United States Department of Agriculture
Forest Service
White Mountain National Forest
Pemigewasset Ranger District
1171 NH Route 175
Holderness, NH 03245-5031
Comm: (603) 536-1315
TTY: (603) 536-3281

File Code: 1950
Date: July 7, 2008

Dear Planning Participant,

The Pemigewasset Ranger District of the White Mountain National Forest is in the process of finalizing the Environmental Assessment (EA) for the Stevens Brook Project. I am enclosing the EA for a 30-day comment period. The project proposes harvesting three million board feet of timber, protection and enhancement of wildlife habitat and management of Forest Road 429 in the towns of Rumney and Wentworth, New Hampshire.

It has been since August, 2006 that you were last contacted about the Stevens Brook Project. Over the course of the last year, we had some personnel changes. District Ranger, John Serfass retired in June of last year. As the new District Ranger, I have now had a chance to review the proposal on the ground and I feel that the analysis fully discloses the environmental effects of the project.

I am requesting your comments because we are at a point where your input will be most useful and meaningful for my consideration in the final decision. To attain standing and to appeal the decision I make on this project proposal, you must submit comments regarding the enclosed document during this period. There will be no other comment period for this project proposal. Your comments must be timely and substantive to assure that I have the opportunity to consider them before we complete the analysis and I make a decision on this project. Instructions for submitting your comments are included with this letter (How to Comment on the Stevens Brook Project, 30-Day Comment Information).

Please review these instructions carefully. Be aware that your name, address and comments will become part of the public record and may be available for public review. Thank you for taking the time to participate in this process. Your comments and involvement are important to me. If you have any questions, please contact me or Janice Mulherin at 603-536-1315. The Stevens Brook EA will also be available on the White Mountain National Forest website (www.fs.fed.us/r9/white).

Sincerely,

/s/ Molly Fuller
MOLLY FULLER
District Ranger

How to Comment on the Stevens Brook Project, 30-Day Comment Information

In June 2003, the USDA-Forest Service issued new implementing regulations (Title 36, Code of Federal Regulations, Part 215) for notice, comment and appeals. The following instructions incorporate these changes. The new regulations allow only those who submit ***timely and substantive*** comments to be eligible to appeal my final decision. To assure that I receive and can consider your comments in my decision, please review these instructions carefully.

TO BE TIMELY your comments must be received or postmarked within 30 calendar days following the publication of the legal notice in the Union Leader. When the comment period ends on a Saturday, Sunday or Federal holiday, comments will be accepted until the end of the next Federal working day. If you do not have access to the Union Leader, please call the Pemigewasset Ranger Station at 603-536-1315 (TTY 603-536-3281) for the published date.

TO BE SUBSTANTIVE your comments must be within the scope of the proposed action, specific to the proposed action, have a direct relationship to the proposed action and include supporting reasons as to why I should consider your comments in the EA and my decision. Substantive comments should enhance the project analysis and provide meaningful and useful information about your concerns.

It is the responsibility of persons providing comments to submit them by the close of the comment period. Individuals and organizations wishing to be eligible to appeal must provide the following information:

1) Name, address and telephone number;
2) Title of the proposed action (Stevens Brook Project);
3) Specific substantive comments on the proposed action, along with supporting reasons the Deciding Official should consider in reaching a decision; and
4) Signature or other verification of identity upon request; identification of the individual or organization who authored the comments(s) is necessary for appeal eligibility.

Comments should be directed to Ammonoosuc-Pemigewasset District Ranger Molly Fuller as follows:

- Written comments must be postmarked by the Postal Service, e-mailed, Faxed or otherwise submitted by 11:59 pm ET on the 30th calendar day following publication of the legal notice.
    - Letters should be submitted to Molly Fuller, District Ranger, Attn: Stevens Brook Project – Janice Mulherin, 1171 NH Route 175, Holderness, NH 03245. Hand delivered letters should be submitted during these office hours: Monday through Friday, 8:00 am - 4:30 pm;
    - FAX comments should be sent to 603-536-5147; and
    - E-mail comments should include an identifiable name and be sent to: (**comments-eastern-white-mountain-ammo-pemi@fs.fed.us**)

Comments submitted as electronic documents must be in plain text (.txt), rich text format (.rft) or Word (.doc) format. When you submit your comments to this e-mail address, you should receive an automated electronic acknowledgement as confirmation of receipt. If you do not receive acknowledgement, it is your responsibility to ensure timely receipt by other means.

- Oral comments may be submitted Monday through Friday 8:00 am to 4:30 pm, either by phone (603-536-1315, TTY 603-536-3281) or in person; and must be received by the close of business on the 30th calendar day following publication of the legal notice.

