, basal area and biomass comparable to initial, old growth forest conditions. In other words, it was very difficult to distinguish between harvested and unharvested area, including the fact both were subject to the most severe impacts of acid deposition during the 1950-1970 period. It does not appear, therefore, that there is any marginal gain in preventing impacts related to soil acidification by defering harvest in Popple Project. As discussed earlier, even at sites previously harvested and subject to acid deposition, there is currently no evidence of change in the long term trends of biomass accumulation (Nuegenkapian 1998; Smith 2002; Martin 1989; Reiners 1992).

Alternatives 2-4

The proposed action and alternative action alternatives are summarized below in tabular form. The summary is organized by clear cut vs. selection + group + thinning. This distinction is made because the quantity of calcium removed in harvest varies by area and by harvest method. Clear cut, for example, removes about 224 Kg/ha of calcium when bole-only harvest is used, while the other methods remove about 20% of this, or 45 Kg/ha. All proposed harvesting in Popple Project is bole-only harvest; there is no whole-tree harvest proposed. There is no proposal for short rotation forestry (40-year re-entry period for final clear cut harvest), which was raised as the most significant concern related to nutrient depletion (Federer 1989). The 224 Kg/ha represents estimates of removal by whole-tree harvest -344 Kg/ha- (Hornbeck et al 1990) modified by removal of the proportion of calcium found in the tops and limbs of a tree, about 35% (Admin. Record). The 20% for other harvest methods represents the proportion of an area actually harvested; for example, a thinning removes the trees from approximately 20% of an acre because about 80% of the forests basal area is left after the thinning. These estimates of calcium removed in forest products indicate that in general, clearcuts have a greater potential direct impact on calcium removed, especially if whole-tree harvest were used, as compared to bole-only clear cut harvest or selective or thinning harvests. Also, at least for direct impacts, a thinning or selective harvest has less of an impact than a clear cut. Over time, evenage harvests remove the same amount of forest as unevenage methods, so the cumulative impact is nearly the same; though there are instances unevenage harvest actually removes more (Adams et al 1996).

Table 20 *Acres clearcut and acres partial cut in each alternative*

Alternative	Acres of Clear Cut	Acres of STS/GS/Thinning
2	205	832
3	171	660
4	205	832

Bole-only, clear cut harvest would remove about 2% of the calcium from a site when compared to the total calcium that resides in the soil. The other harvest methods would remove <1% of the calcium when compared to the total calcium that resides in the soil. On this basis, Alternative 3 has the potentially least impact on calcium, while Alternatives 2 and 4 have the greatest potential impact. With respect to indirect impacts, direct measurement of exchangeable soil calcium indicates there is no change based on studies at Hubbard Brook Experimental Forest relying on pre- and post-harvest measurements at 60 soil pits over a period of fifteen years (Johnson 1997; Johnson Pers. Comm. 2004). There is no peer reviewed evidence that soil buffering capacity has declined on the White Mountain National Forest. From the perspective of the agency requirements for assessment of soil productivity based on biomass accumulation, as mentioned previously, research evidence does not indicate any change in observable trends in biomass accumulation since the early 1930's (Nuegenkapian 1998); or based on recent measurements related to forest productivity (Smith 2002); or based on measurements at Hubbard Brook Experimental Forest (Martin et al 1989; Reiners 1992) or elsewhere on or in the vicinity of the White Mountain National Forest (Fay et al 1997). This includes sites where timber harvests have occurred. While there are indications of forest health issues at high elevations (Eagar 1992; Schaberg 2000; DeHayes 1999) with respect to red spruce, there is no peer reviewed evidence of dieback or decline in northern hardwood on the White Mountain National Forest.

3.6.2.2 Cumulative Effects on Soil Calcium

No Action Alternative

Early land use is estimated to remove calcium from harvested forest stands (Hornbeck 1990). At Popple Mountain early forest harvest appears to have been relatively light, so it was probably similar to a thinning or selective harvest. Based on soil nutrient depletion tables, this may have removed <1% of the calcium per acre of harvest (Fay 1993). Early in this analysis, it was estimated that acid deposition may have removed about 2% of the soil calcium during the past fifty years based on the original estimate by Federer (1989), revised to use updated information on mineral weathering, which was poorly known at the time of original calculation (Liken 1998). Therefore, approximately 2% of the total soil calcium may have been removed up to the current. These estimates are based on small watershed mass balance studies, so as more information is collected, it may shed light on nutrient reserves not yet accounted for, such as calcium oxalate (Bailey 2003) or mineral weathering by fungal activity (Blum 2000). A larger reserve would diminish the estimated magnitude of estimated impact on calcium.

On-site evidence during timber and other inventories has not revealed any unusual dieback or mortality. Stands previously harvested in this vicinity have adequately re-stocked (Admin.Files). So based on on-site evidence and the previously discussed research on biomass accumulation, it does not appear there are issues with soil productivity or forest health. As previously noted, where forest health issues have arisen, it is pre-disposed by inciting factor such as severe insect defoliation. Recent field review has not revealed severe insect defoliation of trees at Popple Mountain. It has been suggested that bio-indicators (putresine) or soil water Ca:Al are routine methods used to assess circumstances related to forest health; however, the use of bio-indicators developed by Shortle and Minocha remain in the research phase according to the principal investigators (Pers.Comm.); and, Ca:Al has only been applied to tree seedlings growing in pot culture or hydroponics, but has not been field tested in a forest environment. Therefore, they are not yet methods routinely applied in the field.

Alternatives 2-4

The action alternatives would add new potential harvest impacts by removal of forest products. The harvest methods are a combination of clear cut and selective + thinning + group cuts. The impact of these harvests, therefore, would range from <1% to 2% depending on the mix of harvest methods in the alternative (Fay 1993). From this perspective, Alternatives 2 and 4 would contribute similar impacts to cumulative effects, while Alternative 3 would contribute less.

Acid deposition will also continue into the future. Using a 20-year portion of the estimates applied by Federer et al (1989), this might contribute an additional <1% to estimated calcium loss. This estimate, of course, does not take into account improvements in air quality since 1989 resulting from the Clean Air Act and its Amendments, which would likely diminish the magnitude of effect.

Based on small watershed studies, therefore, past (<1-2%), present (<1-2%) and future harvests (<1-2%) plus the past (2%) and foreseeable future acid deposition (<1%) is estimated to effect approximately 5-8% of the total soil calcium. Bearing in mind that this is not a direct measurement of soil calcium, as done by Johnson (1997), and that recent research is suggesting that calcium reserves may be greater than known in 1989 (Bailey 2003; Blum 2002), and therefore the impacts are likely to be smaller than estimated, this information suggests Alternatives 2 and 4 are likely to have the greatest cumulative impact on soil calcium, while Alternative 3 is likely to have the least of the action alternatives. Given the direct soil measurements made by Johnson (1997) where the intensity of harvest was significantly greater than these harvests; and findings by Gbondo-Tugbawa (2003) indicating the dominance of acid deposition impacts over harvest effects on exchangeable calcium and base saturation, the differences among alternatives, including No Action are small and difficult to distinguish.

In all likelihood, the impacts forecast by small watershed studies will become smaller as the total reserve of soil calcium is better understood, pending the research on calcium oxalate (Bailey 2003) and mineral weathering by fungus (Blum 2000). These estimates also do not take into account improvements that have occurred in air quality that would further diminish acid rain impacts, which is arguably the most significant factor in changes in acid-base status of soils. As previously stated, there are indications that soil and water is recovering from the impacts of acid deposition (see http:/nadp.sws.uiuc.edu)

With respect to forest health and soil productivity, the long-term research already cited which transcends the 1950-1970 period of most intense acid deposition, does not indicate changes in soil productivity or forest health. Given what is known at this point, the most likely change that might be observed is a change in species composition if species such as sugar maple prove to be differentially susceptible. Improvements in air quality (http:/nadp.sws.uiuc.edu) are a positive factor that may mitigate against change, with some improvements already being observed; but it is likely to be a long term process (Likens 1996; Likens 1998; Kahl 2004; Driscoll 2004).

With respect to the issue of irreversible impacts related to soil nutrients, observations from field studies in northern hardwood forests suggest that intensive timber harvest has not lead to an irreversible impact, as exchangeable soil calcium showed no change when re-measured for fifteen years after an intense clear cut harvest using whole-tree harvest (Johnson et al 1997; Johnson Pers.Comm). An irreversible impact refers to factors such as soil productivity that are renewable only over long periods of time. The same was observed in oak dominated forests (Johnson and Todd 1998).

Distinct from the possibility of timber harvest is the possibility of irreversible impact from acid deposition. As discussed earlier, acid deposition has caused detectable changes in base cations based

on watershed studies (Federer 1989; Likens 1998; Bailey 2003), experimental watershed acidification (Fernandez 2003) and retrospective soil analysis (Bailey 2005; Lawrence 1997). The magnitude of impact continues to be refined because our knowledge of storage and release mechanisms has not yet allowed estimation of the overall size of soil nutrient reserves (Bailey 2003). There is evidence of alternative sources of supply besides the traditionally considered soil exchange pool. These include calcium oxalate (Bailey 2003) and direct weathering of minerals by fungal activity (van Breeman 2000; Blum 2002). However, despite these changes, peer reviewed published evidence reveals that scientists believe the impacts are recoverable (Likens 1996; Kahl 2004; Driscoll 2004; Likens 1998; and Gbono-Tugbawa 2004), that it will take time and persistence at improvement in air quality related to acid deposition.

3.7 Roadless/Wilderness Character

Affected Environment

As part of the Forest Planning process the White Mountain National Forest is required by law to conduct an inventory of lands within the National Forest that qualify as "Roadless." The Forest must evaluate and consider these lands for recommendation as potential Wilderness areas. Two types of Roadless Areas are discussed below: 1. Areas identified for the 1986 Forest Plan; and 2. Areas identified in 2003 for the ongoing Forest Plan Revision.

1986 Forest Plan Roadless Areas

For the 1986 Forest Plan, 17 Roadless Areas totaling about 353,000 acres were inventoried on the White Mountain National Forest. From that inventory, the Forest Service recommended and Congress approved the 12,000-acre Caribou-Speckled Wilderness. The White Mountain National Forest currently has 5 congressionally-designated Wilderness areas, totaling 114,000 acres.

The remaining 16 Roadless Areas inventoried in the 1986 Forest Plan were assigned to a variety of management areas. Two of these Roadless Areas, Presidential Range-Dry River Extension and Wild River, are near (greater than ½ mile from closest harvest unit) the Popple Project Area, but are not directly impacted by any of the proposed harvest units. Maps of these Roadless Areas are available in the Project Planning Record.

In January 2001, President Clinton approved new rules for managing Roadless Areas, referred to as the Roadless Area Conservation Rule (RACR). This new direction would have provided greater protection of these Roadless Areas than some of the management area prescriptions assigned by the 1986 Forest Plan. To date, the RACR has not been formally implemented. However, the Forest Service is following temporary direction to protect these areas by requiring that the Chief of the Forest Service approve any new road construction or timber harvest within the boundaries of the Roadless Areas covered by the new rule. The Popple Project does not propose any road construction or timber harvest within any Roadless Area covered by the Roadless Area Conservation Rule.

Forest Plan Revision – New Roadless Area Inventory

For the ongoing Forest Plan Revision, the White Mountain National Forest has completed a new Roadless Area Inventory. This inventory reconsiders all lands on the National Forest for their Roadless Area potential, accounting for new land acquisitions, changes to the landscape since the last Forest Plan, and improved computer technology for evaluating areas. The new inventory includes 17

Roadless Areas totaling nearly 508,000 acres (including 114,000 acres of Wilderness). The new inventory expands the Wild River and Presidential Range-Dry River Extension Areas. A portion of the Popple Project Area falls within the boundaries of the Presidential Range-Dry River Extension #2 Roadless Area (Harvest Units 1-6, 11-22, 38, 39). A map of the 2003 Roadless Area Inventory is available at the Saco Ranger District.

Roadless Characteristics

Roadless characteristics are quantitative and objective. They determine whether an area may be considered for recommendation as Wilderness. Not all of the roadless characteristics will be evaluated, since only some of these characteristics are affected by the Popple Project proposal.

The following roadless characteristics will be analyzed:

- To be roadless, an area must have less than a 0.50 mile (½-mile) of improved roads per 1,000 acres of National Forest.
- To be roadless, the percentage of an area that has had a regeneration timber harvest (clear cuts, seed tree cuts and shelterwood cuts) within the past 10 years must be less than 20%.
- To be roadless, the percentage of an area that has non-native tree plantations or permanent wildlife openings must be less than 15%.
- To be roadless, an area should have a core of solitude of at least 2,500 contiguous NF acres that is not impacted by motorized influences (and meets primitive or semi-primitive non-motorized recreation opportunity guidelines).

The Analysis Area for direct and indirect effects on roadless characteristics is the Forest Plan Revision Presidential-Dry River Extension #2 Roadless Area. The Presi-Dry #2 is 4,915 acres and includes 0.4 miles of improved roads. This is a density of 0.08 miles per 1,000 acres. The Analysis Area does not include the Presidential Range-Dry River Wilderness Area or Presidential Range-Dry River Extensions #1 or 3 because Popple Project has no proposed activities in these areas.

Because Forest Plan Revision makes recommendations for all proposed Roadless Areas, the future management of the Presidential-Dry River Extension #2 Inventoried Roadless Area will ultimately be determined by Forest Plan Revision processes. Therefore, the foreseeable future for cumulative effects is from now until the revised Forest Plan Record of Decision is signed. This is anticipated to be in the fall of 2005.

Wilderness Characteristics

Once an area qualifies as Roadless, it is evaluated in Forest Plan Revision to determine if it has characteristics consistent with Wilderness. Not all of the Wilderness characteristics will be evaluated, since only some are affected by the Popple project proposal.

The following Wilderness characteristics of Presi-Dry #2 will be analyzed:

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

The Presidential Range-Dry River Wilderness is about 0.35 miles from the nearest proposed harvest

unit, so there would be no effects to it**.**

3.7.1 Direct and Indirect Effects on Roadless/Wilderness Character

The Analysis Area for direct and indirect effects on Wilderness characteristics is the same as for roadless characteristics because the affected area is the Presidential-Dry River Extension #2 Roadless Area.

Alternative 1: No Action Alternative

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

Action Alternatives 2, 3 and 4

To qualify as a Roadless Area, the criteria permits up to 983 acres of regeneration harvest and 737 acres of wildlife openings within the Analysis Area. Alternatives 2, 3 and 4 propose 142 acres of regeneration harvest within Presi-Dry #2 Roadless Area. When added to the existing acres of regeneration harvest (157 acres) and wildlife openings (zero acres), the total acres cumulatively under any Action Alternatives fall well short of the number permitted (see Table 21).

The roadless criteria would permit up to 2.5 miles of improved roads in the 4,915-acre Presi-Dry #2 Roadless Area. Roads inventory identifies 0.4 miles of existing improved roads. No alternative proposes additional roads within the Analysis Area.

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

None of the proposed alternatives and connected actions or existing Nordic Skiing and road and trail maintenance would impact the Presidential Range-Dry River Wilderness. Nor would they effect the availability of Presi-Dry Roadless Area #2 to be considered for potential Wilderness in Forest Plan Revision. This is because Presi-Dry #2 is not recommended for Wilderness designation under any Forest Plan Revision alternative.

Table. 21 Summary of Effects on Presidential Range-Dry River #2 Roadless Area

Roadless Characteristics	Presi-Dry #2 Roadless Area			
Total Acres	4,915			
Regeneration Acres				
Acres Allowed to Remain Roadless (20%)	983			
Inventoried Regen Ac within Roadless #2	119			
Acres Added by Popple within Roadless #2	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
	0	142	142	142
Acres Added by Foreseeable Future Actions	0			
Improved Roads				
Miles Allowed to Remain Roadless	2.5			
Inventoried Miles	0.4			
Miles Added by Popple Proposal	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
	0	0	0	0
Miles Added by Foreseeable Future Actions	0			
Permanent Wildlife Openings				
Acres Allowed to Remain Roadless (15%)	737			
Inventoried Permanent Wildlife Opening Acres	0			
Acres Added by Popple Proposal	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
	0	0	0	0
Acres Added by Foreseeable Future Actions	0			
Solitude and Disturbance				
Acres Allowed to Remain Roadless	2,500			
Inventoried Core Acres of Solitude	2,500			
Core Acres after Popple Proposal (All Alts)	2,500			
Core Acres after Foreseeable Future Actions	2,500			

3.7.2 Cumulative Effects on Roadless/Wilderness Character

Table 22 Summary of Cumulative Effects on Roadless/Wilderness Character

Analysis Area	Time Period	Estimated Acres
Presidential Range-Dry River Wilderness, and the Presidential –Dry River Extensions 1,2 and 3 Roadless Areas	Present 2005-2006	43,956 NF acres

Alternative	Summary of Cumulative Effects
1	Does not contribute to cumulative effects on roadless or Wilderness characteristics
2	Proposes 142 acres of regeneration harvest, however, when considered cumulatively, (no known future actions), Roadless designation remains unaffected
3	Alternative 3 has similar, though slightly fewer cumulative effects than Alternative 2, because partial harvest units 19 – 22 are omitted.
4	Alternative 4 has identical cumulative effects to Alternative 2

The Cumulative Effects Analysis Area for Roadless/Wilderness characteristics includes the current Presidential Range-Dry River Wilderness and Presidential Range-Dry River Extensions 1, 2, and 3 Roadless Areas. This includes all of the existing Wilderness and potential roadless/wilderness, including a total of 43,936 acres of land on the Ammonoosuc-Pemigewasset, Androscoggin, and Saco Ranger Districts. The Ammonoosuc-Pemigewasset and Androscoggin Ranger Districts do not have any current projects nor do they anticipate any foreseeable future actions that will affect the Roadless or Wilderness designation of any of the Presidential Range-Dry River Extensions (# 1 and 3).

The Saco Ranger District has an ongoing project, Back-A-Pickering II that lies within the Presidential-Dry Extension #3, south of the Popple Project. Back-A-Pickering II Project is 45 acres of regeneration clearcut harvest within Extension #3. However, the Action Alternatives when considered cumulatively with Back-A-Pickering II, would still have no effect on the eligibility of Presidential Range-Dry River Extension #2 as Roadless, or ultimately as Wilderness.

Consideration for Wilderness in the Forest Plan Revision

Forest Plan Revision will determine the availability of a Roadless Area for consideration as potential Wilderness. Popple Project does not propose any activities that would make Presi-Dry #2 unavailable for consideration as potential Wilderness in Forest Plan Revision. And in addition, Presi-Dry #2 is not recommended for Wilderness designation in any Forest Plan Revision alternative.

3.8 Wildlife

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, literature review (DeGraaf and Yamasaki 2001) and the Species Viability Evaluation done for the Forest's Plan Revision, it is known a wide array of wildlife species inhabit the White Mountain National Forest throughout all or part of the year. The species on the Forest use a variety of habitat types and age classes to meet their needs. In forested habitat approximately 70% of the species use mature and over mature habitats while 66% use early successional habitats for all or part of their life cycle (DeGraaf and Yamasaki 2001, DeGraaf et al. 1992).

Management for wildlife species diversity can be achieved by providing a broad spectrum of habitat conditions. To meet the goals of the National Forest Management Act, the Forest developed a wildlife strategy based on Habitat Management Units (HMU) to 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 for native wildlife species and likely include upland vegetated areas, non-forested areas, wetlands, riparian zones, and areas of ecological significance.

The 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.

Affected Environment

Proposed Popple Project lies within HMU 503 and HMU 506. For this project proposal, only 75 acres (all of Harvest Unit 24, 45 acres of Unit 25 and 6 acres of Unit 26) lie in HMU 506. Under all alternatives except the no action, the proposal is to commercially thin these stands. This would retain the stands in a mature age class therefore having no change in age classes or community types in HMU 506. For this reason, no further analysis of HMU 506 will occur.

Timber management activities since the 1950's constructed the existing road system. There have been several recent timber sales in the Miles Brook area: Miles Brook Sale, Miles Brook II Sale and a previous Miles Brook sale sold in the early 1980's that was not completed due to default. The Miles Brook II sale was completed in 1998 and resulted in 119 acres of regeneration-age habitat.

In the southern portion of the project area, the Popple Mountain Sale sold in March 1985 and resulted in 46 acres of regeneration-age habitat along with some single-tree selection harvest. These regeneration–age acres have already succeeded into the young age class. Along Iron Mountain Road, private landowners cleared approximately 110 acres of woodlands within the last four years. Currently this is providing regeneration-age habitat in the area.

The Marsh Brook sale was completed in 1996 and created 128 acres of regeneration-age habitat along with 85 acres of uneven-aged northern hardwood treatment. Prospect Farm is located in the Marsh Brook area. This historic farm on private land has been returning to forested habitat for many years. No logging has occurred in the recent past (2004. personal communication: Art Fernald, Jackson).

All of these past land uses have contributed to the conditions currently on the ground. At this time there are no future timber sales planned in HMU 503.

The Ellis River and Route 16 bisect the Project Area. The eastern portion lies on Spruce Mountain. This area drains into both the Ellis River and the Wildcat River. There is a mixture of community types in this area as well as age classes. A small wetland exists along with a permanent wildlife opening that preserves an old homestead apple orchard.

The west side of the Ellis River contains the tributaries of Miles Brook and Meserve Brook. The area generally faces east and extends from the Ellis River west to the ridgeline. The predominant forest type is mature northern hardwood. Moderate ice storm damage occurred in the mature and over mature northern hardwood stands at mid-slope elevations throughout HMU 503 during the 1998 ice storm. The significant breakage of branches, large tree limbs, and boles in ice-damaged stands resulted in a reduction of canopy closure, which was significant in some instances. Since the ice storm, there has been an increase in understory vegetation where damage was heaviest.

Softwood exists in small pockets and in the riparian areas. Deer presence has been observed on the knolls in the lower section of Meserve Brook. A few may over winter in the small softwood patches in this area. Paper birch and some aspen are found on the mid to upper slopes. Several permanent wildlife openings exist, two along the Ellis River and one near the confluence of Meserve Brook. Several beaver flowages are also present. Past harvest activities have created some age class diversity.

Proposed watershed improvements would occur in Meserve Brook near Unit 40 and below the Jackson Water Precinct in holding. The upper area lacks pools, sinuosity, and cover. Past management has led to little to no large logs in the stream or riparian areas. The lower area has been impacted from past historical use and has become 'braided', causing soil erosion and sedimentation of the brook. Proposed fisheries and stream bank improvement projects are designed to improve these conditions.

Other uses in this HMU include Nordic skiing, hiking, camping, snowshoeing, and hunting. Human use appears to be low in this HMU during the snow-free seasons and high during winter due to the existence of Jackson Ski Touring Foundation's numerous trails. Expectations are winter use will continue to be high and may increase.