White Mountain National Forest

United States
Department of
Agriculture

Forest
Service

**Eastern
Region**

Stevens Brook Project

Environmental Assessment

Towns of Wentworth & Rumney
Grafton County, NH
Prepared by the
Pemigewasset Ranger District
July 2008

For Information Contact: Janice Mulherin
Pemigewasset Ranger District
1171 NH Rt 175
Holderness, NH 03245
603 536-1315
TTY 603 536-3281

Figure 1 (cover). Stevens Brook. (WMNF photo by Livia Crowley)

This document is available in large print.
Contact the Pemigewasset Ranger District
603-536-1315
TTY 603-536-3281

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Contents

Chapter 1 — Purpose and Need for Change

1.1 Introduction

The Pemigewasset Ranger District of the White Mountain National Forest is proposing a forest management project that would increase wildlife habitat and forest diversity and produce high quality timber and other forest products through the harvest of 3.0 million board feet of timber in the Stevens Brook area of Wentworth and Rumney, Grafton County, New Hampshire. This Environmental Assessment (EA) explains the purpose of and need for the proposed project, and considers two alternative means for accomplishing it. There is also a "No Action" alternative that looks at the effects if the project is not undertaken. The EA includes a description of the physical, biological, and socio-economic settings within the area surrounding the Stevens Brook project, and discloses the direct, indirect, and cumulative impacts that could result over time under each alternative.

The White Mountain National Forest Plan

The proposal presented here is tiered to the White Mountain National Forest's *Land and Resource Management Plan* (the *Forest Plan* – USDA 2005a), approved in 2005 after eight years of extensive environmental analysis and collaboration with the public. Thousands of people representing a variety of interests, sciences, and specialties joined in the effort by way of public meetings, discussions, document reviews and comments, and scientific study. The 2005 Forest Plan reflects the agreed-upon balance of uses to meet society's needs while protecting, restoring, and enhancing our natural resources.

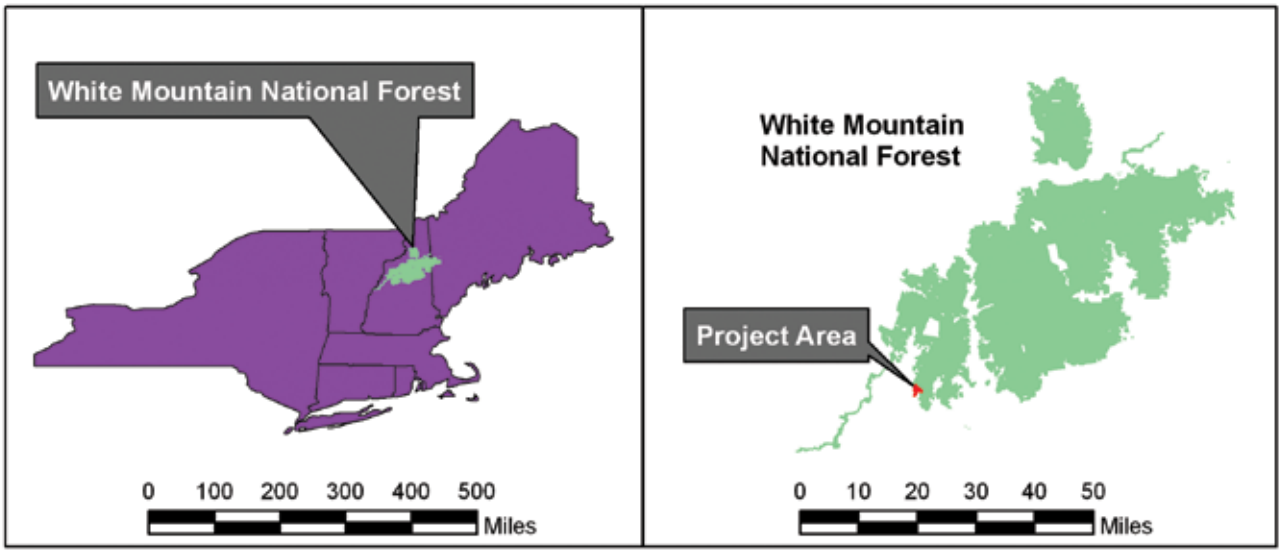
The Forest Plan guides our land management activities for about 15 years, when it will again be revised. Until then we are charged with implementing the 2005 Forest Plan to achieve our goals, objectives, and vision of the desired conditions for the White Mountain National Forest.

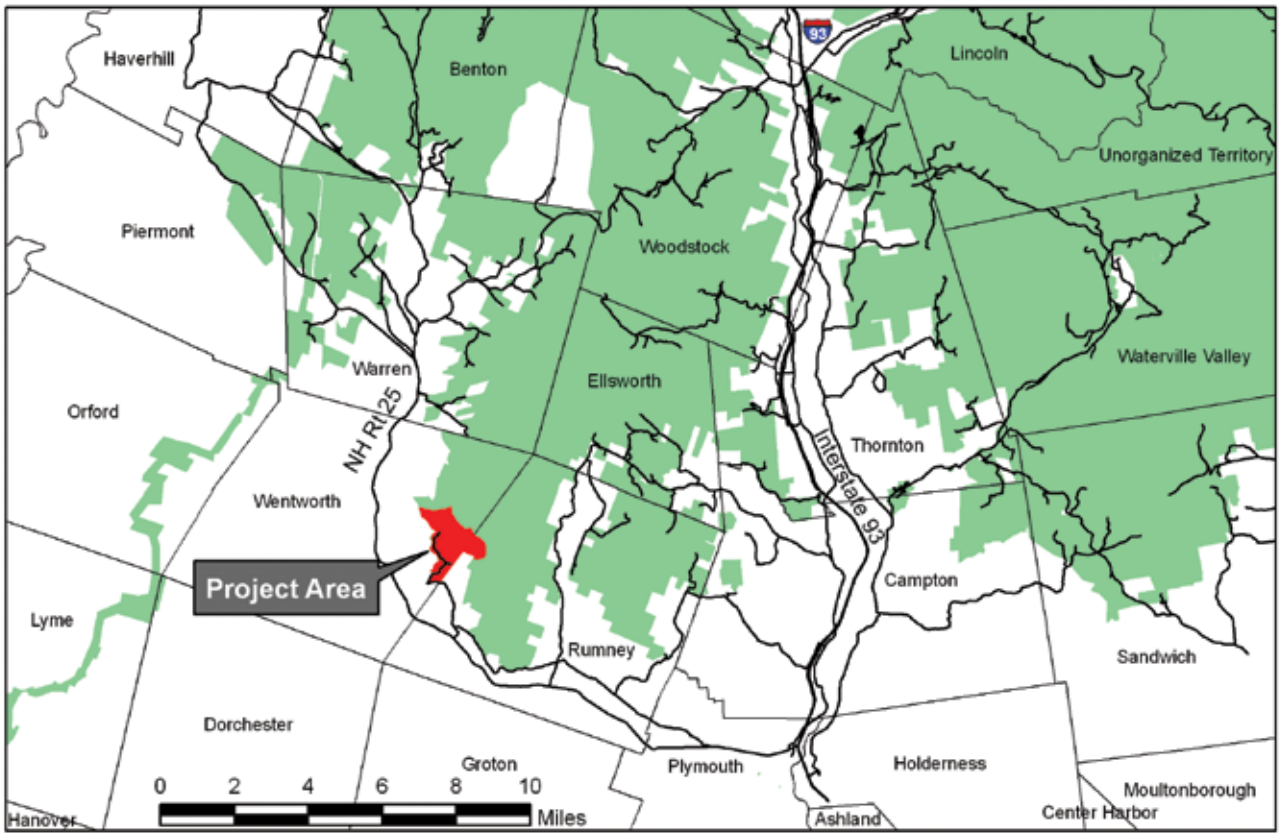
The Stevens Brook project proposal is designed to carry out the direction of the Forest Plan. This Environmental Assessment was prepared in compliance with the National Environmental Policy Act of 1969, and will provide a basis for the District Ranger to make an informed decision.

1.2 Background

The **Stevens Brook Project Area** consists of approximately 1,000 acres of National Forest System lands located within the towns of Wentworth and Rumney, in Grafton County, New Hampshire (Map1). It has a history of agricultural use dating back to the early 1800s, as evidenced by the presence of "old field" white pine, an apple orchard, and cellar holes. Since the early 1900s, the area has naturally reverted to forest land. The orchard has been maintained as a permanent wildlife opening and is mowed on a regular basis. Bordered on the west by Stevens Brook and on

Map 1. Stevens Brook Project Vicinity.





the north by Ames Mountain, the project area abuts private land on three sides (refer to Map 2). Since the 1950s, it has been actively managed for wildlife habitat and forest products, with the most recent timber harvest taking place in the early 1990s. In addition to providing forest products, the area offers a limited variety of recreation activities, such as walking on Forest Road 429, scenic and fall foliage viewing from Buffalo Road and Route 25, mountain biking, snowshoeing, wildlife watching, hunting, fishing, and firewood gathering.

The project area is comprised of one of the fifteen Management Areas (MAs) that the Forest Plan allocated across the Forest to emphasize particular goals, objectives, and desired conditions. Each MA has specific standards and guidelines that set parameters on activities to ensure protection of the character of the land and the goals assigned to it. A complete description of each Management Area can be found in Chapter 3 of the Forest Plan.

The Stevens Brook area is within Management Area 2.1 – General Forest Management – that allows for a range of uses and activities, including timber harvest, roads, motorized recreation such as snowmobiling, and developed areas such as campgrounds. It also provides for a balanced mix of habitats for wildlife species and high quality sawtimber and other forest products on a sustained-yield basis, and is the only management area that allows for scheduled timber harvesting activities. MA 2.1 is fully described in the Forest Plan, pages 3-3 through 3-8.

1.3 Purpose and Need for Change

The **purpose** of this project is to accomplish resource objectives for MA 2.1 lands in the Stevens Brook area, specifically addressing wildlife habitat, vegetation, and transportation (roads) objectives (Forest Plan, pp 1-15 to 1-22).