The Analysis Area for direct and indirect effects on wildlife habitat is the 7,445 acres of managed lands (MA 2.1 and 3.1) of HMU 503, since this is the portion of the HMU in which habitat objectives have been established in the Forest Plan. **The Analysis Area for cumulative effects to wildlife habitat** includes all lands (8,530 acres) in HMU 503 and private lands within or adjacent to the Project Area, and 75 acres in adjacent HMU 506. An HMU is a building block for the larger wildlife habitat management goals of the 1986 Forest Plan. When vegetative management activities fall within the desired future condition (DFC) for a given HMU, the effect cumulatively is that the given HMU contributes to wildlife habitat goals for the National Forest. Non-managed National Forest lands within the HMU boundaries and private lands adjacent to the HMU are considered when analyzing cumulative effects to determine if there are activities taking place elsewhere in the HMU that may affect wildlife habitat. This area is analyzed because the Forest Plan is based on wildlife habitat requirements (vegetation types) as measured on a HMU basis.

The temporal scope for considering cumulative effects on wildlife habitat is ten years in the past and 10 years in the future because the benefits of regenerating stands diminish after 10 years for some wildlife species. Ten years was the time period selected because it represents the length of

time after a stand is clearcut when it is considered in the regeneration phase and the canopy is not fully closed so sunlight can reach the ground.

3.8.1 Direct and Indirect Effects on Wildlife Habitat under Alternative 1

Alternative 1: No Action Alternative

Alternative 1 would cause no direct effects of tree removal or compaction of snow or soil substrates or noise from vegetation management activity. Therefore, there would be no direct effects of temporary displacement or interruption of established territories or travel patterns of wildlife species to, from, or within the proposed Popple Project Area from vegetation, recreational, wildlife, watershed or invasive management activities.

Changes in the existing condition of vegetation community type or age class composition would occur through the natural process of forest succession or large-scale disturbances (fire, hurricane, ice storm, drought, or insect and disease infestations). The No Action alternative would perpetuate a mature and over-mature forested habitat condition. Forest interior species such as the ovenbird and wood thrush and species preferring mature closed-canopy and climax forest conditions would benefit from the perpetuation of the mature northern hardwood community type. However the No Action Alternative does not meet the Purpose and Need. The No Action would not: move the forest towards the desired condition of HMU 503 for the northern hardwood regeneration age class, increase the amount of spruce/fir; paper birch or aspen community types; nor provide wildlife habitat diversity in managed lands identified in the Forest Plan (USDA-LRMP 1986a, III 30-35, III 35-41).

The No Action would cause an adverse indirect effect of a decline in habitat diversity in the early-successional age class and the paper birch /aspen community types. The No Action would not provide an opportunity to increase the amount of early-succession (0 to 9 year old regeneration age-class) or next successional young-aged hardwood type, required by various species.

Table 23. Age Distribution as Seen in the year 2014 for HMU 503

Community	Regeneration Age	Young Age Class	Mature Age Class	Overmature Age Class
Northern Hardwoods	0 Acres	684 Acres	4655 Acres	587 Acres
Paper Birch	0	0	75 Acres	138 Acres
Aspen	0	0	33	0
Spruce/Fir	0	35 Acres	124 Acres	86 Acres

Table 24. Age Distribution as Seen in the year 2024 for HMU 503

Community	Regeneration Age	Young Age Class	Mature Age Class	Overmature Age Class
Northern Hardwoods	0 Acres	479 Acres	4444 Acres	1003 Acres
Paper Birch	0	0	0	213
Aspen	0	0	33	0
Spruce/Fir	0 Acres	15 Acres	125 Acres	105 Acres

The No Action Alternative, over time increases the amount of the mature and overmature age class. This creates greater potential for accumulation of downed woody material and large diameter cavity trees compared to the harvest units proposed for the action alternatives. However, Alternative 1 would not provide an opportunity via harvest treatments to increase the paper birch and aspen component or pin cherry, raspberries, and other mast producing vegetation. Over time the loss of paper birch or aspen types would cause long-term, adverse indirect effects on several species including the MIS broad-winged hawk and MIS ruffed grouse associated with these community types, and cause a potential decline in the diversity of wildlife favoring early-successional habitat, such as white-tailed deer and several neo-tropical migratory song birds in the project area.

There would be a lost opportunity to stimulate hardwood regeneration or increase available browse adjacent to the existing scattered softwood component, as recommended for moose and white-tailed deer habitat management (Reay et al. 1990). The No Action would cause an adverse indirect effect on the MIS mourning warbler and MIS chestnut-sided warbler, representative of early-successional and young age class (sapling) in the northern hardwood community type. Alternative 1 allows the softwood spruce/fir component to increase over time as the paper birch and aspen forest types to die out. Without a natural disturbance softwood regeneration would not be accelerated. Snowshoe hare, a MIS, which is the primary prey base for Canada lynx prefer softwood regeneration habitat. (See the BE/BA, as amended for detailed analysis for potential effects to Canada lynx).

Indirect effects over time would include declines in habitat diversity (Trani et. al 2001), and some wildlife species would not find suitable habitat within the project area. It is expected there would be a potential decline in overall diversity via loss of vegetation age class and type and associated wildlife in the Popple project area.

3.8.2 Cumulative Effects on Wildlife Habitat under Alternative 1

This alternative would add an adverse cumulative effect to the steadily declining trend in early-successional, regeneration-age class of northern hardwoods and aspen/birch community types within the Project Area and at the larger HMU, Forest-wide, and New England regional scales. Because of a decline in early-successional habitat, Neotropical migrant MIS chestnut-sided and mourning warblers and snowshoe hare, and upland opening MIS Eastern kingbird and MIS bluebird that rely on early-successional age class and/or aspen/birch community type would potentially decline within the Popple Project Area. Overall, wildlife habitat and species biodiversity within the Popple Project Area would decline (NHFG 1996). At the landscape scale, this alternative would add to the cumulative effects of a maturing forest, which is steadily increasing over the past several decades across the White Mountain National Forest, as well as across New England forested landscapes (USDA-FS 1993).

This alternative would not add to the effects of past harvests. This Alternative would maintain habitat conditions for approximately 175 wildlife species associated with mature northern hardwood or mixedwood habitats, approximately 125 wildlife species associated with mature softwoods habitat, and approximately 135 species that associate with shrubby upland openings (DeGraaf et al. 1992). Species relying on regeneration-age habitat would continue to find some suitable habitat on adjacent private lands for the next several years. By 2015 these acres would not be suitable for these species.

This alternative does not meet Habitat Management Goals for age class and structural habitat outlined in the Forest Plan. 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 (USFS 1996). The annual amount of clearcutting (the primary management tool used to create northern hardwood regeneration) has declined from 3308 acres in 1970

to 242 acres in 2000 (USFS 1998). For habitat diversity, the forest continues to have far more acres of mature northern hardwood community type than desired, and less of all other community types, such as spruce/fir and hemlock (USFS 1996).

3.8.3 Direct and Indirect Effects on Wildlife Habitat under Alternative 2

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

Harvesting of trees would have direct effects to species living within them. Species desiring mature forest characteristics would be displaced. Site conditions on the forest floor of clearcuts would be hotter and drier for about 2 to 5 years after cutting with increased decomposition of leaf litter (Fay et al. 1994). This could adversely affect some species of amphibians, such as red-backed salamander (DeMaynadier and Hunter 1998). Individual salamanders in large unshaded openings would not likely survive. Amphibians and small mammals in clearcuts also might be more vulnerable to predation. This would be partially mitigated by leaving reserve patches of trees throughout these units.

Harvesting trees increases the amount of limbs and tops on the ground and provides a localized, short-term source of natural browse for white-tailed deer, especially if harvested in winter when they need it most for overwinter survival. Mobility patterns of large mammals traveling to, from, or within the project area after harvesting activity would not be adversely affected by the proposed treatments or any road reconstruction or skid trails. Skid trails and forest roads provide packed snow trails for animals such a bobcat, fisher, and coyote to move along while foraging. Large mammals such as moose and white-tailed deer have large home ranges, and appear to adjust quickly to displacement from harvesting activity and may adjust their foraging behavior from day to night to avoid harvesting activity. Noise from logging equipment may cause a direct effect of displacing white-tailed deer to other areas during the day, but they return at night to feed on down treetops.

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 (Trani et.al 2001; Conner and Adkinsson 1975; Dale et.al. 1995; DeGraaf 1992; Thompson et.al 1992).

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 such as owls that breed in winter could be affected during this time (December through March). 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.

Aquatic work in upper Meserve Brook

Placing large wood directly in the stream would have a direct effect on aquatic organisms dwelling at these sites. Individuals may be crushed while others may be injured. Some sediment may be created during implementation. Experience from former projects indicate this would be a minor amount and only for a short duration (Milot, personal communication).

Proposed Ski Trails

New ski trail construction could have some direct effect on ground dwelling species, as a portion of the ski trails would be in new locations and part would be placed on existing skid trails. Individuals of species may be crushed or injured during implementation. Elimination of vegetation, re-contouring of trail surfaces, and brushing them for winter trail use may affect some species movement. This is typically done on an annual basis in the fall. The mower also may injure or kill individuals.

Table 25. Summary of Alternative 2 for HMU 503

Community *	Regeneration Acres			Young Acres			Mature Acres			Overmature Acres			Uneven Age Acres		
	Existing	Desired	Alt 2	Existing	Desired	Alt 2	Existing	Desired	Alt 2	Existing	Desired	Alt 2	Existing	Desired	Alt 2
NH	119	362	**244**	1358	1205	**1358**	4323	1440	**4026**	126	363	**126**	932	1500	**944**
S/F	0	35	**0**	48	83	**48**	97	175	**97**	80	33	**80**	39	1172	**119**
PB	0	73	**68**	33	315	**33**	213	240	**213**	0	72	**0**			
Aspen	0	15	**12**	0	25	**0**	0	50	**0**	20	10	**20**			
Hemlock													25	75	**25**

*NH = Northern Hardwood
*PB= Paper Birch
*S/F = Spruce/Fir

Table 25 indicates an overabundance of existing mature northern hardwood habitat with minor percentages of the other community types. The objective as described in the Forest Plan would be to convert some of those acres to other community types and/or age classes in order to create a more diversified array of habitats.

Indirect effects of creating additional Northern hardwoods, paper birch & aspen regeneration age class

This alternative proposes to create 125 acres of northern hardwood regeneration and 68 acres of paper birch regeneration and 12 acres of aspen regeneration habitat. This would benefit species such as chestnut-sided warblers, fox, and white-tailed deer that are associated with shrub layers, herbaceous ground vegetation, soft mast, and minimal overstory components. Up to 150 species will use northern hardwood regeneration habitat for all or part of their life cycle (DeGraaf et al. 1992, DeGraaf and Yamasaki 2001). Early successional paper birch is used by approximately 150 species of wildlife (DeGraaf et al. 1992). 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. 1992). If some disturbance action such as blow-down or clear-cutting does not occur, these species would continue to decline in the area.

Indirect effects of even-aged treatments on Mature Northern Hardwoods

Alternative 2 proposes 686 acres of commercial thinning. This maintains the mature character of the existing stands retaining interior forest characteristics for species such as ovenbirds and wood thrush. (King 1993; MacFadden 2000; Welsh 1992, Yamasaki et.al. 2000). Some mature trees would be removed to allow the residual trees room to grow. No conversion to other community types would occur and wildlife would experience minimum indirect effects despite harvesting and skidding trees.

Indirect effects of uneven-aged treatments on Mature Northern Hardwoods, Mixedwoods, Spruce/Fir and Hemlock

This treatment moves the HMU in the direction of the desired condition by increasing softwood habitat, initiating paper birch, aspen and northern hardwood regeneration, and reducing the amount of mature northern hardwood habitat. The 137 acres of single tree and group selection harvests proposed in Units 8, 15, 19, 22, 33, and 39 would maintain the mature character of these mixedwood stands. The objective is to maintain canopy cover while scarifying soil in some areas along with increasing sunlight to the forest floor to enhance softwood regeneration. The component of red spruce, balsam fir and hemlock would increase and eventually provide softwood habitat for white-tailed deer winter cover and for many other species such as red squirrel, snowshoe hare and American marten. Releasing the understory would create more vertical structure, or layers and ultimately converts 80 acres from northern hardwood (mixedwood) to softwood habitat.

Group selection and single tree selection treatments retains a canopied, interior forest condition. This uneven-aged management system requires entries on a 15-year average which results in more frequent disturbance such as soil compaction, human presence, etc. Tops left on the ground would provide immediate forage for browse-eating species while stump sprouting would provide browse for several years after harvest. Units 7 and 34 are northern hardwood stands proposed for uneven age management that would ultimately convert 12 acres from evenage to uneven age northern hardwood.

Where group selection openings occur, the area may become marginally suitable for species desiring regeneration-age habitat (Costello 1995; Kerpez 1994; DeGraaf and Healy 1988). The larger the group opening, the more suitable for species such as chestnut-sided warblers. Larger openings may also see an increase of shade intolerant species such as paper birch in the center of group openings, which may have a minor benefit to individuals of a species.

These uneven-aged treatments create disturbance and open the forest floor to sunlight. They diversify stand structure and increase understory vegetation and browse for wildlife. Wildlife species preferring a closed canopy, dead trees or softwood cover (DeGraaf et al. 1992) are favored by these treatments.

Indirect effects of aquatic work in upper Meserve Brook

The proposed action would increase pool habitat and woody cover in approximately 4,000 feet of Meserve Brook. Whole trees, root wads and boulders would be placed in strategic locations to increase pool habitat from its low level of 2.4% of the stream (USFS 1992 unpublished data). The desired percentage is at least 20% (Forest Plan III 15b). Wood would be placed and anchored using natural barriers and forms within the stream. Adding wood would slow water movement during high rain events thereby decreasing potential erosion in the area (Jeffries, et.al. 2002). Large wood in the riparian zone is also beneficial to terrestrial wildlife in that is provides denning areas and cover.

Indirect effects of Aquatic work in lower Meserve Brook

The treatment area is below the property boundary at the Jackson Water Precinct in holding to the confluence with the Ellis River. This currently braided section of stream has several side-channels and has been altered considerably since early settlement including two dams, a sawmill, and cattle and/or sheep grazing in Grey's Field. Grey's field was converted to an apple orchard later on. There is evidence of an old gravel pit and a large old dump site from the early 1900's believed to have been Jackson's town dump. Past and present uses appear to have caused the stream braiding in this area.

The goal is to stabilize this stream section by ensuring culverts are large enough to handle high water flows and stabilizing stream banks. Logs, root wads and boulders would be placed to divert water during high flows away from the dump site and old roads that crossed Meserve Brook.

Some trees in the riparian area would be utilized for this work. Other trees could be brought in from outside the riparian area. Some individuals of wildlife species may be directly impacted by removal of trees or placement of them in or adjacent to the brook. Some species may be affected by the change of water flow. No species is expected to be impacted to the extent it is considered for listing. Ultimately, the changes are expected to improve aquatic conditions and water quality in Meserve Brook.

Indirect effects of Additional Nordic Trails

The Avalanche Brook Trial is not groomed for Nordic Skiing and receives little use. The proposal to relocate it and add it and allow grooming may have indirect effects. Nordic Ski trail #2 would require tree removal along a 300 foot section not already a skid trail. Nordic Ski trail #3 lies on an old logging road that would require removal of some shrubs and trees, and regular maintenance (brushing) to allow grooming. This would benefit species that utilize grasses and forbs.

Cumulative effects of these trails would be an overall increase in human presence to the detriment of wildlife species that avoid humans. Additionally, groomed trails increase the area that predators cover during winter when normally deep snow impedes their range. This may have a negative effect on prey species such as red squirrels, mice, voles, etc. See the Biological Evaluation summary for effects to Canada lynx habitat.

Indirect effects of Roads

Roads would be gated to vehicular access upon completion of harvest, therefore human presence and its effects to wildlife would not increase beyond what already exists except that an additional road corridor would exist. The linear opening in the forest created by the road may provide certain species desired habitat. Most bats utilize roads and trails as travel corridors through the forest. Northern goshawks have been known to nest adjacent to roads.

Indirect effects of Invasive plants

The invasive plants known to exist within the Project Area can be beneficial to wildlife. Autumn olive and Japanese barberry have been promoted as beneficial wildlife plantings in the past. Glossy buckthorn produces seeds that are consumed by many species. While wildlife may benefit directly from these species, indirectly these plants are altering the habitat in the area. Grey's Field, the Doliff

Field, and Winneweta Falls openings are all infested with these species to the detriment of other native plants.

Direct effects from removal of these shrubs would be an increase of sunlight to the ground. Most of these shrubs are growing in open areas so the increase would not be extreme, but in areas where the shrubs are dense and provide shade there would be a noticeable difference. Smaller shrubs could be pulled out of the ground. There would be some minor soil disturbance from this method. There would be a direct reduction in mast produced. This would cause an indirect response of some species to search elsewhere for food. While there may be a reduction in the number of individuals dwelling in the area, no wildlife species is expected to be eradicated from the area due to a reduction of invasives.

3.8.4 Cumulative Effects on Wildlife Habitat Under Alternative 2

The Analysis Area for cumulative effects to wildlife habitat includes all lands (8,530 acres) in HMU 503 and private lands within or adjacent to the Project Area. No other timber harvest proposals are planned for HMU 503 during the analysis time period.

The overall desired amount of regeneration-age habitat in HMU 503 is 485 acres. Northern hardwood regeneration-age class is increased by 205 acres, or 67% of the desired amount. With the existing 110 acres of regeneration age habitat on adjacent private land and 119 acres within HMU 503, Alternative 2 would create 434 acres (98% of the desired amount) of this community age class.

Creating 68 acres (93%) of the desired amount of paper birch regeneration perpetuates the paper birch community type. Aspen regeneration is also increased by 12 acres, which is 80% of the desired amount. Ruffed grouse use both community types, and many species prefer to browse on paper birch and aspen. Acres of uneven-age softwood habitat are increased. Mature and overmature age classes of northern hardwoods are reduced and northern hardwood uneven-age acres and regeneration acres are increased, which is a desired effect.

Aquatic work in upper Meserve Brook would increase stream diversity. This in addition to the watershed work in lower Meserve Brook would enhance the overall habitat conditions in the watershed.

Human use in wildlife openings infested with invasive plants may allow invasives to persist in the area or be transported to new areas. Harvest activities may also spread invasives despite mitigations. The use of herbicides in Alternative 2 may effect individual wildlife species that ingest leaves that have had herbicides applied. Application would likely occur directly to leaves in early summer prior to fruit formation. There are no effects to wildlife expected from herbicides applied directly to cut stems. Invasive eradication is expected to be implemented over many years, as invasive plants are persistent and difficult to eradicate.

3.8.5 Direct and Indirect Effects on Wildlife Habitat under Alternative 3

Direct and indirect effects to wildlife would be proportional to those described for Alternative 2. Because fewer acres are proposed for harvest, direct effects would be less.

Table 26. Summary of Alternative 3 for HMU 503

Community *	Regeneration Acres			Young Acres			Mature Acres			Overmature Acres			Uneven Age Acres		
	Existing	Desired	Alt 3	Existing	Desired	Alt 3	Existing	Desired	Alt 3	Existing	Desired	Alt 3	Existing	Desired	Alt 3
NH	119	362	**210**	1358	1205	**1358**	4323	1440	**4088**	126	363	**126**	932	1500	**962**
S/F	0	35	**0**	48	83	**48**	97	175	**97**	80	33	**80**	39	1172	**73**
PB	0	73	**68**	33	315	**33**	213	240	**213**	0	72	**0**			
Aspen	0	15	**12**	0	25	**0**	0	50	**0**	20	10	**20**			
Hemlock													25	75	**25**

*NH = Northern Hardwood
*PB= Paper Birch
*S/F = Spruce/Fir

Alternative 3 moves towards the desired future conditions for wildlife habitat in HMU 503, though not to the extent as Alternative 2. In moving the HMU toward the desired future condition, Alternative 3 proposes 91 acres of northern hardwoods regeneration which is beneficial to species such as chestnut-sided warblers; increases spruce/fir forest type by 34 acres; creates the same amount of paper birch and aspen regeneration (68 acres and 12 acres respectively); and increases the number of acres in uneven-age northern hardwoods.

Alternative 3 does not reduce mature northern hardwood age class as much as Alternative 2, and so creates fewer acres of northern hardwood regeneration, and less softwood habitat.

Direct and indirect effects of Aquatic and stream bank stabilization work in Meserve Brook, and from proposed Nordic Ski trails and Roads are identical to those disclosed for Alternative 2 above.

Indirect effects of Invasive plant treatments

This would be similar to that discussed under Alternative 2 except that herbicides would not be utilized so direct and indirect effects from herbicides would not occur. Eradication of invasives by manual treatment is difficult, and when near an area proposed for disturbance, may prove ineffective. The potential for viable seed to find exposed soil increases under this alternative. Therefore the potential for invasives to spread increases.

3.8.6 Cumulative Effects on Wildlife Habitat under Alternative 3

This alternative would benefit wildlife species requiring mature northern hardwoods, softwood cover, interior forest conditions, and regeneration-age habitat. The overall desired amount of regeneration-age habitat in HMU 503 is 485 acres. Northern hardwood regeneration-age class is increased by 91 acres and paper birch/aspen is increased by 80 acres (35% of the desired amount). With the existing 110 acres of regeneration age habitat on adjacent private land and 119 acres within HMU 503, Alternative 3 would create 400 acres (82% of the desired amount) of this community age class.

The effects on paper birch community types, softwood habitat, mature and overmature age classes of northern hardwoods, and northern hardwood regeneration acres are the same as reported above for direct effects.

Cumulative effects to wildlife from existing recreational use and increased ski trails would be similar to those described under Alternative 2. Cumulative effects from other connected actions, including the aquatic and stream bank improvement projects would be the same as those described under Alternative 2 except for invasive plants. Not utilizing herbicides for treatment of invasive plants is the same as that described under direct and indirect effects for Alternative 3 above. If control efforts were ineffective the effects would be adverse to native plant communities in infested areas.

3.8.7 Direct and Indirect Effects on Wildlife Habitat under Alternative 4

Alternative 4 differs from Alternative 2 in that many of the units are restricted from winter logging and proposed access to units 29–32 is adjacent to the Hall Trail Connector. This alternative also dropped a proposal for relocating a 1700 foot section of the Avalanche Brook Trail and eliminated Nordic Trail #2, but increased the length of Nordic Trail #3, by 0.6 miles and connects it to the Ellis River Trail.