The **need for change** is identified by comparing the existing conditions on the ground with the desired conditions as established in the Forest Plan. Management activities are designed to either maintain existing desirable conditions or help move the land closer to those desired conditions.

Wildlife Habitat

One of the most important wildlife issues today in New England is the decline of early-successional habitats and the species associated with them (DeGraaf et al. 2006). The desired condition for wildlife habitat calls for a mix of habitats across the forest, including various **forest types, age classes and non-forested habitats** (Forest Plan, pp 1-20 to 1-21 and 2-33 to 2-36). In particular, the Proposed Action for the Stevens Brook Project would:

- Manage forest composition for the broad habitat types of northern hardwood, mixedwood, and spruce-fir forest consistent with land capability.
- Where ecologically feasible, maintain less common within-stand features such as aspen-birch, oak, pine, butternut, and hemlock inclusions.
- Maintain high quality mature forest and old forest habitats.

- Provide regeneration-age forest and expand an existing orchard opening to sustain biological diversity and support species that prefer those habitats.
- Perpetuate the softwood and oak component and create hardwood browse adjacent to the known deer yard in the Stevens Brook Project Area.

Need for Change – Wildlife Habitat

Habitat Types and Age Class Diversity

The wildlife habitat needs in the Stevens Brook Project Area were identified by examining specific stands and considering land capability, existing age, composition, and condition. Opportunities to meet desired age and habitat objectives through treatment of individual stands were then identified and incorporated into the timber harvest proposal. The Desired Future Condition calls for 23 percent to 50 percent in the mature age class, with 1 percent to 7 percent in the regeneration age class.

The MA 2.1 land in the Upper Rattlesnake HMU is located in four separate areas: one each in the northeast and southeast corners, and two in the southwest corner. There are opportunities to diversify habitat types and age classes in these areas, as defined in the Forest Plan and its Appendix D. Currently, no regeneration age (0 to 9) stands exist within the 13,225 acre HMU, and regenerating forest in this age class would provide essential nesting and foraging habitat for a wide variety of wildlife that use it for all, or part, of their life cycle. In the Stevens Brook Project Area, there are also opportunities to perpetuate spruce-fir, mixedwood, and inclusions of aspen-birch and oak-pine habitats to increase wildlife habitat diversity in the project area and the HMU.

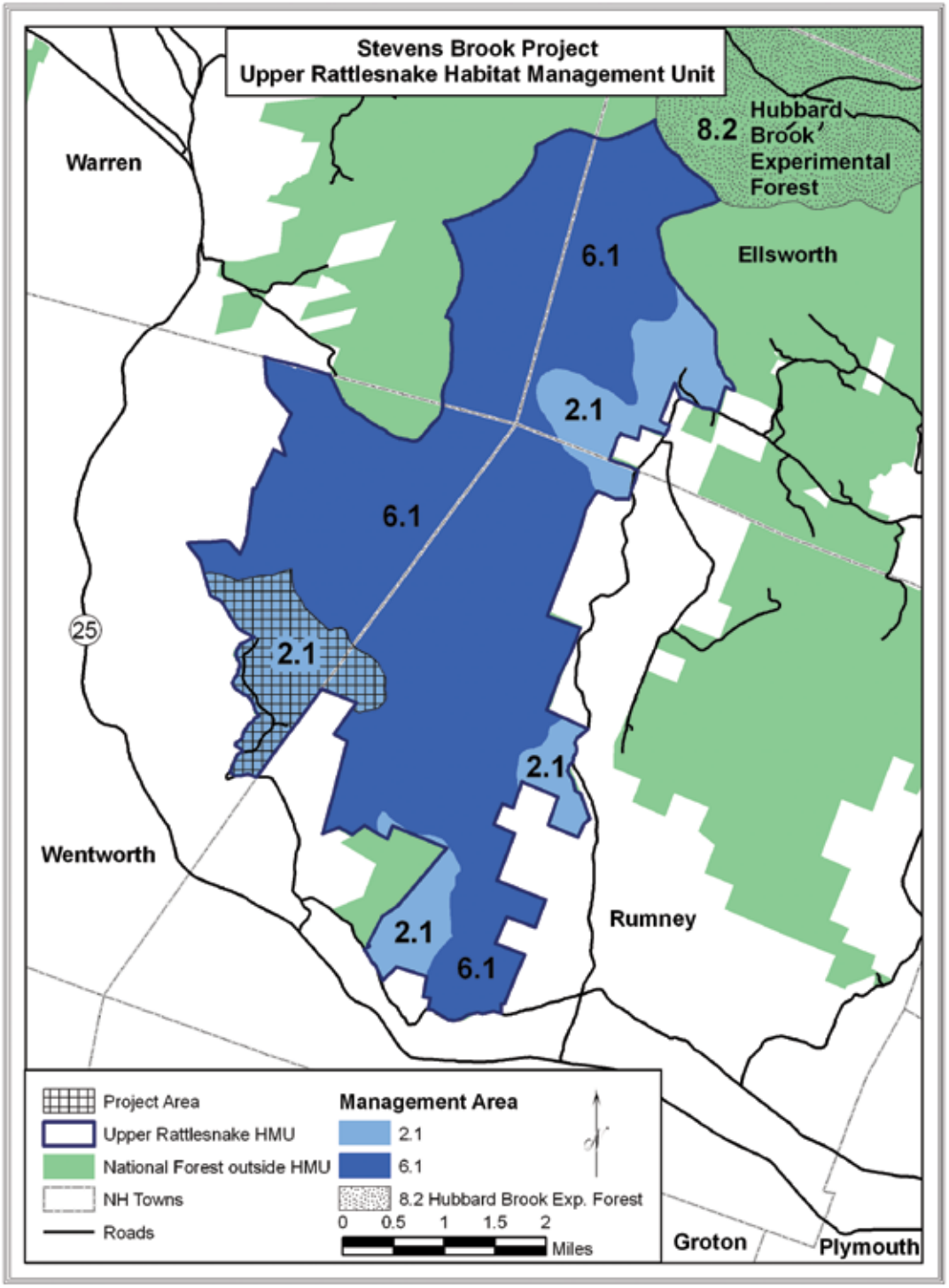
Non-Forested Habitats

Wildlife often take advantage of openings in the forest for forage. This project presents the opportunity for wildlife to temporarily use five proposed log landings after harvest is completed. There is also an opportunity to expand an existing two-acre apple orchard opening by three acres to meet the habitat needs of a variety of wildlife. Many species use these habitats, and very little is currently available.

Vegetation

The desired condition for vegetation calls for management using an ecological approach to provide both healthy ecosystems and a sustainable yield of high quality forest products, such as sawtimber. Management for commercial products uses integrated prescriptions that protect biotic and abiotic resources and are compatible with the level of recreation use on the Forest (Forest Plan, pp 1-17 and 3-3). Harvest prescriptions need to consider land capability to promote species best adapted to specific sites. Land capability is defined as the inclination of the land to grow a particular forest type given the soils, climate, geology, aspect, and elevation of the site.

Map 2. Upper Rattlesnake Habitat Management Unit (HMU) Showing Management Areas.



Need for Change – Vegetation

Between 91 and 99 percent of the stands within the Upper Rattlesnake HMU are mature. To provide for healthy, sustainable and productive forests, these older stands should be regenerated. The HMU objective for ranges from 47 percent of the hardwoods to 50 percent of the mixedwood stands in the mature age class. Field examinations by resource specialists have identified specific stands that are in need of treatment to move toward the desired conditions while providing a mix of sawtimber and pulp volume for local markets. Field visits to proposed treatment areas by foresters and biologists identified the following needs.

- The need to manage mature stands with the goal of creating a more desirable stocking of species, sizes, and quality of trees, while providing for long-term forest diversity and for a sustainable yield of forest products, especially paper birch, aspen, red oak, and white pine.
- The need to reduce overall stocking and to increase the softwood component in mixedwood stands where soils indicate softwood capability
- The need to reduce overall stocking and improve stand quality in oak stands.

Forest Health and Productivity: Timber harvest in identified mature stands would promote the health and vigor of the residual trees. Opening up the canopy by removing some of the suppressed, lesser quality trees would enhance growth of the remaining trees and encourage desirable species to regenerate. The paper birch and aspen are declining due to maturity. In the project area, beech trees are infected with beech bark disease.

All proposed harvesting has a site-specific objective to meet desired conditions for either wildlife habitat or vegetation; in many instances, harvest prescriptions are designed for both. The stands, harvest treatments, and management objectives are described in Chapter 2, Section 2.2, and in Table 1.

Field visits to proposed treatment areas by foresters and biologists identified the following conditions in the project area.

- Between 91 and 99 percent of the stands within the Upper Rattlesnake HMU are mature.
- The paper birch and aspen are declining due to maturity, with other species moving into the canopy of these stands.
- Red oak and white pine stands are growing in with other, less desirable species, such as beech, which could eventually result in conversion of the stands from oak-pine habitat.
- Many mature stands are densely stocked, resulting in slowed growth and reduced vigor.
- Land capability indicates that many mixedwood stands in the area should be spruce-fir forest.
- In the project area, many beech trees are infected with beech bark disease.

- Stands previously harvested using group selection have young vegetation growing in so densely that growth of desired species is suppressed.

Based on the existing conditions in the area and the desired condition in the Forest Plan (pp 1-17 and 3-3), there is a need to:

- Regenerate aspen and paper birch stands to maintain this forest type and improve the health of these stands.
- Improve species composition in oak and pine stands.
- Improve size and quality of trees in mature northern hardwood, mixedwood, oak, and pine stands.
- Provide a sustainable yield of forest products to local markets, including both sawtimber and pulp.
- Increase the softwood component in mixedwood stands where land capability indicates an increase is appropriate.
- Remove suppressed, lower quality trees to enhance growth of the remaining trees, and to encourage desirable species to regenerate.
- Reduce the number of young trees growing in previously harvested groups to encourage development of desired species.