Direct and indirect effects to wildlife from proposed vegetation management would be the same as those described for Alternative 2. See Table 27 for a summary of community types and age classes. The effects for Meserve Brook stream bank and aquatic improvement work and for herbicide use on invasive plants would be the same as that described in Alternative 2.

No direct or indirect effects would occur in relation to the Avalanche Brook Trail or Nordic trail #2. Direct and indirect effects from Nordic Ski trail #3 would be similar to those discussed for Alternative 2, however, over an additional 0.6 miles of proposed ski trail that would first be used for skidding timber in units 30 and 31. Removal of additional trees may be required to accommodate a groomer, and to reach all the way to the Ellis River Trail, because the trail is buffered.

Direct effects (injuring individuals), indirect effects from compacted snow routes that increase access for predators and from maintenance of these trails in a grassy condition, would be similar to that discussed for Alternative 2, but for a total of 2.4 miles, 0.4 miles less than proposed in Alternative 2. This Alternative would benefit species that utilize grasses and forbs, and may be detrimental to prey species and to species that avoid human presence.

3.8.8 Cumulative Effects on Wildlife Habitat under Alternative 4

Cumulative Effects are the same as those reported for Alternative 2, above.

Table 27. Summary of Wildlife Habitat Objectives for HMU 503 that would be accomplished by the Action Alternatives

	Community	Northern Hardwoods			Paper Birch			Aspen			Spruce/Fir			Hemlock		
HMU 503																
Regeneration Age Class	**Existing**	119			0			0			0			0		
	Desired	362			73			15			35			NA		
	Alternative	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**
	Change by Alternative	125	91	125	68	68	68	12	12	12	0	0	0	NA	NA	NA
	Acres after harvest	244	210	244	68	68	68	12	12	12	0	0	0	0	0	0
Young Age Class	**Existing**	1358			33			0			48			0		
	Desired	1205			315			25			83			NA		
	Alternative	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**
	Change by Alternative	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA
	Acres after harvest	1358	1358	1358	33	33	33	0	0	0	48	48	48	0	0	0
Mature Age Class	**Existing**	4323			213			0			97			0		
	Desired	1440			240			50			175			NA		
	Alternative	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**
	Change by Alternative	-297	-235	-297	0	0	0	0	0	0	0	0	0	NA	NA	NA
	Acres after harvest	4026	4088	4026	213	213	213	0	0	0	97	97	97	0	0	0
Overmature Age Class	**Existing**	126			0			20			80			0		
	Desired	363			72			10			35			NA		
	Alternative	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**

	Change by Alternative	0*	0*	0*	0*	0*	0*	0	0	0	0	0	0	NA	NA	NA
	Acres after harvest	126	126	126	0	0	0	20	20	20	80	80	80	0	0	0
Uneven-Aged	**Existing**	932			0			0			39			25		
	Desired	1500			NA			NA			1172			75		
	Alternative	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 2**	**Alt 3**	**Alt 4**
	Change by Alternative	12	30	12							80	34	80	0	0	0
	Acres after harvest	944	962	944							119	73	119	25	25	25

*By 2014, northern hardwood overmature will have increased by 315 acres and paper birch overmature by 138 acres as these stands are not proposed for harvest this entry. Therefore, the desired acres for this age class will be attained within 10 years under any alternative.

3.9 Management Indicator Species

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

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

The analysis area for direct and indirect effects on MIS is the Project Area. The Project Area is the units proposed for vegetative management and the associated roads and landings. Representative indicator community types exist or potentially exist in the Project Area for twelve MIS. They are chestnut-sided warbler, Northern goshawk, broad-winged hawk, ruffed grouse, snowshoe hare, Cape May warbler, mourning warbler, eastern bluebird, eastern kingbird, brook trout, American marten, and Canada lynx.

The Analysis Area considered for cumulative effects on MIS population trends are large and vary for each MIS species. The Cumulative effects area for each species is described in the MIS and Population Viability Report, White Mountain National Forest (USFS 2001a). The temporal scope for MIS is ten years past and ten years into the future for reasons discussed in Section 3.8.

Brook trout is discussed in the fisheries report. Canada lynx is discussed in the federal/RFSS Biological Evaluation. Suitable habitat (wetlands) for black duck exists within the analysis area but lies outside of the affected areas. The project is not expected to effect rufouse-sided towhee, gray squirrel and black duck, therefore these MIS species are not addressed further.

Table 28 identifies MIS on the forest and whether the indicator habitat occurs or has potential to occur in the Project Area. Individual species discussions that expand on Table 28 are found in the project files, and are available upon request from the Saco Ranger District.

Affected Environment

Representative indicator community types exist or have potential to exist in the Project Area for thirteen of the twenty-five Management Indicator Species. They are chestnut-sided warbler, Northern goshawk, broad-winged hawk, ruffed grouse, white-tailed deer, snowshoe hare, Cape May warbler, mourning warbler, eastern bluebird, eastern kingbird, brook trout, American marten, and Canada lynx. Habitat requirements and limiting factors are described in reference USFS 2001b. Brook trout is discussed in the fisheries report. Canada lynx is discussed in the federal/RFSS Biological Evaluation.

Table 28 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.

Northern goshawks have a relatively stable population on the WMNF though they are uncommon (USFS 2001b). Regional data indicate that nesting habitat for this species is expanding in the eastern United States as forests mature. 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).

Cape May warbler populations have fluctuated between 1966 and 1979 but are now stable (USFS 2001b). This species has been detected sporadically during eight years of monitoring on the White Mountain National Forest (MacFaden and Capen 2000). Their populations are known to increase in areas infested by spruce budworm (USFS 2001b). Regional trends for northern New England and the Maritimes indicate mourning warbler populations are stable (USFS 2000a). Recent transects across the WMNF in managed and non-managed lands showed a consistent significant decline for mourning warbler during eight years of monitoring. This was at least partly attributed to forest succession within the study area (MacFaden and Capen 2000). Chestnut-sided warblers and mourning warblers are also declining in the region due to reduction in early successional habitat (MacFaden and Capen 2000).

The downward trend of wildlife species associated with early successional habitat is well recognized across New England (Askins et al. 1990, Askins 1993, Smith et al. 1992, Hagan 1993, Litvaitis 1993, Litvaitis et al. 1999, Rosenberg and Hodgman 2000, Thompson et al. 2001). Regrowth of forests on abandoned farmlands and previously harvested areas, intensification of agriculture on remaining farmlands, and increased human development are factors attributed to this decline.

Regeneration-age class for aspen and paper birch stands is very low in this HMU and for the Forest. Mature and overmature paper birch and aspen stands are in decline (WMNF Habitat Trend Analysis 1984–2003). This is due to natural succession to shade tolerant northern hardwood species, reduction in clearcutting, and in HMU 503, is exacerbated by mortality in paper birch resulting from ice storm damage that occurred in 1990 and subsequent secondary agents.

Roughly 85% of the Neotropical migratory birds that breed in the White Mountain National Forest utilize early successional habitat. (DeGraaf et. al. 1992). U.S. Fish and Wildlife Service Breeding Bird Surveys indicate many of these Neotropical birds have declined in numbers in recent years. Several bird species, such as chestnut-sided warbler, only occur in regeneration habitat after 2 years, and begin to decline in these habitats after 10 years (DeGraaf et al. 1992). With no foreseeable project in the future, these birds would begin to decline in the Analysis Area approximately ten years after the harvest.

Spruce/fir habitat has declined on the WMNF below 2,500' (WMNF 2003 Habitat trend analysis 1994 – 2003) however, higher elevation portions of the WMNF provide extensive softwood habitat for species such as snowshoe hare (USFS 2000a). Snowshoe hare are subject to cyclic fluctuations. Forestwide populations were considered stable in the early 1990s and appear to be increasing (USFS 2001b).

Eastern bluebird have been increasing in New England while eastern kingbirds have been decreasing. These are the MIS species for upland shrubby openings.

3.9.1 Direct, Indirect and Cumulative Effects on Management Indicator Species

Alternative 1: No Action

Direct Effects on MIS

This alternative maintains habitat throughout the project area for northern goshawk, Cape May warblers, and American marten, the Management Indicator Species (MIS) for mature and overmature northern hardwoods and mixedwoods, spruce/fir and forests where basal area exceeds 80ft². There would be a decrease in regeneration habitat within a few years, to the detriment of chestnut-sided warbler, ruffed grouse, and snowshoe hare, ruffed grouse and broad-winged hawk.

Cumulative Effects on MIS

MIS associated with mature northern hardwood, mixedwood, spruce/fir, and hemlock habitat (northern goshawk, Cape May warbler, white-tailed deer, American marten) would be favored by this Alternative because it would maintain current habitat and population levels. This habitat type has been increasing on the WMNF. (WMNF Habitat trend analysis 1984-2003, Tables in Project File).

A decrease of aspen and paper birch stands over time under this alternative would reduce habitat for broad-winged hawks and ruffed grouse.

Within HMU 503 and in the adjacent private land, 229 acres of early successional habitat would move into the young age class within a few years, reducing habitat for chestnut-sided warblers and mourning warbles and exacerbating the trend. This Alternative would contribute to the decline of these warblers.

This alternative creates no change in the spruce/fir regeneration habitat for snowshoe hare. Population trends for snowshoe hare are not expected to improve under this alternative.

There would be no change in suitable habitat for eastern bluebirds or eastern kingbirds.

None of the MIS species would have their viability jeopardized under this Alternative. For species associated with disturbance, such as chestnut-sided warblers and mourning warblers, populations are not expected to completely disappear from the Forest. Natural disturbances that create openings, such as windfalls or wetlands created by beavers will continue to provide small amounts of this habitat component across the Forest (USFS 2001b). For all other MIS, No Acton would cause no change in habitat and no change in population trend.

Alternatives 2 and 4

Direct Effects on MIS

The creation of regeneration-age habitat in northern hardwoods, paper birch and aspen would provide habitat for chestnut-sided warbler, the MIS for northern hardwood regeneration, and ruffed grouse, the

MIS for aspen and paper birch stands.

Natural succession of overmature paper birch and aspen habitat to other northern hardwood species would reduce potential nesting habitat for broad-winged hawk. This is somewhat mitigated by the 80 acres of regeneration-age paper birch/aspen habitat that would be created and ultimately grow into nesting habitat for this hawk.

Maintaining mature and overmature northern hardwoods, mixedwoods, and spruce/fir would provide habitat for northern goshawk, Cape May warbler, and American marten, MIS that require mature forested habitat for all or part of their life cycle. The patchiness created by group selection harvesting in mixedwood habitat may benefit snowshoe hare.

Maintenance of permanent wildlife openings would benefit species associated with upland openings such as bluebirds and kingbirds.

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 (USFS 2001). Some individual of a species would be affected during harvest activities, yet these effects are off set by the benefits that would result from the habitat management.

Cumulative Effects on MIS for Alternatives 2 and 4

Alternative 2 and 4 would benefit MIS associated with regeneration-age habitat including chestnut-sided warbler, ruffed grouse, Neotropical migratory birds and all other wildlife that utilize this age class.

This alternative would supply broad-winged hawks with their preferred nesting habitat once the regeneration age paper birch attains maturity.

Maintaining and promoting softwood habitat and regeneration benefits snowshoe hare, Cape May warblers and supports the Canada lynx conservation strategy. Small group openings created in mixedwood habitat would provide cover after a few years. Snowshoe hare also may find an increased browse source in the clearcut and group cuts. No changes to forest wide population levels of snowshoe hare or Cape May warblers are expected.

Uneven-age management maintains a forested habitat now and into the future that would benefit species such as marten and northern goshawks. Species such as black bear and deer would utilize this habitat in addition to many other habitat types. Neo-tropical birds utilize these areas as interior forested habitat.

Even-age management under Alternatives 2 and 4 reduces potential nesting habitat for northern goshawks by 205 acres, which is still more than the desired amount of mature and overmature northern hardwood habitat.

In the short term, American marten, may find that approximately 3% of the habitat is less suitable if the basal area goes below 80ft². However, thinned stands move quickly to more than 80ft². Marten have been known to utilize these areas if they comprise only a portion of their home range (DeGraaf and Yamasaki 2001). Approximately 97% of the Analysis Area would still have suitable habitat after harvest, which exceeds the recommended 80% guideline. If non-managed lands were incorporated into suitable habitat, the percentage of suitable habitat would be even greater.

Implementation of either Alternative is not expected to result in any changes to northern goshawk or American marten populations across the Forest. Management Indicator Species associated with upland openings including bluebirds, kingbirds and mourning warblers would continue to find suitable habitat.

Additional Nordic ski trails may increase human disturbance to some species. Current recreational use in the area is considered low to moderate and is expected to increase in the future.

Meeting current Forest Plan Standards and Guides for habitat diversity would maintain viable populations of wildlife now and in the reasonably foreseeable future (Forest Plan Chapter III 11-14). Habitat would remain stable for some MIS, decrease for some, and increase for others. No species viability would be affected and neither Alternative would alter current population trends on the Forest.

Alternative 3

Direct Effects on MIS

Alternative 3 moves in the direction of the desired future condition but not to the extent as Alternatives 2 or 4. The community types of aspen and paper birch would still be increased and to the same amount as in Alternatives 2 or 4. Therefore the effects to MIS ruffed grouse and broad-winged hawks would be the same as in Alternatives 2 or 4.

Chestnut-sided warblers would benefit from this alternative as 171 acres of regeneration-age habitat is created. This is more than the No Action Alternative but less that Alternatives 2 or 4. Northern goshawks would find nesting habitat reduced by this same number of acres.

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

The maintenance of permanent wildlife openings would benefit species associated with upland fields such as bluebirds and kingbirds, the MIS for upland shrubby openings.

Under this alternative less impacts to mature northern hardwood habitat would occur retaining more potential nesting habitat for northern goshawks. American marten would find more acres with the basal area above 80ft² than under Alternative 2 or 4, but less than Alternative 1.

Cumulative Effects on MIS

Alternative 3 has similar cumulative effects to Alternatives 2 and 4 and would not have a significant effect to MIS species in this HMU or at the Forest-wide scale. Changes in habitat would contribute to the overall habitat available on the White Mountain National Forest and therefore populations of corresponding MIS. None of the MIS species are expected to have its viability jeopardized under this Alternative.

Table 28 **MANAGEMENT INDICATOR SPECIES in the POPPLE MOUNTAIN PROJECT**

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 *Dendroica pensylvanica*	Regeneration (0-9yrs old) Northern Hardwood/Mixedwd	Yes	Suspect	Declining	Declining	Existing habitat of 119 acres would move into young age class and become unsuitable.	Increases suitable habitat by 205 acres.	Increases suitable habitat by 171 acres	Increases suitable habitat by 205 acres
Northern Goshawk *Accipiter gentilis*	Mature and Overmature (60+yrs old) Northern Hardwood/Mixedwd	Yes	Documented	Uncommon but Stable	Mature and overmature hardwood age class increasing in acres	No Change	Eliminates nesting habitat on 205 acres.	Eliminates nesting habitat on 171 acres.	Eliminates nesting habitat on 205 acres.
Broad-winged Hawk *Buteo platyperus*	Mature and Overmature Paper Birch and Aspen (Aspen=40+ yrs; Birch=50+yrs)	Yes	Suspect	Stable	Mature age class decreasing; overmature age class somewhat stable	Decrease of 33 acres of OM paper birch and 20 acres aspen due to old age.	Creation of 68 acres of paper birch habitat and 12 acres aspen habitat for future; but lose 33 acres of PB and 20 of aspen due to old age	Creation of 68 acres of paper birch habitat and 12 acres aspen habitat for future; but lose 33 acres of PB and 20 of aspen due to old age	Creation of 68 acres of paper birch habitat and 12 acres aspen habitat for future; but lose 33 acres of PB and 20 of aspen due to old age
Ruffed Grouse *Bonasa umbellus*	All Ages of Aspen and Regeneration and Young Paper Birch (0-49 yrs)	Yes	Suspect	Declining or uncertain	Paper birch & aspen regen decreasing Young age classes increasing	Decrease of 33 acres of OM paper birch and 20 acres of OM aspen due to old age.	Creation of 68 acres of paper birch habitat and 12 acres aspen habitat for future; but lose 33 acres of PB and 20 of aspen due to old age	Creation of 68 acres of paper birch habitat and 12 acres aspen habitat for future; but lose 33 acres of PB and 20 of aspen due to old age	Creation of 68 acres of paper birch habitat and 12 acres aspen habitat for future; but lose 33 acres of PB and 20 of aspen due to old age
Rufous-sided Towhee *Pipilo erythrophthalmus*	Regeneration of Young Oak or Oak/Pine (0-59yrs)	No/Yes	No	Declining	Decreasing	No habitat present at this time	No change	No change	No change
Gray Squirrel *Sciurus carolinensis*	Mature and Overmature Oak or Oak/Pine (60+ yrs)	No/Yes	No	Stable	Stable	No habitat present at this time	No change	No change	No change

Table 28 **MANAGEMENT INDICATOR SPECIES in the POPPLE MOUNTAIN PROJECT**

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
Northern Junco *Junco hyemalis*	Regeneration and Young Pine (0-69 yrs)	No/Yes	Suspect (does utilize other habitats).	Slight decline	Decreasing	No change	No change	No change	No change
Pine Warbler *Dendroica pinus*	Mature and Overmature Pine (70+ yrs)	No/Yes	No	Increasing	Stable	No change	No change	No change	No change
White–tailed Deer *Odocoileus virginianus*	All Ages Hemlock during deep-snow winters.	No/Yes	Suspect (does utilize other habitats).	Stable	Stable to decreasing	No change	Maintains/enhances 25 acres of hemlock	Maintains/enhances 25 acres of hemlock	Maintains/enhances 25 acres of hemlock
Snowshoe Hare *Lepus americanus*	Regeneration of Young Spruce, Spruce/Fir and Fir (0-39 yrs)	No/Yes	Suspect: have seen evidence of presence in analysis area.	Stable to increasing	Decreasing	No change	Initiate conversion to S/F on 80 acres.	Initiate conversion to S/F on 34 acres.	Initiate conversion to S/F on 80 acres.
Cape May Warbler *Dendroica tigrina*	Mature and Overmature Spruce, Spruce/Fir and Fir (40+yrs)	Yes	Yes, 1 individual reported on transect in 1997	Stable/fluctuate with spruce budworm outbreaks	Increasing	No change	Initiate conversion to S/F on 80 acres.	Initiate conversion to S/F on 34 acres.	Initiate conversion to S/F on 80 acres.
Eastern Kingbird *Tyrannus tyrannus* **Eastern Bluebird** *Sialia sialis*	Upland Openings – Grass, Forb, Orchard	Yes, but may not be of sufficient size	No	Declining Increasing	Stable to decreasing	No change	Maintain/enhance via invasive treatment on 4 acres	Maintain/enhance via invasive treatment on 3 acres	Maintain/enhance via invasive treatment on 4 acres
Mourning Warbler *Oporornis philadelphia*	Upland Openings-Shrub; Forest Ecotone	Yes	Suspect	Stable	Decreasing	No change	Maintains/enhances upland openings by 4 acres; increases habitat by 205 acres	Maintains/enhances upland openings by 3 acres; increases habitat by 171 acres	Maintains/enhances upland openings by 4 acres; increases habitat by 205 acres

Table 28 **MANAGEMENT INDICATOR SPECIES in the POPPLE MOUNTAIN PROJECT**

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
Black Duck *Anas rubripes*	Wetlands and Water	Yes	Suspect	Declining	Fluctuates with beaver activity	No change	Maintain existing habitat	Maintain existing habitat	Maintain existing habitat
Brook Trout *Salvelinus fontinalis*	Permanent Lakes, Ponds, Streams	Yes	Yes	Stable	Stable	No change	Improve habitat on approx 2 miles of Meserve Brook	Improve habitat on approx 2 miles of Meserve Brook	Improve habitat on approx 2 miles of Meserve Brook
Peregrine Falcon *Falco peregrinus*	Cliffs and Talus	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A
American Marten *Martes americana*	At least 80% of their home range must have forest that is 30+' tall with at least 80 ft² of basal area	Yes	Suspect	Increasing	Increasing	No change	Potential to reduce habitat suitability by approximately 3%	Potential to reduce habitat suitability by approximately 2%	Potential to reduce habitat suitability by approximately 3%
Osprey *Pandion haliaetus*	Large water bodies	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A
Common Loon *Gavia immer*	Large water bodies	No/No	No	Increasing	Stable	N/A	N/A	N/A	N/A
Sunapee Trout *Salvelinus aureolus*	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 *Potentilla robbinsiana*	Alpine	No/No	No	Stable/Increasing; Delisted in 2002	Stable	N/A	N/A	N/A	N/A
Canada Lynx *Lynx canadensis*	Dense softwoods	Yes, suitable habitat in Units 8, 12, 13, 18, 22, 23,30, 33, 38, 39, 40	No	No presence recorded in last 2 decades	Increasing	No change	Initiate conversion to S/F on 80 acres. Gain of 2.3 miles of over the snow trails	Initiate conversion to S/F on 34 acres. Gain of 2.3 miles of over the snow trails	Initiate conversion to S/F on 80 acres. Gain of 2.4 miles of over the snow trails

Table 28 **MANAGEMENT INDICATOR SPECIES**

in the

POPPLE MOUNTAIN PROJECT

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)** *Catharus bicknelli* **Blackpoll Warbler** *Dendroica striata*	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.

3.10 Other Species of Concern

The WMNF conducted a **Species Viability Evaluation** (SVE) in 2002 for plant and animal species that may have potential viability concerns on the Forest (USFS 2005). Assessments are made as to whether the proposed project would increase the viability concern of any of these species. Through the SVE process, 61 **"Species of Concern",** were identified as occurring on the National Forest and whose viability within their range or within the National Forest is a concern now or within the next 20 years or whose viability might become a concern depending on National Forest management (see Appendix A)**.**

After a review of the habitat required by these species and surveys conducted in the Project Area, the species listed below were determined to potentially exist or have suitable habitat in the project area. **The direct, indirect, and cumulative effects Analysis Area and temporal scope for habitat for species of viability concern** are the same as described for Wildlife, section 3.8.

Bay-breasted warbler (*Dendroica castanea)*

This bird breeds in boreal forests and mature northern coniferous or mixed forests, especially balsam fir up to 4000'. It primarily uses closed canopy forest, but may use small forest openings or edges adjacent to small clearings, fencerows, highways, bogs or streams. This species is occasionally found in mixed forest adjacent to ponds.

Limiting factors may be availability of large unbroken tracts of mature forest, spruce/budworm spraying that reduces the prey base and may also affect the health of the birds, and deforestation and subsequent development of its wintering grounds. In New Hampshire, the bay-breasted warbler is probably limited most by the availability of mature spruce-fir forest habitat and lack of recent spruce-budworm outbreaks. The WMNF has management responsibility for much of the available habitat in NH, and a small portion of the Maine habitat (USFS 2005).