Details of management objectives for individual stands are described in Chapter 2, Table 1.

Transportation (Roads)

The desired condition for our Forest Roads is to provide a safe, efficient, and seamless transportation and parking network that allows for current, continued, and projected management use and enjoyment of the Forest. As funding is available, roads not needed to meet management objectives will be decommissioned, and those retained will be maintained to meet Forest standards and the requirements of the Highway Transportation Safety Act (Forest Plan, pp 1-16 to 1-17).

An analysis of the existing road system in the Stevens Brook Project Area was conducted to determine the need for retaining or decommissioning roads or road segments (Roads Analysis in project record). Roads needed to meet long-term management objectives will be retained or added and included as forest roads in our Forest roads database, while unneeded roads will be decommissioned.

Need for Change – Roads

Road Classifications: Our analysis considered 22.2 miles of existing road under Forest Service jurisdiction in the project area. We will retain most roads for long-term forest management, and will plan decommission of approximately 2.0 miles of existing road. This decommission will be done through a database update; no ground disturbance is proposed because thewse roads are now c overed with trees and other vegetation and no culverts or other structures need to be removed (see Figure 2).

Figure 2. Forest Road U-1031 and U-1032 in the Stevens Brook project area, proposed for decomissioning. (WMNF photo by Janice Mulherin)

1.4 Public Involvement

The Stevens Brook project was first published on the quarterly Schedule of Proposed Actions (SOPA) in October 2004. On August 3, 2006, a scoping letter was sent to interested people, abutters, and various agencies and organizations. Comments received during the scoping period were instrumental in the early stages of identifying issues and developing possible alternatives to the proposed project. We received seven responses, which we examined for significant issues and potential design features. Comments and Forest Service responses are in Appendix A.

Issues

On-going field examinations, data analysis, discussion by resource specialists, and public input helped the Interdisciplinary Team (IDT) refine the project proposal. Most concerns were addressed through minor modifications of the Proposed Action or the development of project design features intended to protect resources

and provide for public safety where necessary (Chapter 2). Concerns that could not be resolved through small changes or design features were identified as "issues" and were used to develop alternatives to the Proposed Action.

Issue 1: Inventoried Roadless Area Characteristics

Some respondents expressed concern that proposed timber harvest in the 2005 South Carr Mountain Inventoried Roadless Area (IRA) would adversely affect the roadless and wilderness characteristics of the IRA, reducing the size of the area that will meet inventory criteria in the future and therefore impacting its eligibility for future wilderness designation (Appendix A).

This public concern led to the formation of **Alternative 3: No Harvest in 2005 South Carr Mountain IRA.**

1.5 Decision to be Made

The purpose for this Environmental Assessment is to provide the responsible official with sufficient information and analysis to make an informed decision about the Stevens Brook Project. In addition to the information in the EA and project record, the responsible official will consider public comment to decide the following:

1. Which of the alternatives would best meet the Purpose of and Need for Action and move the Stevens Brook Project Area toward the Desired Future Condition outlined in the Forest Plan?
2. Which of the alternatives best addresses relevant issues raised by the public and the Interdisciplinary Team?
3. Would the Proposed Action or the alternatives pose any environmental impact to warrant the need for an Environmental Impact Statement (EIS)?

Chapter 2 – Alternatives

2.1 Introduction

This Environmental Assessment explores the differences between the proposed action and two possible management alternatives for the Stevens Brook Project Area. Each alternative could be implemented if selected, and together they provide a framework for analyzing different ways to meet the purpose and need stated in Chapter 1. This chapter includes:

- A description of alternatives considered in detail and design features.
- A comparison of alternatives (Table 3).
- How the alternatives were developed.

2.2 Alternatives

Alternative 1: No Action

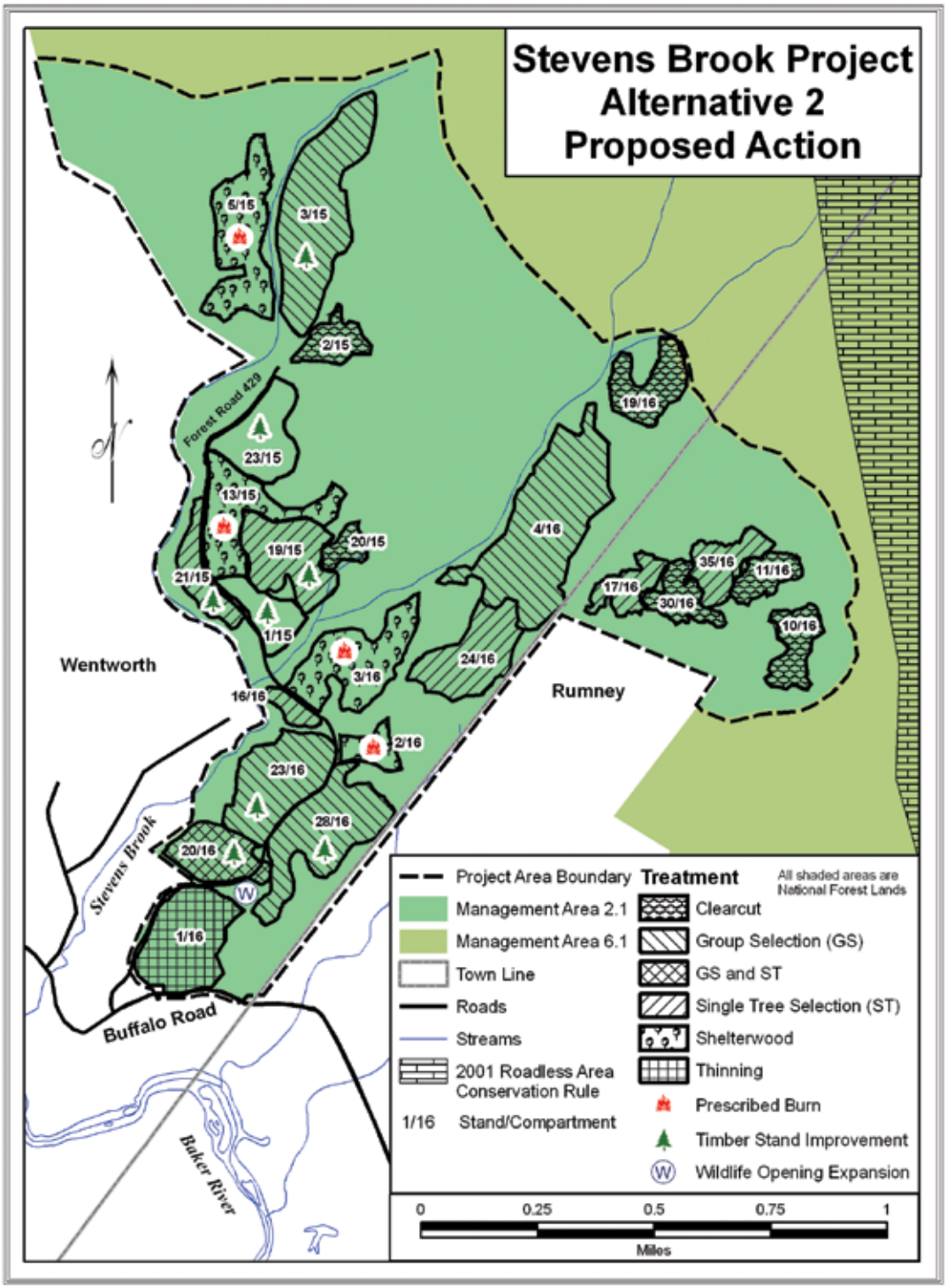
Under this alternative, there would be no change to the existing condition except from natural occurrences: no harvest of trees, no increase in wildlife habitat diversity nor expansion of an orchard opening or use of log landings as temporary wildlife openings after harvesting. While this alternative does not meet the Purpose of and Need for Action, it does provide a basis for analyzing the effects of not conducting any new management activities (No Action) in the project area and comparing these effects with alternatives that do propose management activities. This alternative is required by regulations implementing the National Environmental Policy Act (NEPA).

Alternative 2: Proposed Action

The details of the Proposed Action are displayed in Table 1 and Map 3. The Proposed Action is summarized as follows:

- Create regeneration age class (0-9 years old) forest habitat on 129 acres through clearcutting and shelterwood harvests.
- Use prescribed fire treatments on selected units after timber harvest to encourage oak regeneration; fire may occur on the same site more than one time, depending on post-treatment survey.
- Promote habitat diversity with 130 acres of group selection treatments.
- Promote high quality timber with 22 acres of commercial thinning and 65 acres of single tree selection.
- Improve future stand quality and productivity by hand thinning 27 acres of existing young stands, and in the groups created as a result of previous harvests.
- Use three existing log landings and create five new landings, which will become temporary wildlife openings after harvesting.

Map 3. Alternative 2 (Proposed Action).



- Provide 3.0 million board feet of sawtimber and pulpwood.
- Maintain approximately 1.8 miles of existing roads. This will be accomplished by treating needed areas for erosion control (seeding and water bars). Install temporary drainage structures, such as culverts, and a temporary 32-foot bridge from mile 1.0 to the end. Forest Road 429 will be returned to closed status at the conclusion of this project.
- Improve wildlife habitat by creating regeneration age habitat (browse) near a deer yard and perpetuating oak and beech to provide mast for various wildlife.
- Expand the existing permanent two-acre orchard opening by approximately three additional acres.
- Update the database to reflect the decommissioning of Forest Roads 4194, U-1031, and U-1032.

Table 1 lists the stands, forest type of harvest, approximate acres, age class, season of operation, and treatment objectives for each stand proposed for treatment. Season of operation is only identified for treatment that would result in ground disturbance.

Map 3 shows the location of the stands proposed for harvest, as well as the location of other proposed activities for the alternatives.