Suitable habitat for bay-breasted warblers exists within the Analysis area however the better areas are primarily at higher elevations and outside the project area. Marginal habitat currently exists in units 8, 15, 19, 22, 33 and 39.

The No Action alternative would have no effect on bay-breasted warblers. Direct effects from the action alternatives could be disturbance or death should individuals exist in harvest areas during implementation. The probability of bay-breasted warblers existing in the harvested areas is low, because the habitat is currently considered marginal. In addition, units containing suitable habitat are proposed for fall/winter harvest. Bay-breasted warblers depart on their southern migration during mid-August to mid-September (1994 Foss). Little if any harvest in these units would occur while bay-breasted warblers were on the WMNF.

Indirect effects in from Alternatives 2 and 4 would be an improvement to 80 acres of habitat in those units that promote spruce/fir habitat (Units 8, 15, 19, 22, and 39). Alternative 3 would improve 34 acres of habitat in Units 15, and 39 with no change occurring in the other softwood/mixedwood units.

Breeding Bird Survey data (1980-1994) showed a continent-wide 12.2% decrease for this species. However surveys show that the population increases and decreases depending on outbreaks of spruce

budworm. WMNF breeding bird surveys showed a mean number of individuals per 15 point transect of 2 in 1997; the mean was less than 1 in 1992-96 and 1998-99 (USFS 2005).

Habitat favored by bay-breasted warbler would be maintained in HMU 503 in the No Action Alternative enhanced equally under Alternatives 2 and 4 and enhanced to a lesser degree in Alternative 3. Mature and overmature mixedwood and spruce/fir has been increasing on the Forest (USFS 2003). At this time, no timber harvesting other than the proposed Popple project is planned for this area for the next 10 years.

Brown's Ameletid Mayfly *(Ameletus browni)*

This species is known from Quebec, Maine, Vermont, and Pennsylvania. Most records have been from Baxter State Park in Maine. One specimen was collected on July 17, 2004 from the Ellis River, just south of the Pinkham Notch Visitor Center (USFS 2005).

This species has been found in first order headwater streams where the drainage is less than <10 $mi^{2.}$ It appears to prefer riffles in first order streams where bank-full width is less than 10 feet. Cold, well oxygenated streams at or near O_2 saturation with relatively high pH (6.6-7.3) are preferred (USFS 2005).

Nymphs have been collected from April to June primarily from erosional areas. Adults were located in June. Expectations are this species has a one year lifespan based on other species of *Ameletus.* It is known as a scavenger/detritivore meaning it forages for food on dead and dying material. Threats to this species are unknown (USFS 2005). .

There would be no direct impacts from the No Action Alternative. Under any of the Action Alternatives Forest plan standards and guidelines would protect streams during harvest activity and road construction from reducing the canopy cover, removing riparian vegetation, and sedimentation. The stream and watershed work proposed in all action alternatives may increase erosional areas during the time of implementation, however the overall goal of these watershed projects is to reduce the areas of erosion on these banks. This may have an indirect negative effect on this mayfly.

Third Ameletid Mayfly *(Ameletus tertius)*

The known range for this mayfly is from southeastern Canada to the northeastern United States. It has been found in first through forth order perennial streams with a boulder/cobble/sand substrate. In larger rivers and streams it is found on submerged grasses and detritus along margins of riffles and transitional areas. It also appears to prefer streams with relatively high pH (6.6-8.4) (USFS 2005).

A stream gradient of 2-4% is preferred along with a canopy closure of 50 to 70%. This puts headwater streams of the first order with consistent flows as preferred habitat. It is known as a scavenger/detritivore meaning it forages for food on dead and dying material (USFS 2005).

Larval dispersal is limited by drainage systems, as they are entirely aquatic. The adults live only a few days and remain close to their emergence sites, as gravid females tend to be weak fliers and do not disperse well. The population trend is unknown however the species is likely stable in Maine as the streams in which it has been located are heavily protected (USFS 2005).

Nymphs of *A. tertius* depend on natural ice and water-scouring erosional areas. Threats to this species are unknown however there is some concern that alternations of small cold headwater streams could have an effect (USFS 2005).

One specimen collected on July 17, 2004 from the Ellis River, just south of the Pinkham Notch Visitor Center. Another specimen was collected from an unnamed branch on east of Peabody River 1 mile north of Pinkham Notch.

There would be no direct impacts from the No Action Alternative. Under any of the Action Alternatives Forest plan standards and guidelines would protect streams during harvest activity and road construction from reducing the canopy cover, removing riparian vegetation, and sedimentation. All of the project sites may see an increase in erosion areas during the time of implementation, however the overall goal of these watershed projects is to reduce the areas of erosion on these banks. This may have an indirect negative effect on this mayfly.

American marten *(Martes americana)*

The WMNF is at the southern edge of the marten's range. Marten occurrences are not tracked in Maine, however the southern limit is at about the same latitude as in New Hampshire. In the northeastern U.S., marten are stand generalists. They occur in large numbers in coniferous, mixed coniferous-deciduous, and deciduous forests, including forests damaged by spruce budworms or managed for fiber. Recent research has shown that physical structure at the stand level, which increases access to prey and avoidance of predators, influences suitability of habitat for marten more than forest age or species composition alone. In Maine, marten generally do not use forests that are less than 30-40 ft tall or with a basal area of less than 80 ft^2/acre BA. Marten do not tolerate a lot of patchiness and generally avoid clearcuts, though they have been observed foraging for raspberries in them. Ideally, at least 80% of a marten's home range (2-2.8 km2 for females; 5-10 km2 for males) should meet these criteria to be suitable (USFS 2005).

In the winter, marten use subnivean resting sites and therefore may only occur in regions with heavy snowfall. Coarse woody debris on the forest floor and dense clusters of small diameter live conifer stems provide subnivean access points to prey and winter resting places. Den sites typically are in large (>15 in/40 cm dbh) hollow trees or logs and subterranean dens. Limiting factors appear to be snow depth, structural complexity such as large hollow trees and other coarse woody material, competition with fisher, and trapping (USFS 2005).

American marten are slowly increasing on the WMNF, particularly in the northern section (USFS 2001b). American marten were reintroduced to the WMNF in the mid-1970s (USFS 2001b).

The No Action Alternative would have no effect on marten.

Any of the action alternatives may have direct effects of disturbance or possibly death to marten should they exist in the harvest units during implementation. Death is unlikely as marten forage over their entire home range every day (USFS 2005). The act of being so mobile during harvest implementation would give them the advantage to avoid direct effects.

Indirect effects of Alternative 2 or 4 would be creation of the greatest amount of clearcuts (205 acres), which marten tend to avoid but on occasions utilize. The non-clearcut units all retain 80 ft^2/acre BA. These alternatives would increase softwood habitat on 80 acres.

Alternative 3 would also create clearcuts but to a lesser amount (171 acres) than Alternative 2 or 4. This alternative also increases softwood habitat but to a lesser extent (34 acres) than Alternative 2 or 4 and maintains 80 ft^2/acre BA on all other harvest units.

The action alternatives maintain mature and overmature northern hardwoods, mixedwoods, and spruce/fir. Past harvests have created the mix of habitat that exists today. The No Action Alternative would not add to these past actions, however any of the Action Alternatives would add to past harvest actions. None of the Action Alternatives is expected to increase the viability concern for this species on the White Mountain National Forest.

The Nordic skiing recreation that occurs in this area is relatively high. More than likely the compacted trails created by this activity allow for fisher, bobcat and coyotes access to the deeper snow areas where marten usually have an advantage. The high winter recreational use of this area may have negative effects on marten fully inhabiting this area.

Pickering's reed bent-grass *(Calamgrostis pickeringii)*

Pickering's reed bent-grass is a perennial graminoid in the grass family (Poaceae) that flowers from early to late summer. This grass ranges from Ontario east to Labrador, south along the east coast to New Jersey, including New York, Massachusetts, New Hampshire, and Maine.

This species is found in a wide range of habitats but is concentrated in higher elevations and along the Maine coast. It also uses dry-bank and dry-alpine habitat, finds talus slopes favorable, may be found in ditches, along the borders of dry, open woods, in floodplains, meadows, ice and flood scoured stream channels, beaver meadows, and fens. Its preference is for wetness; in particular, alpine and sub-alpine habitats in New England where it is broadly located in the boreal forest in acidic soils. This species thrives in sphagnous peatlands and is one of the few grasses that grows in open mats of *Sphagnum.* It avoids forested habitats but seeks out wet openings and at the edges of streams, wetlands, etc (USFS 2005). The probability of this species occuring within the project area is extremely low even though habitat appears present in Grey's Field, the Doliff Field and some ditches. Plant surveys did not indicate presence in the project area. Limiting factors include loss of habitat from destruction of wetlands, trampling from increased number of hiking trails and exclusion via invasive plants (USFS 2005).

The No Action alternative would have no effect on Pickering's reed bent-grass. None of the action alternatives are expected to impact individual stems of Pickering's reed bent-grass as it does not exist in Grey's Field and no skidding, roads, etc would occur there. The possibility of this plant growing in a roadside ditch in the project area does exist, but the probability is extremely low. Widening or clearing of ditches may improve the suitability of these microhabitats for this species.

The cumulative affects Analysis Area and temporal scope for wildlife habitat is the same as described under Alternative 1. Within North America this species is considered stable to increasing (USFS 2005). The population trend within New England is unknown. Standards and guidelines exist in the Forest Plan that protect alpine and wetland habitat.

Implementation of any action alternative may impact this plant, though the probability is very low. All action alternatives maintain mature and overmature northern hardwoods, mixedwoods, and spruce/fir. Past harvests have created the mix of habitat that exists today. The No Action Alternative would not add to these past actions, however any of the Action Alternatives would add to past harvest actions. At this time, no timber harvesting other than the proposed Popple project is planned for this area for the next 10 years. Past harvests may have created suitable habitat. The roadside ditches along all of the existing roadways are potential sites however this plant was not observed during surveys. These roads are proposed for pre-haul work (mowing, brushing, grading, reshaping, culverts, etc). This action would most likely eliminate individuals if they were existing in the ditchline. This road work is necessary to implement the project that also creates openings that are suitable habitat for this species. Pre-work survey of the roadside ditches for this species would reduce or eliminate the small probability of eliminating this species from road work.

Autumn Coralroot *(Corallorhiza odontorhiza)*

Autumn coralroot is an orchid at the northern and eastern edge of it range in New Hampshire. It is a non-showy, fall flowering species with no foliage leaves that may be overlooked (USFS 2005). The SVE panel indicated they did not believe this species would occur on the WMNF as the Forest's southern boundary is at the northern edge of its range.

Corallorhiza odontorhiza has the unique habit of sending up flower stalks only once every few years. It has been found one year at a certain site, and not again at the same location for the next two or three years (USFS 2005). Autumn coralroot can be found in a variety of forested upland habitats, though these woods are typically mesic and only occasionally dry.

Literature regarding this plant indicates there is no consistency on the habitat it prefers. Reports vary from woodlands, edges, and dappled shade as suitable habitats, and that it can grow in semi-shade or no shade to it has a good ability to colonize disturbed sites to ground disturbance, sedimentation, erosion, road-widening, and timber harvesting may be detrimental (USFS 2005). There is no known population trend for this species in northern New England.

The single known occurrence on the WMNF is in a moist, selectively logged northern hardwood stand at 900-1000' elevation (USFS 2005). This occurrence was discovered October 2004 and is the first and only record of C. odontorhiza on the WMNF. The No Action Alternative would have no direct impacts to this species. It is not known whether there would be indirect impacts as the literature is not clear on whether this plant prefers a high degree of shade and little to no disturbance or some sunlight and a degree of disturbance.

The Action Alternatives may have direct impacts to autumn coralroot. Timber harvest, road construction, and trail construction have the potential to affect individuals of this plant if in affected areas. Winter harvest may mitigate some effects if there is sufficient snow-cover. This would indicate Alternative 2 may have the least potential impacts of the Action Alternatives.

Implementation of any action alternative may impact this plant, though the probability is very low. The probability of this species occurring within the project area is extremely low even though habitat may be present. If it is present, this orchid may benefit from timber harvest, particularly where a good portion

of the canopy remains, however individuals may be negatively impacted. There is not enough information known about this plant to make a clear determination.

Northern wild comfry *(Cynoglossum virginianum var. boreale)*

Northern wild comfrey is an herbaceous, long-lived perennial in the borage family (Boraginaceae) that flowers from May to June in the Northeast, and fruits from July to August. This species produces four strongly bristled, animal-dispersed nutlets that tend not to persist in the soil seed bank. Northern wild comfrey grows in mesic, often calcareous soils of rich upland forests (often red oak northern hardwoods). It prefers areas where the canopy has been disturbed, allowing light to penetrate the understory, such as in tree fall gaps, recent burned areas, open edges, paths, and cliffs (USFS 2005). In Maine it can be found on alluvial sandy soils along roadsides, in open woods and thickets, and on sites associates with logging such as in clear cuts and along skid trails.

Northern wild comfrey is a disturbance-tolerant species that will likely respond well to any disturbance (either natural or man-made) that creates a canopy opening, such as fire, ice or wind storms, and timber harvesting (USFS 2005). However, large-scale habitat conversions will negatively affect this species, including, potentially succession. Given its affinity for disturbed habitats, this species is also threatened by competition from non-native invasive species.

Only one extant population exists in New Hampshire in Coos County; however, historic populations occur in Carroll and Grafton Counties near WMNF land. In Maine, extant populations occur in Aroostock, Franklin, Piscataquis, Somerset, and Oxford Counties. No known populations exist on the WMNF, but this is likely due to lack of inventories, as the Forest is central to the comfrey's range in NH (USFS 2003).

Based on occurrence data *Cynoglossum virginianum* var. *boreale* is declining in NH and VT as almost all known occurrences are historic. This species moves around, and just because it has disappeared at one site doesn't mean that it won't come back or appear somewhere else (USFS panel 2005). The probability of this species occuring within the project area is extremely low even though habitat appears present.

The No Action alternative would allow current suitable habitat to succeed into habitat not suitable for northern wild comfry. The action alternatives may enhance habitat within the HMU for this species as all increase light to the forest floor in varying degrees. Appartently any disturbance that creates a canopy opening would be beneficial to this species (USFS 2005). Therefore, Alternative 2 or 4 would conceivably provide more suitable habitat than Alternative 3 as it creates more clearcut acres and disturbs more ground.

All of the action alternatives would continue to maintain suitable habitat for this species in HMU 503 by creating new disturbed areas.

Prairie Goldenrod (***Oligoneuron album)***

Prairie goldenrod is an herbaceous perennial in the Aster family (Asteraceae) that flowers from June to September and produces wind-dispersed seeds. This species grows on open ledges and outcrops, in meadows and fields, and along roads. It seems to prefer dry, full sun conditions, but can grow in shaded

situations as well. In New Hampshire, all known occurrences are growing on calcareous soils or bedrock (USFS 2005).

Succession and increased shade could threaten this species, especially in New Hampshire where one large population is dependent on annual mowing to maintain an open habitat. Recreational impacts such as trampling and rock climbing are also a potential threat to existing populations.

Extant populations exist in Grafton and Sullivan Counties, the latter of which is a recent discovery that is thought to be a non-native introduction from a planted seed mix from the Midwest. Both Grafton County populations, one adjacent to the Appalachian Trail, are on cliffs thought to be managed by the White Mountain National Forest (USFS 2005). No historical or extant populations are known from Maine, and no populations were found in the Project Area.

The probability of prairie goldenrod being present in the Project Area is extremely low as no calcareous soils exist. The presence of roadside ditches may provide marginal habitat.

The No Action alternative would maintain suitable habitat as it currently exists. Mowing of the wildlife openings would continue under this alternative so these are not expected to succeed into forested habitat. The action alternatives would cause disturbance by creating new clearcuts and use the associated roads. Effects of any action alternative would be similar to that described for northern wild comfry as both are associated with open, sunlit areas and some disturbance.

All of the action alternatives would continue to maintain suitable habitat for this species in HMU 503 by creating new disturbed areas.

Ciliated Aster (*Symphyotrichum ciliolatum)*

Ciliated aster is an herbaceous perennial in the Aster family (Asteraceae) that flowers from August to September, and produces wind-dispersed seeds in the fall. This species seems to be governed by disturbance as it typically occurs in small to large openings in dry northern hardwood or mixed-hardwood stands, as well as in early successional openings and along roadsides (USFS 2005). In sandy pine barrens in Ottawa, Canada, it grows in a community that is maintained by fire; however, there is no specific information available on the fire ecology of this species.

Given the aster's affinity for forest openings, succession is likely the primary limiting factor to its establishment and growth. Inadequate disturbance regimes that include fire, wind, or ice may contribute to population declines in this species.

While there are no current occurrences on the Forest, historic populations are reported from Carroll, Coos, Grafton, and Merrimack Counties in New Hampshire and all Counties in Maine except for Somerset, Oxford, Knox, Lincoln, and York. Past harvests created suitable habitat however this species has not yet been documented in the area and was not found during mid-summer field surveys.

The probability of this species occuring within the project area is extremely low even though habitat appears present. Past harvests may have created suitable habitat. The roadside ditches along all of the existing roadways are potential sites however this plant was not observed during surveys. These roads

are proposed for pre-haul work (mowing, brushing, grading, reshaping, culverts, etc). This action would most likely eliminate individuals if they were existing in the ditchline. This road work is necessary to implement the project that also creates openings that are suitable habitat for this species. Pre-work survey of the roadside ditches for this species would reduce or eliminate the small probability of eliminating this species from road work.

Any of the action alternatives would create new suitable habitat where ground is disturbed and canopy is removed.

Table 29. *Effects determination for species with potential viability concerns on the Forest (not including Federally or Regionally (R9) listed species, which have been analyzed separately in the biological evaluation*).

Species with Viability Concerns	Effects Determination
Bay-breasted Warbler (*Dendroica castanea)*	The proposed action may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability for these nine species.
Brown's Ameletid Mayfly (*Ameletus browni)*	
Third Ameletid Mayfly (*Ameletus tertius)*	
Autumn Coralroot (*Corallorhiza odontorhiza)*	
American Marten *(Martes Americana)*	
Pickering's Reed Bent-grass (*Calamagrostis pickeringii)*	
Northern wild comfrey (*Cynoglossum virginianum* var. *boreale*)	
Prairie goldenrod (*Solidago calcicola*)	
Ciliated aster (*Symphyotrichum ciliolatum*)	

3.10.1 Cumulative Effects on Other Species of Concern

The No Action Alternative would have no effect on any of the species of concern. The probability of any of the species of concern existing in the Project Area is low. Past actions within this analysis area have created what habitat exists today. The Action Alternatives may allow for habitat for several Species of Concern to become more suitable. Disturbance from timber and other resource projects such as watershed improvements, invasive eradication, trail construction, etc. may also allow for suitable habitat to be created for several of these species. On the other hand, actions such as road maintenance may eliminate some individual plants should they exist, but create more suitable habitat for the future. The wastershed projects may have an overall negative impact on two mayflies listed.

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

Affected Environment for TEPS, RFSS and Rare Communities

A Biological Evaluation (BE) for Federally Threatened, Endangered, and Proposed (TEP), and Regional Forester Sensitive Species (RFSS) was completed on April 5, 2005 for all Alternatives proposed for the Popple Project (see BE, Project Planning Record). US Fish and Wildlife Service concurrence for this project was received on April 27, 2005.

Based on a pre-field review of all available information, it was the Forest Service Biologist's determination that potential habitat may occur within the Project Area for one Federally Endangered Species (Indiana bat), and four Regional Forester Sensitive Species (eastern small-footed myotis, northern bog lemming, Bailey's sedge and American ginseng). The area could provide adequate habitat for Canada lynx, although this species is not currently considered to be present on the White Mountain National Forest.

The Analysis Area for direct and indirect effects to TEPS/RFSS is the Project Area, including stands proposed for treatment and the connected actions (roads, landings, Nordic Trails, invasive plant treatment and watershed improvement). **The cumulative effects analysis area** for TEPS/RFSS is the WMNF for some species, and the lands within HMU 503 and adjacent private land abutting HMU 503 for other species, because their respecitve analysis areas vary according to species. The temporal scale for Indiana bat is 5 years in the past when the USFWS developed Terms and Conditions to minimize take (USFWS 2000) and ten years in the future as the benefits of regeneration age class for some wildlife species diminish after 10 years. For eastern small-footed myotis, northern bog lemming, Bailey's sedge and American ginseng the temporal scale is ten years in the past and ten years in the future because the benefits of regeneration age class diminish for some wildlife species after 10 years.

The BE details direct and indirect effects to the species mentioned above. The expected adverse or beneficial effects to the Indiana bat were determined to be small and "discountable" (defined as effects that are extremely unlikely to occur). There may be minimal direct and indirect effects to eastern small-footed myotis foraging and roosting habitat. There is a slight potential for the Action Alternatives to temporarily displace northern bog lemmings, although the potential for presence of this species in the Project Area is low. There may be minimal direct and indirect effects to Bailey's sedge if it does exist in the project area but has not yet been detected. American ginseng is known to exist in the Project Area and known populations have been avoided. There may be minimal direct and indirect effects to this species if it also exists in other areas but has not yet been detected.

Canada Lynx Habitat

Conservation Assessment and Strategy

The Canada Lynx Conservation Assessment and Strategy (CLCAS) describes a process to define suitable, unsuitable, and non-lynx habitat and Lynx Assessment Units (LAU) on federal lands. Conservation measures were described for suitable and unsuitable lynx habitat within an LAU (Ruediger et al. 2000). The application of LAU mapping criteria, factors used to define suitable and unsuitable lynx habitat and application of conservation measures on the White Mountain National Forest, including Core Areas for Nordic Ski Areas are discussed in USDA Forest Service 2000d and 2000e.

Vegetative Management

All Alternatives are consistent with the conservation measures outlined in the Canada Lynx Conservation Strategy and Assessment for Vegetative Management (BE, Project Planning Record).

Recreation Management

Neither Alternative 2 nor Alternative 3 are consistent with the conservation measures outlined in the Canada Lynx Conservation Strategy and Assessment for Recreation Management (BE, Project Planning Record). Both Alternatives propose a net gain of over-the-snow routes in lynx habitat. Alternative 4 is consistent with the CLCSA as proposed because Nordic trail #3 is within Jackson Ski Touring Foundation's (JSTF) core exclusion area (see below).

CLCAS Direction:

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 Jackson Ski Touring Foundation Trails are designated ski trails and has also designated a Core Area for portions of this trail system. Trails proposed within a designated Core Area are exempt from meeting requirements of the CLCSA.

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.

Avalanche Brook trail relocation is in non-lynx habitat, and portions of Nordic Trail #2 and #3 are within suitable lynx habitat. However, trail #3 lies within the Core Area designated for JSTF, where the no net gain in over the snow routes is exempt.

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 under Vegetative Management. Both Alternative 2 and 3 violate the CLCAS standard of 'no net gain' under Recreation Management. Alternative 4 is consistent with the CLCAS standard of 'no net gain' under Recreation Management because the only proposed trail lies within the Core Area designated for the Jackson Ski Touring Foundation's network of trails.**

Indiana Bat Habitat

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), as amended in the Forest Plan (USDA Forest Service 2001c). The Terms and Conditions are divided into those that are applicable throughout the year, and those that are applicable during the non-hibernation season (May 15 through August 30). **All**

Alternatives are consistent with the Terms and Conditions outlined in the Biological Opinion (USFWS 2000), as amended in the Forest Plan (USDA Forest Service 2001c) (BE, Project Planning Record).

3.11.1 Effects Determination and Rationale For TEPS and RFSS

Canada Lynx

All Alternatives will have *no effect* on Canada lynx since this species is currently not considered to be present on the White Mountain National Forest. Should lynx reoccupy the Forest, consultation with the USFWS is required under Section 7 of the Endangered Species Act.

Rationale

1) The lynx is not considered present based on surveys conducted over the past two decades for this species.

Indiana Bat

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

Rationale

1) Located at the northern edge of the Indiana bat's summer range, the habitat in the Project Area is mature northern hardwoods, mixedwood, and softwood, with canopy closure often exceeding 80%. Indiana bats prefer roosting and foraging canopy closure ranging from 50% to 70%. The likelihood of Indiana bats occurring in the Project Area is very low.

2) Forest Plan Standards and Guidelines (USFS 1986a) maintain adequate habitat for Indiana bat by providing direction to maintain a diversity of habitat conditions well distributed across the Forest (III-13), reserve large wildlife trees in areas managed for vegetation, retain standing dead trees where possible (III-15), and maintain riparian habitats (III-18). Implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000), as incorporated in the Forest Plan Amendment (USFS 2001c), should also maintain habitat components needed by Indiana bat and minimize the potential for incidental take of an Indiana bat.

3.11.2 Regional Forester Sensitive Species (RFSS)

Eastern Small-Footed Myotis (Bat)

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

Rationale

1) Most literature indicates that eastern small-footed myotis roost under rocks on hillsides and open ridges, in cracks and crevices in rocky outcrops and on talus slopes, as well as in buildings (Erdle and Hobson 2001). The likelihood that individual bats are roosting in trees in the Project Area is considered low.

2) Forest Plan Standards and Guidelines (USFS 1986a) maintain adequate habitat for eastern small-footed myotis by providing direction to maintain a diversity of habitat conditions well distributed across the Forest (III-13), reserve large wildlife trees in areas managed for vegetation, retain standing dead trees where possible (III-15), and maintain riparian habitats (III-18). Implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000a) as incorporated in the Forest Plan amendment (USFS 2001c), should also maintain habitat components needed by eastern small-footed myotis.

Northern Bog Lemming

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

Rationale

1) Northern bog lemmings are rare in New England. The likelihood of an individual occurring in the Project Area is considered low.

2) Identifiable riparian habitat or wet areas are usually excluded from harvest units minimizing the risk of disturbing an individual animal or associated habitat.

3) Forest Plan Standards and Guidelines maintain a diversity of habitats (III, 12-13) and protect riparian habitats (III-19). It is expected these would minimize negative effects and provide adequate habitat for northern bog lemming.

Bailey's Sedge

The No Action Alternative would have *no impact* on Bailey's sedge. Any of the Action Alternatives *may impact individual stems of Bailey's sedge, but would not likely cause a trend to federal listing or loss of viability*.

Rationale
1) Bailey's sedge is on the northern edge of its range in New England and may be naturally rare here being suitable habitat appears plentiful.
2) Identifiable wet seepy areas are usually excluded from harvest units minimizing the risk of disturbing individual plants or associated habitat.
3) Forest Plan Standards and Guidelines maintain a diversity of habitats (III, 12-13) and protect riparian habitats (III-19). It is expected these would minimize negative effects and provide adequate habitat for Bailey's sedge.

American Ginseng

The No Action Alternative would have *no impact* on American Ginseng. Any of the Action Alternatives *may impact individual stems of American Ginseng, but would not likely cause a trend to federal listing or loss of viability*.

Rationale
1) Surveys have been conducted and areas supporting American Ginseng have been excluded from harvest or associated actions.
2) Surveys would occur in Unit 41 prior to harvest as this was not surveyed during appropriate time last field season.
3) Forest Plan Standards and Guidelines maintain a diversity of habitats (Forest Plan III, 12-13) and protect highly enriched and wet areas (Forest Plan III-19).

3.12 Fisheries

Affected Environment

Miles Brook and Meserve Brook are the main sub-watersheds of the Ellis River watershed and the analysis area (HMU 503). Both brooks flow into the Ellis River. There are several unnamed tributaries and beaver flowages within the Analysis Area. A minor area of the project drains into the Otis Brook watershed. See the Affected Environment for Water for a more detailed description of the area.

Meserve Brook and Miles Brook were inventoried for stream habitat conditions in 1992 using the Hankin and Reeves method. Both streams were found to be low in pool to riffle ratio and large woody debris.

New Hampshire Fish and Game stocking records indicate both Miles and Meserve Brooks were stocked with brook trout (*Salvelinus fontinalis*) in the mid 1900's but no stocking has occurred since the mid 1970's (NHFG 1990-2004). Ellis River has been stocked annually with brook trout and in 1985 also with brown trout (*Salmo trutta*), but no brown trout have been stocked since.

The Jackson Water Precinct dams, particularly the upper dam is more than likely preventing trout from moving through the entire Meserve Brook watershed. Trout currently exist above and below these dams but the upper population is apparently segregated from the lower population.

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

Historical records indicate the lower area of Meserve Brook has experienced many different land activities prior to becoming National Forest land. The area was once a logging camp complete with horse stables, a gravel pit provided gravel for logging purposes, there are several old dump sites

The fishery resource has been sustained over the years in the Miles Brook watershed primarily through natural processes, though logging has occurred in the area for most of the last 150 years.

Historically, Brook trout were probably most impacted when the area near the confluence of Meserve Brook was first settled. The dams placed on Meserve Brook would have stopped trout migration up and downstream. The use of this lower area as a source of gravel, dump, pasture, apple orchard, and logging camp have caused much change in this lower portion of Meserve Brook. 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, the Ellis River, Miles and Meserve Brook provide a recreational fishery. Current conditions are a result of past actions. Canopy cover currently exists over these streams however there is a lack of large wood in the stream itself as well as in the riparian areas.

Factors that are important to maintain quality habitat for brook trout, a Management Indicator Species, 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 and aquatic resources in these streams is to meet standards and guidelines identified in the Forest Plan for water quality, and for riparian, fisheries, and aquatic habitat (Forest Plan III, 15 a-d, 16, 19, 20).

3.12.1 Direct and Indirect Effects

The Analysis Area for direct and indirect effects on fisheries are the streams within HMU 503 because all proposed activities are within these watersheds.

Alternative 1: No Action

There would be no direct effects on brook trout or aquatic habitat from the No Action Alternative. Negative indirect effects may continue to occur if enhancement work is not implemented in upper Meserve Brook or if streambanks are not stabilized below the Jackson Water Precinct dams.

Alternative 2: The Proposed Action

All proposed harvest areas near perennial streams would have a 25 foot no-cut buffer zone. This would mitigate the potential for sedimentation that may have a negative effect on trout. Logging equipment would not enter stream courses thereby eliminating direct effect to trout or aquatic organisms. Harvest prescriptions near riparian areas would maintain and promote healthy trees providing canopy cover, future large woody debris recruitment, and bank stabilization.

Expectations are that the proposed watershed improvement proposals would improve stability in the watershed under all Action Alternatives in both upper and Lower Meserve Brook and would improve habitat for brook trout. Logs cause scouring that forms pools. Pools provide resting and foraging areas for brook trout. Logs also collect debris and increase the nutrient level of the stream. This would increase the prey base of macroinvertebrates for brook trout. There may be a short increase in sedimentation during implementation however experience from other stream projects done on the WMNF have indicated this is temporary and normal conditions return within a few hours (Milot, Personal Communication).

The Forest Service is working with Jackson Water Precinct to improve watershed conditions and increase streambank stability at and below these dams. Correcting this situation may cause a temporary increase in sedimentation. This would have a minimal impact on brook trout because it would be implemented between April and October when trout eggs are not incubating.

Of the proposed Nordic ski trails, neither Avalanche Brook Trail relocation nor Proposed #2 trail are near trout streams. Therefore no effect to fisheries is expected from the addition of either trail under Alternative 2. Proposed trail #3 parallels Meserve Brook for close to ¾ of a mile. There are several hundred feet between the proposed trail and Meserve Brook, therefore no negative effects from sedimentation, decrease of canopy cover, etc. is expected.

Roads currently within the project area are distanced from perennial streams. Temporary roads and skid roads that would cross perennial brooks would have temporary abutments comprised of native material (logs) or no abutments where the stringers reach completely across the channel. Measures would be taken during installation to prevent sedimentation. Bridge placement would only occur between May and October to further avoid potential sedimentation during brook trout egg deposition. Temporary bridges, abutments and fill would be removed upon completion of the sale and the streambank restored. Based on experience from other like projects with stream crossings, and implementation of Best Management Practices and Forest Plan Standards and Guidelines, stream sedimentation would be minimal.

The proposal for use of herbicides to control invasive plants would not effect brook trout as neither of the two herbicides proposed for use has shown negative impacts to aquatic species. See Section 3.4, Water Quality, for a more detailed discussion on effects of herbicide application proposed in this project.

Alternative 3:

Several units are dropped under this alternative which would reduce the potential for sedimentation into nearby streams and subsequent effects to fish or aquatic species. All other effects would be similar to that described for Alternative 2 except herbicides would not be utilized to control invasive plants. Treatment of invasive plants in this alternative would have no effect on brook trout**.**

Alternative 4:

Under this alternative trail #3 from Scenic Vista to the lower Meserve brook area is extended to connect to the Ellis River Trail. This trail would need a ski trail bridge (with no abutments) that to span Meserve Brook. This location is where the previous bridge weakened and eventually collapsed on the Scenic Vista trail. Another ski trail bridge would be needed between units 30 and 31, again spanning the brook and not placing abutments in the brook. This bridge crossing is through a relatively wet, swampy area. Trout were not observed in this area; however it appeared to provide suitable fry-rearing habitat because the stream is small and has appropriate substrates and lower flows. Sediment may tend to collect in this area during placement of the bridge, increasing local sedimentation because of the low flows. This would have a negative effect on brook trout if present in the affected area. However, implementing the listed mitigation requirements is required to minimize potential sedimentation when placing skidder and truck bridges and for ski trail bridges.

Up to the terminus point described under Alternative 2 and 3 effects would be similar for this trail under Alternative 4. Alternative 4 proposes an extension to go from the terminus described in Alternatives 2 and 3 to a junction with the Ellis River Trail.

3.12.2 Cumulative Effects for All Alternatives

The Analysis Area for cumulative effects on fisheries are Meserve Brook, Miles Brook and the Ellis River because all potential cumulative effects for fisheries are limited to within these streams.

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. Jackson Water Precinct owns a parcel in the project area, and is contemplating replacing the pipe that carries water from their dams to their filtration system in the Ellis River, perhaps within the next ten years. They are also looking into how best to eliminate the breaching of the lower dam. Several undersized culverts were placed on the Hall Trail Connector by Jackson Ski Touring Foundation where intermittent streams intersect the trail. These culverts are in need of replacement to prevent additional erosion from occurring. Wildlife opening maintenance is the only other foreseeable project planned for this area within ten years.

There would be little to no measurable cumulative effect on brook trout or its habitat within the analysis area because implementing Forest Plan standards and guidelines and Best Management Practices would minimize adverse effects. Implementation of any of the action alternatives would ultimately improve the watershed conditions and thereby improve habitat for trout and other aquatic species.

There are no harvests planned in the foreseeable future. Harvests are typically planned for areas on a 15-20 year rotation. Recreational use such as Nordic skiing, mountain biking and hiking in the area is expected to increase gradually over the foreseeable future. Implementation of any of the alternatives

would not have a cumulative effect on forest or regional brook trout population trends, nor stream habitat trends under any of the alternatives, thus brook trout would remain viable under any of the alternatives.

3.13 Heritage Resources

Direct, Indirect and Cumulative Effect on Heritage Resources for all Alternatives

The analysis area was surveyed by a cultural resource Para-professional in 2004. Identified sites near the Ellis River would be avoided under all alternatives. Sites near Meserve Brook will be avoided except in the case of a mid 1900's era town dump site. This site lies near an old road and will be protected by adding additional fill material if needed to insure that skidding operations maintain the integrity of the site. There are currently no National Register of Historic Places within the analysis area.

Any cultural resource exposed by or otherwise discovered during sale activities would require 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.

No direct or indirect effects to heritage resources would occur based on implementation of mitigations. No historic sites are within or adjacent to proposed harvest units. Therefore, no cumulative effects to cultural resources would occur.

The following steps were followed to survey for cultural resources within the Project Area:

1) Research was conducted prior to field review to identify cultural resources sites within the area. The cultural resource paraprofessional consulted District cultural resource maps, atlases, and files, and additional historic documents.
2) A cultural resource paraprofessional conducted a walk-through of units in the project area, with particular attention to areas near streams, on benches or other flat areas, rock outcroppings and in the vicinity of known sites.
3) A cultural resource paraprofessional prepared an extensive report on all known information regarding cultural resources in the project area.
4) The Forest Archeologist reviewed the cultural resource report.
5) The State Historic Preservation Officer (SHPO) reviewed the cultural resource report and provided concurrence on January 6, 2005.

Chapter 4 - Preparation and Consultation

ID Team Members and Forest Service Contacts

The following individuals participated in the development and analysis of the proposed action and the alternatives, as well as project design and preparation of the environmental assessment.

Interdisciplinary Team:

NEPA Coordinator / Silviculture / Layout.....Rod Wilson, Saco Ranger District
Wildlife Biologist..... Kathy Starke, Saco Ranger District
GIS technician / Layout Forester .....Keith Konen, Saco Ranger District
Assistant Ranger / Ecosystems Team Leader ..... Rick Alimi, Saco Ranger District
Forest Engineering Technician / Roads Analysis ..... Jay Sylvester, White Mountain National Forest
Recreation .....Holly Jewkes, Saco Ranger District
Marking Crew Lead Technician ..... Randy Harrington, Saco Ranger District

Forest Service personnel consulted for professional and technical assistance:

District Ranger ..... Terry Miller, Saco Ranger District
Silviculture.....Bob Burt, Green Mountain National Forest
Soils Scientist.....Steve Fay, White Mountain National Forest
Hydrologist .....Tracy Weddle, White Mountain National Forest
Botanist .....Tracy Weddle, White Mountain National Forest
Botanist ..... Kathy Fife, White Mountain National Forest
Harvest Operations..... Ken Jeager, Saco Ranger District
Archeological Paraprofessional ..... Joe Gill , Androscoggen Ranger District
Archeological Paraprofessional .....Francena Simard, Saco Ranger District
Archeologist..... Karl Roenke, White Mountain National Forest

Other Agencies Consulted:

U.S. Fish and Wildlife Service ..... Susanna L. von Oettingen, Biologist
State Historic Preservation Office ..... James McConaha

Local Organizations and Governments providing public involvement:

Jackson Ski Touring Foundation .....Thom Perkins
Jackson Water Precinct..... Scott Hayes
Jackson Office of Selectmen.....Selectmen

Appendix A - Project Mitigations

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 measures are planned and apply to all action alternatives.

Project and Unit Design

- The skid trail crossing over Meserve Brook will include a bridge located just downstream of the water supply dams at the private in-holding, and upstream of Greys Field. Volume from units 29 – 32 will cross Meserve Brook at this location. The skidder bridge would be built up to increase clearance over the brook. The skid trail at this location would be constructed to promote drainage off the skid trail and onto the vegetated slope to prevent water flowing down the skid trail into the floodplain. Tops from trees would be placed along the trail so that skidders would be driven on tree tops rather than on bare ground. Hay bales, straw bales, or silt fences would be installed at the base of the slope near the stream crossing to prevent sediment from reaching Meserve Brook. After closing the sale, the skid trail would have waterbars installed and be seeded to prevent erosion.
- Avoid rock piles in unit 7 and the foliar collection research site in Unit 26 by not cutting trees or skidding in these areas.
- During marking of the proposed units protect raptor nest trees and report their presence to the District Biologist, who determines if further mitigation is needed.

Botanical and Invasive plants

- Begin project operations in un-infested areas before operating in weed-infested areas if possible, to reduce the risk of spreading weed infestations.
- Conduct additional sensitive plant surveys prior to ground disturbing activities for the Connected Actions (watershed rehabilitation projects and proposed ski trails).
- Conduct additional sensitive plant surveys prior to ground disturbing activities in unit 41.
- Insure that proposed herbicide applications (under Alternative 2 and 4 only) occur only when the weather forecast does not predict rain in the next forty-eight hours to minimize the likelihood of chemicals reaching surface water.

Water Quality

- Units along Miles Brook and Meserve Brook, and designated perennial streams are buffered from treatment an average width of 25 feet. In addition, timber stands along designated perennial streams would retain a minimum of 70 square feet of basal area in the adjoining 75 foot area. Buffers may exceed these distances where steep slopes or wet areas exist. Equipment is not allowed in no-cut buffers except at designated crossings.
- Riparian buffers along designated perennial streams adjacent to clearcut units for this project are increased to up to 100 feet.
- Apply annual grass seed as needed to stabilize disturbed soils, reduce soil erosion, and prevent invasive species.

Appendix B – Species with Potential Viability Concerns

The Forest Plan Revision process for the White Mountain National Forest included an inventory of "Species with Viability Concerns" on the National Forest that are not already listed on the Regional Forester's Sensitive Species (RFSS) list (See Biological Evaluation in Project Planning Record, and Section 3.10 of the EA, for information on RFSS). Effects analysis for Species with Viability Concerns is included in Section 3.7.3 of the EA. The Project Area is the portion of the Analysis Area that includes stands proposed for vegetative management as well as the area associated with connected actions (roads and landings). For each species of concern, this table notes the following:

- Have there been current or historical sightings of the species of concern within the Project Area?
- Is there suitable habitat for the species of concern within the Project Area?
- Have there been surveys conducted within the Project Area for the species of concern?
- Will the proposed project impact the species of concern or its habitat?

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS

Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
AMPHIBIANS						
Jefferson Salamander *Ambystoma jeffersoniannum*	Mixed wetland and forested habitat. Vernal to semi-permanent pools are preferred breeding areas. Surrounding habitat usually mature forest with rocky soils, a duff layer, pit and mound topography, large (> 10 cm) logs, and relatively closed canopy. Usually below 1700' elev. Avoids floodplains.	NO: doubtful occurrence on WMNF (SVE)	Vernal pools may occur in areas with hardpan soils	NO	**NO**	In NH, only 1 true individual of this spp has been recorded from the SW corner of the state. Hybrids of this species are more common than not. Probability of true spp. occurrence is extremely low.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
BIRDS						
Bay-breasted Warbler *Dendroica castanea*	Primarily mature coniferous forests (though mixed forests used) up to 4000'. Prefers the thick lower vegetation at edges of small forest openings.	NO	YES	YES	**YES**	Mature spruce/fir and mixedwood in Project Area.
Rusty Blackbird *Euphagus carolinus*	Prefers northern ponds, wetlands, beaver ponds typically between 1000' to 4000' in elev. Nests found in spruce and fir.	NO	YES	YES	**NO**	Suitable habitat exists in beaver pond near Doliff Field along Ellis River and old beaver flowage near Grey's Field. No harvest or connecting activities are proposed nears Doliff Field. Grey's Field below 1000' elev..
Three-toed Woodpecker *Picoides tridactylus*	Year-round resident of spruce/fir zone, which typically occurs above 2500'. Breeds in mature coniferous forest with clumps of snags, including at least some 10-12" in diameter. May prefer flooded or swampy areas.	NO	NO	YES	**NO**	No Harvest Unit is above 2500' Very marginal spruce/fir habitat and no clumps of large snags.
Pied-billed Grebe *Podilymbus podiceps*	Waterbodies usually ≥ 12 acres with both open water and emergent vegetation.	NO	NO	YES	**NO**	Doliff beaver pond may exceed 12 acres when active. S&Gs will protect wetland areas.
FISH						
Atlantic salmon *Salmo salar*	Larger streams of the Merrimack and Connecticut River watersheds. Also Saco River watershed below Hiram Falls.	NO	NO	NO	**NO**	Project area above Hiram Falls; therefore no salmon present.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
INSECTS						
Brown's Ameletid Mayfly *Ameletus browni*	Larvae prefer erosional areas in cold, fast-moving headwater streams that usually are well-oxygenated, of relatively high pH, with canopy cover and rocks or boulders present. Adults typically remain along streambanks near emergence sites.	NO	Possibly	NO	**YES**	Miles Brook had a pH of 6.59; the Ellis River a pH of 6.6, but little to no grass or detritus currently in Meserve Brk, Miles Brk, or Ellis River. S&Gs protect streams from disturbance during harvest. Stream enhancement work may impact
Third Ameletid Mayfly *Ameletus tertius*	Larvae are found in small and large streams in secondary depositional areas and on submerged grasses and detritus along margins of riffles and transitional areas. Adults typically remain along streambanks near emergence site. Streams are usually well-oxygenated, of relatively high pH, with canopy cover and rocks or eroding banks present.	NO	Possibly	NO	**YES**	Miles Brook had a pH of 6.59; the Ellis River a pH of 6.6, but little to no grass or detritus currently in Meserve Brk, Miles Brk, or Ellis River. S&Gs protect streams from disturbance during harvest. Stream enhancement work may impact
Boulder Beach Tiger Beetle *Cicindela ancocisconensis*	Open sand or mix of sand and cobble along permanent streams of mid-sized rivers; feed and live on the sandy areas exposed by receding rivers.	NO	NO	NO	**NO**	Miles & Meserve Brooks and Ellis River lack sand deposits. Project would not affect substrate of any brook within the stream channel

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Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Black lordithon rove beetle *Lordithon niger*	Late-successional or old growth northern hardwood or mixed coniferous forest below 2500'. Presently known from The Bowl RNA.	NO	NO	NO	**NO**	No old growth habitat in project area.
A big-headed fly *Nephrocerus slossonae*	Late-successional or old growth northern hardwood or mixed coniferous forest above 1500'. Presently known from The Bowl RNA.	NO	NO	NO	**NO**	No old growth habitat in project area.
MAMMALS						
American Marten *Martes americana*	Inhabits coniferous, mixed, and deciduous forest that is 30+' tall with at least 80 ft² of basal area. Prefers structural complexity in stands, including large hollow trees or downed logs.	NO	YES	YES	**YES**	Most of project area has forest 30+' tall with basal area >80 ft².
ODONATES						
Southern Pygmy Clubtail *Lanthus vernalis*	Lives in small, shady spring-fed creeks, preferring clean sandy or mud substrates and shallow running water.	NO	NO	NO	**NO**	No streams with sandy or mud substrates in the project area.
Forcipate emerald *Somatochlora forcipata*	Found in spring-fed steamlets within subalpine hillside fens with floating vegetation or in pools associated with flowing groundwater in fen areas. Avoid open, sunny fen areas.	NO	NO	NO	**NO**	No fens with cold streamlets. No mud bottom in any Brook within project area.
Ebony boghunter *Williamsonia fletcheri*	Found in low elevation sphagnum bogs adjacent to coniferous or mixed coniferous/deciduous forested areas. Absent from most bogs without sphagnum. Larvae may develop in shallow pools (6" to 12") in sedge fens or among sphagnum mats with open pools and not choked with heaths. It appears to utilize openings within the forest rather than completely open upland habitat.	NO	NO	NO	**NO**	No sphagnum bogs within project area.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
PLANTS						
Missouri Rock-cress *Arabis missouriensis*	In the WMNF, probably restricted to semi-open conditions of richer sites. Often in semi-open rocky woods or on rock outcrops within rocky ridge woodlands. Typically south or west-facing slopes below 1500'. Associated species include red oak, ash, basswood, sugar maple.	NO	YES	YES	**NO**	No enriched areas within harvest units
Alpine Bearberry *Arctostaphylos alpina*	Typically on the exposed end of the dry/mesic heath meadow system of alpine communities. *Arctostaphylos alpina* is usually found in small, isolated populations on ridgelines of the Presidentials	NO	NO	NA	**NO**	No alpine habitat in Project Area.
Pickering's Reed Bent-grass *Calamagrostis pickeringii*	Uses a variety of habitats including bogs, wet shores, ditches, damp openings, roadsides, and dry streambeds. Prefers wet, but uses dry; often, though not always, at high elevations. Acidic peats, sands, gravels, and shores.	NO	SUSPECT	YES	**Possibly**	Miles & Meserve Brooks and Ellis River may provide suitable gravels. Project would not affect gravels or banks of any Brook. Found in openings, but survey did not locate it in Grey's Field or Doliff Field. Ditches are in project area.
Cut-leaved Toothwort *Cardamine concatenata*	Primarily in rich woods; also in wooded bottoms and on calcareous rocky banks, talus, and ledges. Prefers vernal deciduous openings and closed canopy in summer.	NO	NO	YES	**NO**	No enriched woods or calcareous soils in project area.
Rocky Mountain Sedge *Carex backii*	Calcareous to circumneutral, dry-mesic, rocky oak-hardwood and limestone hardwood habitat. Also may occur on calcareous to neutral rock outcrops and ledges.	NO	NO	YES	**NO**	No calcareous soils.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Hair-like Sedge *Carex capillaris*	Snowbank communities and wet rocks in alpine, and wetter areas of dry-mesic heath alpine habitats.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Head-like Sedge *Carex capitata ssp. arctogena*	Wet, acidic, rocky or gravely soil in the alpine. May also occur in similar dry habitats.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Meagre Sedge *Carex exilis*	Bogs and fens, often in association with *Sphagnum* moss.	NO	NO	NO	**NO**	No bogs or fens in project area.
Scirpus-like Sedge *Carex scirpoidea*	Strongly associated with circumneutral or calcareous rocky summits, outcrops, and cliffs. In NH, only known from open ledges and subalpine habitats.	NO	SUSPECT	YES	**NO**	Some rocky outcrops present but no harvest proposed near them.
Pale Painted-cup *Castilleja septentrionalis*	Cool, wet ravines, along alpine brooks, and in wet alpine and subalpine meadows. Soil conditions vary by location from moist organic soil to gravelly soil to calcareous cliffs. Good representative of the snowbank/wet meadow/streamside ravine alpine communities.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Fogg's goosefoot *Chenopodium foggii*	At cliff bases, on rocky slopes and outcrops, and in sparsely wooded areas; apparently associated with circumneutral habitats	NO	SUSPECT	YES	**NO**	Some rocky outcrops present, but not near harvest units.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Autumn Coralroot *Corallorhiza odontorhiza*	Found in a variety of forested upland habitats, often rich hardwoods. Requires mycorrhizal host, but details unknown.	NO	YES	YES, however surveys may not indicate no presence	**Possibly**	This orchid often lies dormant for a few years in between eruptions. Habitat descriptions are relatively general. Therefore will be considered present for analysis.
Northern Wild Comfrey *Cynoglossum virginianum var. boreale*	Can occur in enriched northern hardwood or mesic red oak northern hardwood, as well as transition limestone hardwood forests. It is mainly in rich mesic woods on sandy or rocky soil where light is available to the understory. Favors southern and western aspects. May also occur on ledges, cliffs, and talus.	NO	SUSPECT	YES	**Possibly**	No enriched areas in harvest units. Ledges outside harvest units. Not observed during surveys, but southern aspects present.
Yellow Lady's Slipper *Cypripedium parviflorum var. pubescens*	Rich deciduous woods and swamps, often along the edges of spring run-off streams, usually at low elevations.	NO	NO	YES	**NO**	No enriched areas in harvest units
Alpine Willow-herb *Epilobium anagallidifolium*	*Epilobium anagallidifolium* occurs on damp moss or wet rock in alpine areas, including in cool, wet ravines, along alpine brooks, and along the moist areas of recent snow runoff. Sometimes it is found on talus in the alpine.	NO	NO	NA	**NO**	No alpine habitat in Project Area.
Boreal bedstraw *Galium kamtschaticum*	Prefers somewhat rich seep habitats with non-channelized flowing surface water; found in cool, wet hardwood, mixed, or conifer woods, swamps, and streamsides.	NO	NO	NO	**NO**	No alpine habitat in Project Area.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Moss Bell-heather *Harrimanella hypnoides*	Snowbank communities, wet seeps, and crevices in alpine habitats.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Alpine Azalea *Loiseleuria procumbens*	Exposed dry-mesic heath alpine areas including alpine heath snowbank and the Diapensia-azalea-rosebay dwarf shrubland communities.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Northern Woodrush *Luzula confusa*	In WMNF, appears to be limited to wet ravine alpine and subalpine communities.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Smooth Sandwort *Minuarta glabra*	Species prefers non-calcareous rocky summits and outcrops up to 3000 ft in elevation. When found in forested habitat in northern New England, it is in openings created by rocky ledges in oak-pine and jack pine communities.	NO	SUSPECT	YES	**NO**	Some rocky outcrops present, but outside harvest units.
Prairie Goldenrod *Oligoneuron album*	Occurs primarily on dry, calcareous cliffs and ledges. May also occur in open fields and roadsides. All known NH occurrences are on calcareous soil or bedrock.	NO	NO	YES	**Possibly**	No calcareous soils in Project Area, but roadsides present..
Mountain Sorrel *Oxyria digyna*	Typically occurs in snowbank communities and on rocky slopes and ledges of headwalls. May occur near alpine streamsides. Above 3500’ in northern New England.	NO	NO	NO	**NO**	Project area below 3500’.
Viviparous Knotweed *Persicaria viviparum*	Snowbank communities, wet mossy rocks and seeps, and near streams in alpine and subalpine areas.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Alpine Timothy *Phleum alpinum*	In NH, usually uses wet alpine meadows; may also occur in wet ravines and on damp shores in the alpine zone.	NO	NO	NO	**NO**	No alpine habitat in Project Area.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Jack Pine *Pinus banksiana*	In WMNF, occurs on rocky summits, rock outcrops and ledges from 2200-4000' elevation; often found on dry, gravelly or sandy sites. Requires moderate to high levels of sun for establishment.	NO	NO	NO	**NO**	Project area below 2200'.
Alpine Meadow Grass *Poa pratensis ssp. alpigena*	In NH, uses nutrient poor soils in alpine/subalpine dry-mesic heath and meadow communities.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Douglas Knotweed *Polygonum douglasii*	Prefers exposed rocky slopes and hillside ledges in well-drained soil where little other vegetation grows. Can also grow in nutrient-enriched hardwood forests if the canopy is open enough; often associated with rocks even in forest.	NO	SUSPECT	YES	**NO**	No enriched sites and no exposed rocky slopes in harvest areas.
Algae-like Pondweed *Potamogeton confervoides*	Occurs in strongly acidic soft-water bogs, lakes and ponds at a variety of elevations. Also found in slow-flowing acidic streams. Likes muddy shores with lots of vegetation. Not known to occur in beaver ponds.	NO	NO	NO	**NO**	No acidic soft-water bogs or ponds or slow moving streams in project area.
Yellow Rattle *Rhinanthus minor ssp. groenlandicus*	Snowbank, wet ravine, and wet meadows in alpine/subalpine zone.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Lapland Rosebay *Rhododendron lapponicum*	Strongly associated with dry-mesic heath communities in the alpine. Prefers slightly sheltered locations. Does not grow on rock outcrops.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Silverleaf Willow *Salix argyrocarpa*	Moist soils in alpine or subalpine streamside and ravine. Known to exist in Tuckerman's Ravine, Lakes of the Clouds, Ammo Ravine	NO	NO	NO	**NO**	No alpine habitat in Project Area.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Dwarf Willow *Salix herbacea*	In NH, typically occurs in cool, wet ravines, snowbank communities, and along alpine brooks. Grassy, sandy, or rocky places in alpine areas; often on thinner soils than other snowbank/wet ravine species.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Satin Willow *Salix pellita*	Wetland obligate. Uses river or stream banks, floodplain forest, moist thickets, forested swamps, and lake or pond shores. Prefers nutrient rich alluvium	NO	SUSPECT	YES	**NO**	Beaver ponds in project area but surveys did not indicate presence. Streams protected by FP S&Gs.
Three-leaved Black Snake Root *Sanicula trifoliata*	Limy deciduous woods below 1500'. Most occurrences on steep slopes. Appears associated w/ dense, lush ground cover and relatively closed canopy but has been found near clearcuts and cliffs that may indicate it can take advantage of sunny conditions.	NO	NO	YES	**NO**	Soils not of limestone in project area. Some steep slopes and recent clearcuts but not in harvest areas.
Alpine Brook Saxifrage *Saxifraga rivularis*	Alpine ravines, wet and mossy areas, wet cliffs, and some dry-mesic heath alpine/subalpine communities. May benefit from reduced competition associated with moderate disturbance. May be a nitrophile.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Arizona cinquefoil *Sibbaldia procumens*	Snowbank/wet meadow/streamside alpine communities; only occurrence is at bottom of a snowfield.	NO	NO	NO	**NO**	No alpine habitat in Project Area.
Rock Goldenrod *Solidago calcicola*	Edges of openings in moist rich woods, rocky or gravelly thickets, talus, and cliffs. Open canopy and nutrient richness are key factors.	NO	SUSPECT	YES	**NO**	No enriched sites within harvest units.
Anderson's sphagnum *Sphagnum andersonianum*	Low hummocks in very poor ericaceous fens.	NO	NO	NO	**NO**	No fen habitat present in the Project Area.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Angerman's sphagnum *Sphagnum angermanicum*	Poor fens, including at edges of ponds	NO	NO	NO	**NO**	No fen habitat or ponds present in the Project Area.
a sphagnum *Sphagnum brevifolium*	Known from poor and intermediate fen habitats. Occupies low hummocks and wet carpets, but seems to prefer high-level carpets. In NH only known from the alpine zone on Mt. Washington (Oakes Gulf)	NO	NO	NO	**NO**	No fen habitat present in Project Area.
a sphagnum *Sphagnum flavicomans*	Medium to tall hummocks in bogs and poor fens. An indicator species for the *Sphagnum rubellum/Vaccinium oxycoccus* dwarf heath moss lawn in New Hampshire	NO	NO	NO	**NO**	No fen habitat present in Project Area.
Lindberg's sphagnum *Sphagnum lindbergii*	In New Hampshire, restricted to alpine and subalpine peatlands, forming carpets in high elevation heath balds and bogs; prefers peatlands with full sun, low to medium nutrient levels, and pH of 4.0-6.0	NO	NO	NO	**NO**	No alpine habitat in Project Area.
a sphagnum *Sphagnum majus ssp. norvegicum*	Occurs in lawns in poor sedge fens and along pond margins.	NO	NO	NO	**NO**	No fens or ponds in the Project Area.
Pylaes' sphagnum *Sphagnum pylaesii*	Forms mats over moist or wet rock or is submerged in fen pools; prefers acidic conditions.	NO	Suspect	NO	**NO**	Stable streams present in the project area, but S&Gs will protect this habitat.
Alpine Meadow-sweet *Spirea septentrionalis*	Cool wet ravines and snowbank communities in alpine and subalpine habitats. Needs open habitats where forest cannot get established.	NO	NO	NO	**NO**	No alpine habitat in Project Area.

Table 30: SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	Habitat Requirements	Sightings Present or Historical within the Analysis Area?	Suitable Habitat within the Analysis Area?	Surveys Conducted within the Analysis Area?	Project May Impact Species or Habitat?	Rationale
Ciliated Aster *Symphyotrichum ciliolatum*	Open woods and dry to moist thickets, shores, and clearings; occurs in openings in pine barrens and dry northern hardwood and red spruce-hardwood forest, and likes clearings and roadsides. Prefers scattered small or large openings in the forest canopy, but not necessarily early-successional forest habitat. Uses sandy soils and sometimes rocky sites.	NO	YES	YES, but not found	**Possibly**	Northern hardwood forest present along with roadsides and openings..
Northeastern bladderwort *Utricularia resupinata*	Pond, lake and bog shores and margins as well as some wet ditches. Prefers clear, acidic waters with sandy, muddy, or peaty shores. May require low water levels to bloom, and needs a slightly higher than average water temperature.	NO	SUSPECT	YES	**NO**	Beaver ponds present, but surveys did not indicate presence. Wet ditches present.
Mountain hairgrass *Vahlodea atropurpurea*	In northern New England, is limited to the alpine/subalpine zone, especially herbaceous snowbanks communites.	NO	NO	NO	**NO**	No alpine habitat in Project Area.

Appendix C - Public Comments and Forest Service Responses

Each comment received during the January 14 to February 14, 2005 comment period was reviewed to identify site specific issues and concerns. Each comment listed includes a response and where appropriate, lists where supporting information can be located in the EA. We appreciate the comments provided for the Popple Project Public Comment Package. Not all comments are included, a representative sample is used where similar comments were received. Similar comments are summarized with a representative comment for brevity. All correspondence is filed and available for public review in the Popple Project Planning Record located at the Saco Ranger Station in Conway, New Hampshire.

These comments were received before the development of Alternative 4, which attempts to resolve many of the concerns expressed.

Recreation

Alternative 4 was developed in large part due to the public comments received on the proposed action. Many comments were received regarding impacts to Nordic Ski Trails, effects from ski trail closures, and regarding the proposed location for access to units 29 – 32. Some respondents were not in favor of making exceptions for Nordic skiing (changes in season of harvest, or adding new trails). Here are representative comments regarding effects to Nordic Skiing.

"*My husband and I are opposed to the planned logging in the Popple Mtn area. As long time residents of the area and cross country skiers who enjoy the beauty of that area, we would appreciate your reconsideration of the impact that the proposed logging would have on the area".*

"I am concerned about the impact that this US Forest Service Logging Plan would have on the Hall Cross Country Ski Trail."

"Please do not cut the trees on Hall Trail."

"Logging on Popple Mountain would be a disaster for those of us who like to XC ski more challenging but groomed terrain. We have been skiing at Jackson for almost 15 years and worked our way up from the golf courses and Ellis River Trail to the more difficult trails, of which there are not many. The Hall Trail and the Connector to Ellis River Trail are favorite trails and the impact of the proposal on the Hall Trail and the Connector would be a HUGE loss."

"As members of the Jackson Ski Touring Foundation, we have enjoyed skiing the wonderful trails around Popple Mountain. We urge you to remember the trails as you plan for potential logging in that area and carefully consider the negative impact the logging would have on the ski trails. The loss of those trails to us who ski them almost every week would be huge."

"We urge you to consider alternatives that would not close the Hall Trail or the Connector Trail (between the Ellis River Trail and the south end of the Hall trail, running through areas 34 and 38 on your map) to skiing. The time and money that was invested in the recent improvements to the Connector trail has made it one of the best trails in the village network! "

"The proposed nordic trail #3 would be a lot more appealing if it connected to the Ellis River Trail or to Grey's Field Trail as an alternative access to the Hall Trail. As it stands, it does not offer much appeal. Loop trails are a lot more fun! "

"If some logging must be done in the winter to get the timber out with minimal impact on the area, please consider only partial closures and limit them to one season in a given area (ie south end of the hall Trail vs. the north end). JSTF is a unique entity in the area, with limited trails to begin with and loosing the use of both ends of the Hall Trail at the same time would put a huge strain on the rest of the trail system."

"Please save the Hall Trail. Preserve this pristine wilderness for cross country skiers."

"I want to express my concern over closing a major portion of the Hall Road and Maple Mt. cross country skiing routes during logging operations next winter. I hope that alternative approaches could be considered to avert this problem. "

"As a frequent user of the Jackson Cross Country Ski Foundation's trail system, I am acutely concerned that the Popple project will vastly reduce the quality of the Hall Trail. Realizing that the comments of skiers and other constituencies gravely concerned with these plans are unlikely to cause the Forest Service to shelf its logging plans on Hall Trail and its Connector, I believe that Alternative #3 will cause the least amount of damage to the system. Should this alternative be chosen, however, it is my hope that all logging activity and its associated traffic in the Hall Trail vicinity will be suspended well before the Christmas holiday season. "

"I am a lifelong cross country skier living in Jackson NH. I strongly urge you to consider the concerns and proposals put forward by Thom Perkins of the Jackson Ski Touring Foundation. This may just be another project for you, but it will have a major impact on our lives here in Jackson."

"*I am an avid cross country skier and my primary reason for owning my home in Jackson is to pursue this interest. I, in particular, enjoy the trail as it allows a great skiing connection from the South Hall, near my house, down to the Ellis River and thus to the rest of the Jackson Network. Thus it seems very unfair and illogical that the proposal chooses to log this area which is a strong selling feature of the Jackson ski network. My understanding is that all the carefully planned and landscaped turns and banks (Hall Connector) would be replaced with a straight logging road and that all the trees that buffer the trail on either side would be harvested. It seems like there are a lot of places in the proposed region to harvest trees and it seems a shame to harvest the trees right in the middle of one of the truly great ski trails. Furthermore it seems illogical that the Forest Service would approve for Jackson to renovate this trail at a cost of nearly $50,000; and then for the forest service to approve a plan to wipe out this trail 2 years later*".

"It is fundamentally wrong for a taxpayer to have to buy a ticket to ski or recreate in other forms on public land. The number of National Forest logging roads available for local residents to ski at no charge are reduced by the miles of roads granted to JSTF. This is unjust. Forest Service operated trails such as the Nanomocomuck Trail are preferred. "

"The Hall Road is one of the two most popular ski trails on the West side of the Ellis and really should be protected for skier recreation. During this project, I would hope and request that you manage its execution so as to protect and minimize its impact on the Cross Country skiing along the Hall Road."

"Alternative 3: The phasing of work to periods outside of the traditional winter use of the forest as proposed in this alternative is the preferable."

"The USFS is building JSTF more trails to the exclusion of non paying recreationists. Ski touring at one point had no interests in these back woods trails. They were once places one could go through out the year

with one's dogs. Now, dogs are not permitted on the ski trails and the trails are groomed taking away from the backcountry experience, and they charge a fee for use of the trails, which are public lands."

"I believe the USFS should go forward with this project, however, I do not believe public funds should be used to build more trails for specific JSTF use. I believe they should use the roads and trails as they exist before and after the cut. If some trails need to be abandoned during the cut, then so be it. We should not spend public funds on ensuring that JSTF has access to trails in that area."

Response: Proposed harvest activity along the Hall trail, specifically units 6, 7, 8, 23, 34, 37, 39, and 41 are partial harvest prescription. Unit 40 is a 19 acre Clearcut. The thinning and single tree selection prescriptions (partial harvest) leave approximately 2/3 of the existing trees intact. In unit 7, small openings are proposed along the road to create a view of Spruce Mountain to the east. Other partial cut units would not enhance views of distant mountains, although some views from roads and existing landings exist.

In partial cut units, evidence of harvest activities would be minimal during snow off seasons within a few years. Winter snow cover would conceal skid trails and branches left behind in the logging operation within a year or two. Views of the project area from adjacent peaks are analyzed in Chapter 3, section 3.2, and are summarized in the Comparison Table in Chapter 2, section 2.E. The amount of new openings viewed change somewhat between alternatives, but all alternatives meet Forest Plan Standards and Guides. The views of the adjacent forest and the condition and density of trees in the forest following treatment would be similar but more open than that experienced currently along these trails.

Only in Unit 40 would the harvest create an opening that would represent a noticeable change. In this unit, it is hoped that the view of Iron Mountain created would offset the adverse effects of the opening. Unit 36 would maintain an existing view that is nearly blocked by new vegetation where a former clearcut is rapidly approaching pole stand size. Indications from the public are that moderate numbers and sizes of created views enhance the recreation experience along ski trails by providing a destination point and view.

Alternative 2 did not include mitigations (season of harvest restrictions) for ski trail closures so it impacts Nordic skiing the most. Alternative 3 was designed to reduce the impacts to Nordic skiing in the project area to the maximum extent possible by eliminating winter logging, and in so doing eliminated several units that would benefit from treatment. Alternative 4 was designed to balance recreation uses and habitat management and vegetation goals for the project area. Mitigations under Alternative 4 seek to minimize effects to the Nordic skiing community and Jackson Ski Touring and area businesses, while accomplishing other project objectives and minimizing effects to resources.

The single tree selection prescriptions for units 29 – 33, and for unit 34 in particular, are designed to minimally impact the user experience by retaining an open stand condition where new young trees can begin the regeneration process, and while maintaining the stand in an uneven aged condition into the future. As discussed above, these units, and other partial harvest units will remain stocked. The adverse effects of these treatments on the recreation experience are expected to be short term.

Alternative 4 also attempts to minimize the effect of providing access to units 29 – 34 by off-setting the proposed road location off the Hall Trail connector. While adjacent to the trail, unlike Alternatives 2 and 3, it would not adversely effect the character of the trail itself.

Comment **"***The forest is perfectly healthy in this area and does not need to be 'managed' by anything other than natural selection. Anybody who has skied or snowshoe'd through this area would mourn the loss even if it is only temporary. You just don't get a better outdoor experience*."

Response: The Forest Plan provides direction for management of National Forest lands including management of wildlife habitat and high quality hardwood production. Popple VMP Proposed Action implements the Forest Plan by treating vegetation stands to meet specific objectives (see Purpose and Need, Chapter 1, sections E and F).

Comment: *"Tree marking paint lasts a long time and shouldn't be so visible from ski or hiking trails."*

Response: The marking crew attempts to apply marking and boundary paint to the back sides of trees. However, it is also important to insure that the paint can be seen by loggers to insure that only marked trees are cut and to protect unmarked trees. All alternatives include mitigations designed to address this concern by marking unit boundaries along trails so as to face away from the trail where possible. No units are adjacent to the hiking trails within the project area. (See Appendix A, Mitigations, Project and Unit Design).

Comments specifically on the Hall Trail Connector

Comment: *"Along with the East Pasture Loop, Popple Mountain and the Hall Trail are two of the best "black/blue trail areas in the Mount Washington Valley. However, why only "Changes in the Nordic Trails"? Why not "Nordic ski trail improvements, Stabilization, Protection, or Enhancement?" These Nordic ski areas deserve as much positive attention as the other actions that you plan***." "**

Response: The Nordic Trail proposals in the action alternatives are integrated into the project in association with the harvest action because the trail locations would likely be on existing old roads that would also be used for skidding in units 31 and 32. Trail locations outside units would also be on existing old roads or skid trails except for ¼ mile section for Avalanche trail. Each alternative includes some of the trails opportunities, as analyzed for later construction by the permittee. They are referred to as changes because, for some publics, these would not be considered improvements. Some publics commented that once these old roads become part of the trail system, they cannot use them in winter without a ski ticket, and cannot be accompanied by a dog. The reference to changes in Nordic Trails incorporates the possibility under some alternatives that winter-long trail closures may occur, and that Hall Trail Connector may be re-constructed (Alts 2 and 3) to accommodate log truck traffic.

Comment: *"As a resident of Jackson, and Green Hill Road, as well as a daily skier of the Ellis and Hall Trails, I am strongly apposed to the logging proposal in the area. Why would the Forest Service approve the Hall Trail connector, then take it away? There is lots of use on the Hall Trail year round. Lots of Jackson residents walk up there with their children, and dogs during the warmer months, enjoying the peaceful setting of the forest***."**

Response: The use occurring on the travelable portions of Meserve Brook Road (NFSR 623) and Miles Brook Road (NFSR 325), whether summer or winter, occur on roads constructed for timber harvest in the recent three or four decades. Their availability for foot traffic and groomed skiing is due to their having been constructed for timber management. These expensive and well maintained roads are in this good condition for the purpose of continued management. The Forest Plan designated Management Areas with management goals within National Forest Lands. The proposed action is in accordance with the Forest Plan, and with other Federal and State laws and National Forest policies. Management of units 29 – 34, and other units further away from the Hall Trail, but which would be hauled on NFSR 325 and NFSR 623 are within the goals and

objectives of the associated management areas. In addition, consideration for effects to the Nordic Skiing experience is considered when planning and implementing treatments along these winter trails, but is not the only consideration.

'Lots of use' on these roads which are Nordic trails in winter has been the case over the decades since they were built, during which time several timber sales have also used these roads, including winter use that temporarily impacted Nordic skiing. We are unaware of concerns by the public about the character of these roads that serve as the Hall Trail.

The proposal in alternatives 2 and 3 would not 'take away' the Hall Trail Connector. Use would continue following the reconstruction and harvest activity despite the probable change in character of the trail. Alternative 4 was developed in part to reduce the overall effects to Nordic trail users and area businesses that benefit from Nordic skier visits. The re-construction of the Hall Trail Connector or construction on a new location in alternative 4, would provide suitable access for multiple activities proposed to enhance water quality, wildlife habitat and provide quality timber now and in the future. Permanent access would provide opportunity to maintain the wildlife opening at Greys field, for future access for maintenance of Jackson's water impoundment facility, and for stream improvement projects that would benefit stream ecology by preventing further environmental degradation.

Comments on the Proposed Nordic Trails

Comment: *"Nordic Trail #3 would further fragment the habitat and introduce a steady stream of recreationists through a now wild area. Did JSTF ask for this trail, or was it a USFS recommendation?"* In addition, "*If the proposed logging interrupts the JSTF commercial use of some of its miles of trails for two to three seasons, that's part of multiple use. To build more trails/roads to make up for this temporary closure is asking too much of this already heavily roaded National Forest*."

Response: Your concern about wildlife affects on the north side of Meserve Brook, where ski trail #3 would be located are commensurate with ours. Effects and needs were discussed at length within the ID Team. Jackson Ski Touring Foundations' master development plan identifies need for a trail north of Meserve Brook, and for other locations within the planning area, including proposed trails #1 and #2. Analysis of these potential trails within the context of a larger project is logical. Although Alternative 4 does not include Trails #1 and #2, Trail #3 is located where it could partially mitigate future timber sale activities that require haul on Meserve Brook Road. If JSTF elects to construct Trail #3, its presence must continue to allow multiple uses in this area to co-exist. Trail #3 lies near proposed thinning units, and expectations are that these areas would continue to be managed in the future with even-aged harvest, including clearcuts, Hence, exclusive winter use of trail #3 location is not a given and the skid trails would likely be used again for logging.

Comment: *"I don't think Jackson Ski Touring Foundation needs more National Forest land for trails, and I found evidence of bridge materials in Meserve Brook, and wet areas that they should not be driving equipment through. In addition there are some old tar covered culverts discarded in the woods that should be removed."*

Response: Thank you for your Comment. We were unaware of them and will have them removed.

Invasive Species

Comment: *"I support a modified Alternative 3. I do not support restricting the means of eliminating invasives to "hand pulling." In my judgement and experience, hand pulling will prove ineffective."*

Response: Thank you for your Comment**.**

Comment: *"The two permanent haul road bridges (*Alts 2 and 3*) might have a long term effect on motorized use and spread of invasive species. Control of invasive species in the project area is extremely important due to the large amount of ground disturbance. The method you propose under alternative 2 is most effective and low impact and should be used for Alternative 3."*

Response: Thank you for your Comment. Of note, Alternative 4 would have no permanent bridges.

Visuals

Comment: *"Long term destruction of the natural beauty of certain northern portions of the Hall Trail. Logging operations to "commercially thin" should leave buffer zones of perhaps 200 feet between ski trail trails and harvest areas. In the scheme of the overall project, the impact on harvest yield would be minimal as contrasted to the adverse impact that would be felt by other users if the cuttings encroached on the trail system."*

Response: Proposed harvest activity along the Hall trail, specifically units 6, 7, 8, 23, 34, 37, 39, and 41 are partial harvest prescription. The thinning and single tree selection prescriptions (partial harvest) leave approximately 2/3 of the existing trees intact. In unit 7, small openings are proposed along the road to create a view of Spruce Mountain to the east.

The Forest Plan does not call for buffers for partial cuts. In partial cut units, evidence of harvest activities would be minimal during snow off seasons within a few years. Winter snow cover would conceal skid trails and branches left behind in the logging operation within a year or two. Views of the adjacent forest and the condition and density of trees following treatment would be similar but more open than that experienced currently.

Only in Units 36 and 40 would the harvest create an opening representing a noticeable change seen from a ski trail. In these units it is hoped that the views created would offset the adverse effects of the (foreground) opening. Unit 36 would maintain an existing view that is nearly blocked by new vegetation where a former clearcut is rapidly approaching pole stand size. Indications from the public are that moderate numbers and sizes of created views enhance the recreation experience along ski trails by providing a destination point.

Comment: *"Any trail breaks, at intersections and stream crossings be re-established as a project mitigation upon harvest/ action completion. Sections of these trails have been joined into /onto the Nordic trails and or forest road with some confusion to hikers."*

Response: Thank you for your comment. Changes to the Nordic system should be properly labeled by the permittee. No changes in the hiking trails are anticipated because no harvest activity is proposed near designated hiking trails.

Comment: *"Size of clear cuts should be restricted to a maximum of 20 acres."*

And…....

Comment: *"I am opposed to Alternative 2, it does not recognize the importance to society of a natural appearing landscape***."** **(**Pierce Beij**)**

Response: The Forest Plan restricts harvest openings to 30 acres or less in size. Other considerations reduced the size of several proposed clearcuts to fewer acres, averaging about 20 acres. Mitigations for scenery and Forest Plan reserve area requirements would be implemented and reduce the opening seen to less than 20 acres in most of the clearcuts, as seen from key viewpoints. See section 3.2 , Scenery for a detailed analysis.

Water

Comment: "*The proposed action must consider and analyze the impacts of alternatives on designated Outstanding Resource Waters*" (Conservation Law Foundation)

Response: Project design and mitigation measures identified for this project would minimize potential effects to water quality and quantity. These mitigations place restrictions on treatments in riparian areas, including twenty five foot no-cut buffers on perennial brooks receiving partial harvest, and 100 foot no cut riparian buffers for clear cut units.

Additional mitigations and Contract requirements such as prohibiting skidding equipment in riparian areas except at designated crossings, designating skid trail locations, etc, are also itemized in Appendix A. These buffer widths have proven to be effective on past harvest treatments.

Incorporating by Reference, from the Soils section of Chandler Round EA (Saco RD, 2004) where Chapter 3 states "Partial 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 forest floor to 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, indirect and cumulative effects from this proposed action are documented in detail in Chapter 3, section 3.4, Water and Chapter 3, section 3.6, Soil in Chapter 3. Given the silvicultural prescriptions, the 25 foot riparian buffer widths, and other resource mitigations, the integrity of these riparian areas is expected to remain intact.

In addition to riparian buffers and other project design to protect water quality, standard mitigation measures (Best Management Practices) would be employed to minimize impacts to water quality that might result from the cumulative effects of activities, including skidding, tree cutting, temporary bridge placements, streambank stabilization, fisheries enhancement projects and road maintenance. Proposed design improvements such as adding drainage ditches and improving culverts on Forest Roads and on Nordic ski trails, or adding surface rock in spots where needed on NSFR 512, would reduce the potential for erosion.

Erosion control measures on existing intermittent use roads include re-establishing drainage structures to avoid concentration of surface water. Stabilization after harvesting may include seeding and mulching at

selected locations. The Saco District has found that establishment of native species is often all that is needed to prevent soil erosion. See EA sections for 3.4, Water and 3.8, Fisheries, and Appendix A, Mitigations, for more information on the analysis of effects.

Comment: *"I am concerned with the potential risk of hydraulic fluid or other contaminants getting into Jacksons' water source. If logging near the Ellis River occurs I hope only environmentally harmless fluids will be used and a bond is posted to correct any damage that might occur."*

Response: There is no clause available in the timber sale contract that allows the Forest Service to require the purchaser to use 'biodegradable fluids'. However, spill kits are required on the sale area during operations should a spill occur. Other mitigations are required in the EA to reduce the likelihood of a spill contaminating the aquifer or river. These mitigations include limits on the amount of fuel that can be stored on site, and mitigations to be applied during harvesting such as skid trail locations, skidder bridge crossings, number of skid trails etc that would reduce the likelihood that other types of water degradation would occur.

Wildlife

Comment: *"The current Forest Plan calls for more timber harvesting and wildlife habitat improvement than has been accomplished. The Forest Service, who is the steward of the taxpayers forest, is remiss in not carrying out the intent of the Forest Plan. Regarding wildlife, the early successional habitat planned for this project (205 acres), this area will still be 572 acres short of Forest Plan objectives, addressing only 26 percent of the shortfall. In my view this is unacceptable."*

Response: Comment noted. The project planners and ID Team developed the proposed action and alternatives to address to the extent possible the need for change within the HMU at this time. Additional regeneration units would be proposed at the expense of meeting timber quality objectives. In other words… other stands were not ready for regeneration harvests.

Comment: *"I am confident the Forest Service will conduct timber harvest within the constraints of the Forest Plan, Best Management Practices, and other current laws, on a sustained yield basis, so I encourage you to proceed with Alternative 2".*

Response: Comment noted.

Comment: "Units 31 and 32 will only fragment an undeveloped area."

Response: The activities proposed for this area (thinning and Nordic trails) are not fragmenting habitat. The Biological evaluation and wildlife report refer to effects of these actions as 'disturbance'. However, the disturbance effects are within the scope of the Forest Plan. In addition, logging disturbances area temporary. As for the permanent development of a Nordic trail, the primary season of disturbance is winter. This area already experiences disturbance a short distance away where existing Nordic trails exists. Neither form of disturbance is likely to have a measurable adverse affect on wildlife species.

Comment: *"The area from Spruce Mountain north through the project units has consistently shown signs of heavy bear, moose and coyote presence. Maximum thinning and clear cutting in this area and even expansion southward would be very good for increasing the browse. The Nordic trails are used as transportation corridors in this area. Increased groomable Nordic ski trails and establishment of snowmobile trails would further help the wildlife."*

Response: Comment noted.

Comment: "*I very much disagree that the ice storm doesn't contribute to early successional growth. Wind events are also creating coarse woody debris and contributing to early successional growth and diversity.***"**

Response: The vegetative structure currently found in areas damaged by ice, while providing new succulent growth, is not the structure represented in "early successional habitat". Early successional habitat is generally considered to be openings in the canopy larger than two acres, and preferably larger than five acres. Incorporating by Reference, from the *Iron Maple II Project*, "Comments and Forest Service Responses", Appendix H, comment # 1.1, in part, as follows;

> "The ice storm, while damaging treetops and affording additional sunlight to the forest floor, has fostered a temporary flushing out of understory species already present in the affected stands. These understory species are primarily American beech (*Fagaceae grandifolia*), sugar maple (*Aceraceae saccharum*), and witch hobble (*Viburnum lantanoides*) in the Iron Maple 2 analysis area. The enhanced presence of these species in the understory of stands damaged in the ice storm have not changed the character of these stands and do not provide early successional habitat as referred to in the Forest Plan. As the treetops recover, the understory will again respond, potentially with dieback or certainly, slowed growth into the sub-canopy layer. In conclusion, the ice storm damage did not create early successional habitat."

The proposed clearcuts are based on Forest Plan direction that sets goals and objectives for early successional habitat, and the subsequent stand ages and structure. While this project treats ice damaged stands, it is not the primary purpose for the proposal. However, where extensive ice damaged trees and recent mortality are present in some stands, their deteriorating condition was a consideration in designating some of these areas for clearcutting.

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

Moderate damage to tree crowns occurred in some of the hardwood stands in the Popple analysis area. Paper birch trees weakened by damaged tops have died in large numbers within the last two years due to secondary insects and disease.

Where tree crowns are moderately to heavily damaged, additional sunlight is able to reach the forest floor. Understory beech, hobble bush and striped maple have capitalized on this increased sunlight. These species were present as advanced regeneration prior to the disturbance and will dictate the species of the future stand. Stand structure remaining in these stands, although containing regenerating young trees, is decidedly not early successional habitat that would provide for the many bird and mammalian species that require openings (and the attendant vegetation that is found in them) for foraging and nesting habitat. Over time, if untreated, these stands would mature as predominantly beech stands.

In summary, the ice storm did not result in openings of the size and brushy structure considered 'early successional habitat'. A lack of early successional openings is reported in the EA, Wildlife section 3.8. This response hereby Incorporates by Reference the narrative sections and Response to Public Comments on this subject in Iron Maple II EA and in Chandler Round Project EA.

Comment: *"The Forest Service must develop and implement management practices and objectives for populations and/or habitat of sensitive species so that they do not become threatened or endangered. It also should maintain viable populations of all native and desired nonnative wildlife, fish, and plant species throughout their range on National Forest System Lands…."* (CLF)

Response: See EA, Chapter 3, Wildlife section 3.8 and Appendix B, Species Viability, for a thorough disclosure of how this project will enhance or effect wildlife and wildlife habitat.

Vegetation

Comment: "*I support the projects design to not allow whole tree harvesting***".**)

Response: Comment noted. 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. No whole tree harvesting is planned for this project.

Comment: "*Logging on private land adjacent to units 25 – 27 was excessive and unnecessary, why log nearby when you could counterbalance that by creating more mature forest?"*

Response: The prescriptions for units 24 – 27 are thins. These treatments will primarily remove smaller diameter trees, reduce the over all stand density, and retain the healthiest trees for future harvest. In the subsequent 20 – 30 years following this thinning, these stands will mature and continue to provide for this habitat type. Individual tree health and vigor will increase.

Comment: "*The proposed action does not propose enough clearcutting to meet the goals of the Forest Plan***"**

Response: 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 vertibrate species. However, controversy over harvesting on the National Forest has resulted in Decisions which included fewer acres of clearcutting than was suggested in Forest Plan projections.

The desired amount of early successional habitat described in the Purpose and Need for this HMU is up to 1162 acres, but the Forest Plan does not require this amount. About 700 acres are even-aged thinnings, designed to improve timber size and quality for future clearcut harvest. The 205 acres of clearcuts (in the proposed action and alternative 4) are the stands recommended for clearcutting at this time. Fewer acres are available than would meet Forest Plan objectives due to extensive harvesting in the mid-1900's, hence, the large number of acres available for thinning.

Comment: "……*peripheral damage from windthrow to stands adjacent to the private clearcuts on Iron Mountain suggests that similar harvests would be subject to similar wind effects that should be considered.*"

Response: We are aware of and very concerned about windthrow potential in this area. For that reason and for scenic considerations we reduced clearcut unit #32 to ten acres. Unit 32 is adjacent to an area with blow down, and thinning might expose the residual stand to windthrow; hence a clear cut was chosen. The new stand will increase in height with its cohorts, supporting one another and developing a new wind-firm stand.

Thinning in other nearby areas such as units 23 – 31 are expected to result in little additional blowdown based on forest type, soils, and topography.

Comment: **"***All of the actions appear commendable. In "Land of Many Uses," timber harvest is a vital part of effective long-term maintenance. Better "maintained" than burned off."*

Response: Comment Noted**.**

Comment: *"Looks like you have the bases covered and the project is a good idea. There should be more timber harvesting on the NF***."**

Response: Comment Noted**.**

Comment: **"** *I am a cross country skier who enjoys the Hall Trail and I hope that logging would not spoil the winter use of the trail. In my travels through many trails in the Jackson System I notice many trees that have fallen. This is a tremendous source of lumber and should be used. It would also lessen the blow of a forest fire and promote new growth of even better timber. I would like to see some planned use of the fallen trees before any cutting of live growth."*

Response: Comment Noted**.**

Comment: *" I support and encourage the removal of the greatest amount of canopy through aggressive thinning and clear cutting. This area is in need of remedial forest management."*

Response: Comment Noted**.**

Comment: *"The pre-commercial thinning should be beneficial but "up to 20 acres" seems a trivial amount."*

Response: Comment Noted**.**

Heritage Resources

Comment: "*Regarding the historic road within units 24 and 25, I am afraid that logging in the usual way will obliterate this road unless buffers are left and crossing the road is kept to a minimum. Following the road after the treatment would be difficult, and these features are not renewable*."

Response: These units are proposed for thinning. The current features of the road should remain following treatment. Skidding may occur on the old road, however, where possible, designated skid trails may be placed perpendicular to the road, since the skidding direction and landing is to the north.

Roads

Comment: "*We ask you to strongly consider a winter logging component for this project. Our concerns are for the impact that trucking this volume of harvested timber will have on the roads of Jackson, and the impact of harvesting on our town water supply. We feel that a winter harvesting component will mitigate some of this impact and deserves your every consideration*." (Town of Jackson - Selectmens Office)

Response: Regarding increased maintenance of roads, road maintenance deposites are collected on each timber sale, but are applied only to National Forest roads damaged during haul if such damage occurs. Green

Hill road, a 1000 foot section of Iron Mountain road for unit 28, and Carter Notch Road for units 35 and 36 are the only town roads that log trucks would be on. These roads have been used periodically for National Forest and for private timber sales. Green Hill road was used recently by log trucks for a private timber sale on Iron Mountain. If load limitations are posted on these town roads for all vehicals over certain weights, the purchaser would abide by them too.

Comment: *"When there has been logging above Green Hill Road in the past, the logging trucks proved to be a danger to residents by driving recklessly fast on our quiet country road, and providing lots of noise pollution in the early morning whipping up Green Hill Road***."**

Response: Logging trucks are required to observe the same speed limits and highway laws as the rest of the public. Logging operations follow all federal, state and contractual requirements. When operations are ongoing, the purchaser is required to post signs alerting the public. This standard procedure is designed to insure the safety of other forest users and travelers. Log truck drivers are required to follow posted speed limits on town roads. When laws are violated drivers can be held liable, and contracts can be suspended or shut down for continued violations.

Comment *: "First, Iron Mountain Road from Spruce Brook to Rt. 16 will carry all the truck traffic to and from areas 23 through 34 and 40. As someone who has met large trucks on this road, I can tell you it is scary. These trucks travel fast and the road is narrow and has dips and blind curves. I urge the Forest Service and the Town of Jackson to address this safety hazard***."**

Response: Only unit 28 is planned to be hauled down Iron Mountain road. Units 24 – 27 will come out Meserve Brook road, NFSR 325, and units 29 – 34 would ascend the proposed new road, and then descend Green Hill Road. Therefore, excepting unit 28, units 23 - 34 would descend Green Hill Road, not Iron Mountain Road.

Logging operations would follow all federal, state and contractual requirements to insure the safety of other forest users and travelers. The sale contract requires safety signs on all Forest Roads and trails where activities are occurring. Log truck drivers are required to maintain safe speeds, follow posted speed limits and other posted requirements on Forest and town roads, and meet all contractual requirements. Violations can result in contract shut downs (see Appendix D Mitigations).

Comment: *"I can't disagree more with the proposed logging road into Units 33 and 34. It is too steep and would impact the work JSTF recently did building the Ski Trail/road. This is a good example of trying to do too much in one area, and the land will suffer due to the additional roads"*

Response: Alternative 4 recognized the concerns with the Hall Trail connector, and with its grade, and would modify the grade under alternatives 2 and 3. The proposed modifications to Hall Connector in Alternatives 2 and 3 was clearly an issue for Nordic skiers. Hence, Alternative 4 chose to locate a haul road adjacent to the Hall Trail.

Comment: "*Iron Mountain Road crosses Spruce Brook over a small bridge. We fear that its structural integrity will be compromised by heavy usage of such heavily loaded trucks. I urge the Town of Jackson to make the Forest Service responsible for the maintenance of this bridge during the project and have it returned to its original condition, if not improved, when the project is completed. The Town's taxpayers should not have to shoulder this cost***."**

Response: The bridge has been inspected by a State Highway Bridge Inspector and certified for load limits required for use by logging trucks.

Socio-economic

Comment: **"***If alternative #2 is adopted, it will be very detrimental to the cross country skiing in the area being logged. While one of the proposed benefits of the project is employment, reducing the quality of the skiing will have a negative impact on the influx of skiers and the economy of the Jackson area. If cutting must be done, take alternative #3."*

and

Comment: *"Year round closure of large areas to skier use is unacceptable. I view this as the one sided alternative because it does not balance the economic interests with the interests of the public user of the national forest. This alternative will severely disrupt the winter use and enjoyment of larges areas for thousands of people annually. Further, a large scale closure of some trail systems for several ski seasons will likely severely impact both the Jackson Ski Touring Foundation and the local lodging industry."*

And

"I am concerned about negative impacts on the Jackson economy due to trail closures."

Response: We are aware that winter closure of the Hall Trail would concentrate skiers that use trails on the west side of the Ellis River, or could divert some users to other ski areas or activities. While this impact is difficult to measure, the closure of Hall trail and connector (under Alternative 2) would result in closure of only 8 percent of the groomed skiing provided by Jackson Ski Touring Foundation. Under alternative 3, use numbers are not anticipated to change, as groomed skiing would not be affected, except if otherwise available prior to December 20th in a given year, and then again, only on 8 percent of the trail system.

Alternative 4 would close the Miles Brook side of the Hall Trail for winter logging, but restricts logging off Meserve Brook (South Hall Trail and Connector) to the period prior to December 15th of each year. In addition, an alternative location for access to units 29-34 was analyzed. Following the development of this alternative (timing of closures and access locations, along with the location for Nordic trail #3, Jackson Nordic Ski Touring indicated that Alternative 4 would be acceptable to them.

Comment: "*I do not want to see FS funds expended to expand JSTF trail network*."

Response: No federal funds would be expended to design or construct Nordic ski trails for as part of this project. The skid roads and other transportation corridors are designed for logging, and at the conclusion of logging will be reviewed for applicability for Nordic skiing (trail #3). Work needed to upgrade the proposed ski trail #3 location for groomed Nordic Ski use will be the responsibility of Jackson Nordic Ski Foundation.

Soils

Comment: The (*public comment*) package does not address **direct effects** of the project **on soil productivity**.

"The following comments address the fundamental importance of soil productivity to the health of the WMNF based on these key points:

"Soil productivity is a fundamental issue and must be thoroughly addressed during the planning process.

"The most important issue is what management steps are necessary to preserve soil productivity and stream water quality over the long term on the WMNF.

"Impacts to soils and stream waters from acid deposition will continue to occur until emissions decrease substantially, and must be considered in the planning process.

"Timber harvesting can further exacerbate these soils and streamwater conditions, and adversely impact soil productivity."

Response:

The Popple Environmental Assessment (Chapter 3.6) provides extensive coverage of the direct and indirect effects of the project on soil erosion (pages 89-92), soil calcium (pages 92-98), and soil productivity (pages 91, and 93-98). The EA describes the direct and indirect effects of proposed activities on soil productivity, as well as mitigation measures designed to minimize adverse impacts of harvesting, skidding, and use of log landings.

It provides the following information as evidence that forest and soil productivity has remained constant on the WMNF for many decades, and that this project is expected to have a minimal effect.

1. Field examination, and on-site stocking surveys dating back to the 1960s indicate that nearly all stands previously harvested to regenerate a new forest on the White Mountain NF have met agency requirements for adequacy of regeneration. Very few have required planting. This suggests that forest soil productivity is adequate.
2. No observable change in biomass accumulation trends for hardwood and softwood forest has occurred at Bartlett Experimental Forest since 1934. This is based on continuous re-measurement of permanent plots on one of the oldest Research Forests in the nation. Measurements at other sites including Hubbard Brook Experimental Forest, The Bowl Research Natural Area, and Campton fields (Nuegenkapian 1998) have suggested no changes in forest soil productivity.
3. Mitigation measures described in the Forest Plan and EA are standard measures whose effectiveness has been shown through monitoring since 1986. Additional mitigations used in the Popple project Appendix C exceed standards required in the current Forest Plan, and many exceed standards established in Best Management Practices.
4. No whole tree harvesting is proposed or permitted in the Popple project. This further conserves calcium by preventing removal of the small amount of foliar and branch calcium otherwise lost in whole tree removal.

Comment: The public comment package does not address the **cumulative effect of decades of acid precipitation on forest health.**

"Since the Plan was adopted in 1986, extensive research and numerous research publications have documented many potential impacts from decades of acid precipitation on forest health...."

"The package has no analysis of potential impacts to any alternative from acid precipitation. Future assessment work on this project should include sufficient analysis of existing soil and vegetative conditions, and potential impacts on soil and water quality from acid deposition, in combination with the proposed harvesting and potential impacts on regeneration… "

"The planning process must therefore take into account the cumulative effect of continued acid deposition and timber harvesting on the long term health and productivity of soils on the WMNF."

Response: The "Public Comment Package" sent out for public review in January was not the full Environmental Assessment, but a condensed description of the proposed actions so the public could easily understand exactly what the Forest Service proposes to do, and thereby provide substantive comments and concerns. This is to better comply with the most recent notice, comment, and appeal procedures contained in 36 CFR 215 dated June 4, 2003. The completed Environmental Assessment includes an analysis of the expected direct, indirect, and cumulative effects of the proposed action (and alternatives) on soil productivity and water quality. It also provides a description of other environmental effects and factors, such as acid precipitation, which may have an influence on soils, water, and forest health. These are contained in Chapter 3.6 of the Environmental Assessment for the Popple Vegetation Management Project, pages 89-99. Cumulative effects on soils are more specifically addressed in Chapter 3.6.1.2 and 3.6.2.2.

Concern was raised about the potential impacts of acid deposition and timber harvest on soil productivity, and the need to consider the cumulative impacts of these factors. As described in Chapter 3.6.2.2 (pages 97-99), there are likely to be minor calcium losses from past, present, and planned future harvest activities. However, there is also evidence to suggest that calcium reserves and the ability of young stands to fix calcium from bedrock substrate may offset this loss. The preliminary status of the research in this area suggests that it is premature to conclude forest soils are experiencing an irreversible loss in calcium or other nutrients.

As further cited, "long-term research does not indicate (past) changes in soil productivity or soil health". Soil conditions do not appear to be contributing to decline in forest productivity across the White Mountain National Forest, especially with respect to those lands identified as suitable for timber management. In the absence of evidence that such productivity losses have resulted from past acid precipitation and timber harvest, it is reasonable to conclude that with proper mitigation, the forest ecosystem in the Popple area will continue to function after harvest as it has in the past.

Comment: The EA needs to address **recent research findings** that demonstrate a decline in forest soil productivity across the WMNF (literature cited).

"Numerous studies, documented in peer reviewed scientific journals, establish that both acid deposition and timber harvesting lower the buffering capacity of soils and cause nutrient depletion. In turn, (this) can lead to reduced forest health, thereby reducing timber yield and forest productivity."

"The importance of a careful assessment of current soil productivity in the WMNF, and the potential impact of timber management practices on soil productivity are therefore clear. To address these

important issues further, the report of "Ecologic: Analysis & Communications" by Kathy Fallon, A REVIEW OF ACID DEPOSITION EFFECTS AND THE WHITE MOUNTAIN NATIONAL FOREST PLAN AND DRAFT ENVIRONMENTAL IMPACT STATEMENT ("ECOLOGIC REPORT") brings together and describes the current state of the scientific evidence on these issues."

Response:

The commenter cites a recent report that portrays a decline in soil productivity on the WMNF, and suggests that therefore timber harvest should be constrained. However, the body of available evidence does not really justify that conclusion.

Little doubt exists that there has been depletion of soil calcium due to acid deposition. However, despite the best evidence available, the magnitude of impact is not yet well understood. Our knowledge of soil storage and release mechanisms has not yet allowed us to estimate the overall size of soil nutrient reserves (Bailey 2003). There is evidence of alternative sources of supply besides the traditionally considered soil exchange pool. These include calcium oxolate (Bailey 2003) and direct weathering of minerals by fungal activity (van Breeman 2000; Blum 2000). Recently, in an article published in the Jan. 2005 *Journal of Forestry*, Yanai & Blum, et al observe that, to their surprise, the forest floor in young stands are often found to be gaining Calcium and nutrient content. They theorize that this may be due to a greater ability of fungal hyphae in young roots to weather silicate materials, particularly apatite, as a source of Calcium.

The EA (Chapter 3.6) cites other information to reinforce the notion that data suggesting calcium loss are too preliminary to draw conclusions about long-term forest productivity.

Comment: The EA needs to address whether timber harvest might exacerbate the sensitivity of soils and water quality to further acidification.

"The weight of the scientific evidence demonstrates that soil conditions that cause declines in forest productivity exists across the WMNF, and timber cutting can substantially exacerbate the sensitivity of these soils and stream waters to further acidification."

"No on-site testing of soil conditions or other efforts to assess the current status of tree health, given the acid-deposition to these forest stands that has already occurred, is described in the package. Given that these methods are relatively available, efforts should be made to assess current soil and tree conditions in order to determine the additional impacts of timbering and potential for adequate regeneration."

Response:

Chapter 3.4 of the EA addresses the potential effects of harvest on water quality, including stream chemistry (pages 74-76 and 80-81). The Project Hydrologist concludes in these pages that the effects of harvest and other planned activities on water quality are likely to be minor, localized, and short-term.

Comment: Respondent is concerned that the combined effects of acid precipitation and timber harvest may "fail to meet the State of New Hampshire water quality standards for Outstanding Resource Waters (ORW)".

"The proposed action must adequately consider and analyze the impacts of alternatives 2 and 3 on Outstanding Resource Waters. The State of New Hampshire has designated all surface waters on the WMNF as outstanding resource waters ("ORW"). NH Code of Admin. R. Env-Ws 1708.05(a). The New Hampshire water quality standards require that:

> *...activities shall not permanently degrade water quality or result (at) any time in water quality lower than that necessary to protect all existing and designated uses in the ORW. Such temporary and*

short-term degradation shall only be allowed after all practical means of minimizing such degradation are implemented."

"…(T)he project needs to consider the impact of management activities on ORW's pursuant to the New Hampshire standards under any alternative listed."

Response:

The Ellis River and tributaries in the project area are not only part of the State of New Hampshire's ORW system, but they are part of the Town of Jackson's public drinking water supply. Hence, they were regarded as a municipal water supply in the development of the Popple project. This is a higher standard of protection than an Outstanding Resource Water would require. The project was designed and mitigation measures used to ensure that any effects to waters will be minimal and of short duration, as required for ORWs.

The Forest has a long standing relationship with Jackson Water Precinct (JWP) and we have been involved with them in the development of this project. The Popple project area is part of a municipal watershed serving the Town of Jackson, and the Precinct also owns a parcel of land surrounded by National Forest within the project area. The property has a dam and water impoundment on it. The impoundment is not maintained as a primary drinking water source, but it does provide hydrologic pressure that powers a hydroelectric generator at their well and treatment plant in Jackson, thus providing electric power for the plant. We have designed many mitigations (such as setbacks and buffers) into the project that are specifically designed to protect the impoundment and water pipeline. These mitigations would exceed State and Town's water supply mitigation requirements even if the impoundment were the town's primary drinking water source, which it is not. Also, the haul road discussed previously has the dual advantage of also providing the Precinct improved access to their property for the purposes of better maintaining the dam and impoundment. Safe and reliable access to the dam has been a problem for the Precinct in the past. The District Ranger plans to issue the Jackson Water Precinct a permit for use of the road once the project is complete.

In a February 9, 2005 meeting with Jackson Water Precinct members, we reviewed our plans and discussed their concerns. The dialogue was constructive, and, in a subsequent letter dated February 14, they stated that they are "comfortable" with all efforts made to meet their needs and address their concerns.

Comment: 70% of streams on the WMNF exceed NH water quality standards for aluminum content.

"*The New Hampshire water quality standard of most significance relates to aquatic protection criteria for chronic exposure to aluminum, set at 87 ug/l (see NH WQS in Appendix 3 to the Ecologic Report.) Existing measurements of aluminum in WMNF streams demonstrate that approximately 70% exceed these water quality standards (see below). It must be demonstrated whether the proposed management activities could exacerbate these existing water quality violations."*

"(T)he review that must be taken as part of the EA process must include determining what surface waters in the WMNF currently have aluminum levels that violate New Hampshire water quality standards. As no further water quality degradation can be allowed in these waters, the determination must be made whether any of the proposed management activities could further exacerbate these water quality violations. It must be demonstrated that the management activities will not contribute further to stream acidification, and thereby increase levels of pollutants such as aluminum."

Response:

The Forest Hydrologist examined this issue during her analysis of the Popple Project, and made the following conclusions (which are contained in the EA, page 74-75, and in the Project Record).

Research at Hubbard Brook has indicated that intensive forest harvesting practices have the potential to lower the pH of soil water, which, in turn, can mobilize soil aluminum. However, these results were from a study in which 100% of a watershed was clearcut. The study also concluded that clearcutting about 15% of a watershed did not measurably change the chemistry of the major 1st and 2nd order streams in the watershed (Martin, et al., 1986). This size watershed studied is of similar scale to that used in the water quantity analysis of this report. As seen in Table 13 in the water quantity section of this report, no more than 7% of the basal area of a subwatershed is proposed for removal under any harvesting practice. This 7% basal area removal is in the Miles Brook subwatershed, which is the most heavily harvested of all the subwatersheds. In addition, selection of either Alternative 2 or 4 would result in only 4.3% of the Miles Brook subwatershed being harvested by clearcutting. Less clearcutting is proposed under Alternative 3 than Alternatives 2 and 4. It is therefore unlikely that changes in pH and increases in aluminum concentrations in the streams would result as a consequence of any of the proposed Action Alternatives.

The Popple Vegetative Management Project does not propose to harvest large portions of watersheds. Research shows that watersheds treated with methods similar to those proposed in the alternatives did not exceed water quality standards for nitrate (Stafford, et al., 1996). Previous timber sales have occurred in the Ellis River watershed in the past 10 years. If the acreage of clearcuts which have been harvested in the past 10 years are added to those proposed in any of the Action Alternatives, then the most heavily harvested watershed is the Miles Brook subwatershed, with a potential of 6% of the watershed being harvested by clearcutting. As described under direct/indirect effects, measurable changes in stream chemistry, including decreases in pH and increases in aluminum, are not seen unless at least 15% of a watershed is clearcut (Martin, et al., 1986). Because of this, the removal of vegetation proposed in this sale is not expected to worsen the existing cumulative effect due to atmospheric deposition.

Comment: <u>The Forest needs to determine the presence of, and assess the impacts on, the Management Indicator Species (MIS) and sensitive species in stands proposed for harvest.</u>

"The Forest Service has an obligation to evaluate management activities with reference to identified and adequately monitored management indicator species. However, the project package to this point provides only general and conclusory statements about mitigation under consideration that may address concerns that are raised. Further assessment needs to provide adequate specific detail with regard to the presence of, or impacts on, MIS in the stands proposed for harvesting in this project."

"In order to maintain viable populations of sensitive species the Forest Service must develop and implement management practices and objectives for populations and/or habitat of sensitive species so that they do not become threatened or endangered because of Forest Service actions."

Response:

The public involvement and comment process for the Popple Vegetation Management Project followed the new planning regulations (36 CFR 215) dated June 4, 2003. Steps of the process are displayed in the Public Comment Package in Chapter 1.J. Public Involvement, and further clarified in Appendix D. The Public Comment Package described the Proposed Action and Alternatives and provided a brief summary of effects. It is designed to generate substantive comments, but not to display a complete analysis of effects. That is done in the EA.

The completed Environmental Assessment discloses the environmental effects on MIS and species with viability concerns and habitats affected by the project. The Biological Evaluation, included in the project file, documents effects to species on the Federal list and Regional Forester's Sensitive Species list and is summarized in Appendix B. Management practices proposed in this project are designed to accomplish objectives identified in the White Mountain National Forest Plan to enhance an array of habitat conditions. The Environmental Assessment describes the mitigation measures to be implemented under any action alternative, and discloses the effects to wildlife and plant species. The Popple EA summarizes the analysis of effects on Threatened and Endangered species, sensitive species and on other resources in Chapter 3. Discussions of the summarized analysis regarding MIS is found in the EA, Chapter 3.9, and is summarized in Table 28, section 3.9.1. The complete Wildlife Report and Biological Evaluation are located in the Project File. They describe for each MIS the population trends, the habitat trends, the monitoring information on which these trends are based, and the expected MIS effects of each alternative.

NEPA Process

"*I am pleased to see that laws regarding the public comment process have changed to introduce simplification. It's definitely a step in the right direction as the old methodology is terribly burdensome".*

Response: Thank you for your comment.

Appendix D - Where this Project is in the Forest Service NEPA Process

NEPA is the Forest Service decision-making process. An acronym for the National Environmental Policy Act of 1969, NEPA provides opportunities for interested parties to give their ideas and opinions about resource management. This input is important in helping us identify resource needs, which will shape the alternatives evaluated and lead to the formation of a decision.

This form shows the steps of the NEPA process, and where the attached proposal is in that process.

____ **Step One - Need for a Project**

The Forest Service or some other entity may identify the need for a project.
YOU may bring the need for a project to the attention of the Forest Service.

____ **Step Two - Develop Project Proposal**

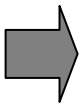
The Forest Service or a project proponent develops detailed, site-specific proposal
YOU may be a proponent who develops a proposal or ***YOU*** can share input and ideas

Step Three - Scoping and Formal Public Comment Period

The Forest Service solicits public input on the site-specific proposal to define the scope of environmental analysis and range of alternatives to be considered.
This combines the scoping period and the formal 30-day public comment period.
YOU provide timely & substantive comments on the analysis during Comment Period

____ **Step Four - Develop Reasonable Range of Alternatives**

If proposal fits categorical exclusion: Forest Service makes & documents decision
If scoping determines need for EA or EIS: Forest Service develops alternatives
YOU suggest alternatives to the proposed action during the scoping process



____ **Step Five – Environmental Analysis and Decision**

Forest Service completes analysis of environmental effects and identifies preferred alternative
Forest Service makes decision to implement one of the alternatives
YOU can review decision; you can appeal if you disagree and you have "*standing*"
Standing: You provided substantive comments during formal period (Step 3)

____ **Step Six - Appeal**

Forest Service allows public 45 days following legal notice of decision to appeal
YOU may file formal Notice of Appeal

____ **Step Seven - Implementation**

Forest Service implements the project
YOU may contribute labor, equipment or funding to implement the project

____ **Step Eight - Monitor and Evaluate**

Forest Service monitors and evaluates project results
YOU provide feedback on the project to the Forest Service

Appendix E – Glossary of Terms

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.

Design criteria. Various practices, standards, and guidelines for eliminating or reducing undesirable impacts to resources.

Desired Future Condition. A goal, as stated in the Forest Plan, as to what a specific area should look like in the future.

Ecological Classification – a multifactor approach to categorizing and delineating, at different levels of resolution, areas of land and water having similar characteristic combinations of physical environment, biological communities, and human factors**.**

Ecological Land Type (ELT) – an area of land with a distinct combination of natural, physical, chemical, and biological properties. In an undisturbed state and at a given stage (sere) of plant succession, an ELT is usually occupied by a predictable plant community.

Even-aged Management – management that regenerates and maintains a stand with a single age class. Even aged stands are composed of a single age class in which the range of tree ages is usually plus or minus 20 percent of the rotation. Harvest methods producing even-aged regeneration aged stands in this project include:

- **Clearcut:** a removes essentially all trees not designated to be "reserved", in one operation and results in a single aged stand.

Uneven-aged (selection) methods - Uneven-aged management is a planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes. Uneven-aged stands are either intimately mixed or in small groups. An un-even aged management system is a planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes. Examples of uneven-aged treatments include group selection and single tree selection.

- **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.

- **Single-Tree Selection -** Individual trees of all size classes are removed more or less uniformly throughout the stand, to promote growth of the remaining trees and to provide space for regeneration.

Thinning - a cultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality. Thinnings are not regeneration treatments.

Thinning interval is the preiod of time between successive thinning entries. Thinning intensity is the combined effect of thinning severity and thinning frequency, usually expressed as the volume removed divided by the number of years between successive thinnings.

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

> Sawtimber minimum piece specification requires a minimum diameter outside bark of 9.0 inches for softwood and 11.0 inches for hardwood and 40 percent sound wood.
>
> Pulpwood minimum piece specification requires a minimum diameter outside bark of 5.0 inches and 50 percent sound and reasonably straight.

Forest Type – A category of forest usually defined by its vegetation, particularly its dominant vegetation, based on percentage cover of the dominant trees. Type is also referred to as stand type.

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 (IDT) 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.

Management Area. A specific geographic location on the WMNF where specific management direction will be applied.

Management Indicator Species (MIS). Species whose presence in certain locations indicates a given environmental condition. Their population changes are believed to indicate effects of management activities on a number of other species.

Mitigation Measure. Includes avoiding an impact altogether by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Monitoring. The collection of site specific information gathered over time by measuring change in an indicator or variable to determine the effects of resource management treatments.

Openings:

> **Permanent openings**. An upland area withdrawn from timber production and managed for wildlife habitat. Trees and shrubs may or may not be present. If trees are present, they could occur in clumps and/or scattered through the area.
> **Temporary openings**. Openings that result from timber harvest activities in an area where nearly all trees are removed. Many wildlife species that utilize openland habitat, utilize these areas until tree regeneration dominates the stand. Temporary openings can provide habitat for openland wildlife species for 5-10 years. These areas are considered temporary openings until the regeneration exceeds 10 feet in height.

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 that includes stream channels, lakes, adjacent riparian ecosystems, flood plains, and wetlands.

Road reconstruction - rebuilding a road to the standard originally constructed. An example would be 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 or building road to a higher standard that an existing road, including improvements to an existing road not classified on the WMNF road system.

Scoping. Identifying and focusing attention on public issues and opportunities related to a proposed action, during the analysis phase. Public involvement through public scoping results in informed decisions, cost-effective analysis, and increased credibility.

Silviculture - A combination of actions whereby forest stands are tended, including actions that harvest trees, modify forest types, and convert stands to even age, uneven aged and/or early successional ages.

Temporary road, or Un-classified road - a low standard road constructed for a single entry with a minimum of disturbance and that is waterbarred and closed following use.

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.

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

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

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

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.

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