Table 1. Alternative 2: Proposed Action Location of Stands Where Activities Would Occur.

Stand-Compartment	Forest Type	Acres[1]	Age Class / Age in Years[2]	Season of Operation	Treatment Method	Treatment Objectives
1-15	Northern Hardwood	9	Young	n/a	TSI	Release desirable species
2-15	Northern Hardwood	7	Mature / 117	W	CC	Regenerate aspen and birch
3-15	Mixedwood	37	Mature / 107	W	GS[3]	Regenerate hardwoods, release softwoods
5-15	Oak	24	Mature / 121	S/F	Shelterwood Rx Fire	Regenerate oak, increase pine composition. Prescribe burn for oak regeneration
			Young	n/a	TSI	Release desirable species in existing groups.
13-15	Northern Hardwood	24	Mature / 107	S/F	Shelterwood Rx Fire	Regenerate hardwood, increase oak composition. Prescribe burn for oak regeneration
19-15	Northern Hardwood	18	Mature / 108	F/W	ST	Regenerate and increase sugar maple composition
20-15	Northern Hardwood	6	Mature / 104	W	CC	Regeneration aspen, birch and other hardwoods
21-15	Mixedwood	8	Mature / 121	W	ST	Regenerate

Stand-Compartment	Forest Type	Acres[1]	Age Class / Age in Years[2]	Season of Operation	Treatment Method	Treatment Objectives
23-15	Northern Hardwood	18	Young	n/a	TSI	Improve stand quality
1-16	Red Oak	22	Mature / 100	S/F	Thin	Improve stand quality
2-16	Pine	5	Mature / 117	S/F	Shelter-wood Rx Fire	Regenerate, increase pine and oak composition. Pre-scribe burn for oak regenera-tion
3-16	Mixedwood	27	Mature / 105	S	Shelter-wood Rx Fire	Regenerate, increase pine and oak composition. Pre-scribe burn for oak regenera-tion
4-16	Northern Hardwood	45	Mature / 106	W	GS	Enhance within-stand diver-sity: Regenerate aspen, paper birch
10-16	Paper Birch	9	Mature / 81	W	CC	Regenerate aspen, birch and other hardwoods
11-16	Paper Birch	7	Mature / 81	W	CC	Regenerate aspen, birch and other hardwoods
16-16	Mixedwood	3	Mature / 116	W	ST	Regenerate and salvage mortality
17-16	Northern Hardwood	8	Mature / 106	W	ST	Improve wildlife cover by increasing hemlock
19-16	Paper Birch	12	Mature / 103	W	CC	Regenerate aspen, birch and other hardwoods
20-16	White Pine	13	Mature / 106	S/F/W	GS/ST	Regenerate white pine and improve residual stand. Locate 3 acre group adjacent to permanent orchard opening to expand opening size
			Young	n/a	TSI	Release desirable species in existing groups
23-16	Mixedwood	23	Mature / 106	S/F/W	GS	Regenerate softwood and oak
			Young	n/a	TSI	Release desirable species in existing groups
24-16	Mixedwood	18	Mature / 90	W	ST	Improve wildlife cover by increasing softwoods
			Young	n/a	TSI	Release desirable species in existing groups
28-16	Mixedwood	25	Mature / 100	S/F/W	GS	Regenerate softwood and oak
			Young	n/a	TSI	Release desirable species in existing groups
30-16	Paper Birch	8	Mature / 103	W	CC	Regenerate aspen, birch and other hardwoods

Stand-Compartment	Forest Type	Acres[1]	Age Class / Age in Years[2]	Season of Operation	Treatment Method	Treatment Objectives
35-16	Northern Hardwood	10	Mature / 106	W	ST	Improve wildlife cover by increasing hemlock
TOTALS		**386**				

[1] Numbers are approximate stand acres.

[2] Approximate age is determined from an increment boring of a representative tree in the stand.

[3] Under a Group Selection treatment, only a percentage of the stand is harvested.

Season of Operation (S = summer, F = fall, W = winter). Operations would be allowed outside of assigned operating seasons if ground conditions allow (i.e., ground is dry or frozen).	
Harvest Method	
CC = Clearcut	**ST/GS =** Single Tree Selection & Group Selection
GS = Group Selection	**Thin =** Commercial Thin
ST = Single Tree Selection	**TSI =** Timber Stand Improvement (non-commercial)
Rx Fire = Prescribe Fire	**MBF = Thousand Board Feet** (one **board foot** is equivalent to a plank 1 inch thick and 1 foot square).

Alternative 3: No Timber Harvesting Activities in the South Carr Mountain 2005 Inventoried Roadless Area

Alternative 3 (Map 4) responds to an issue raised by the public during the scoping period for an alternative that "does not log or build roads in the South Carr Mountain inventoried roadless area." This alternative eliminates all timber harvest and timber stand improvement activities within the South Carr IRA. **None of the alternatives being analyzed for the Stevens Brook Project proposes any road construction.**

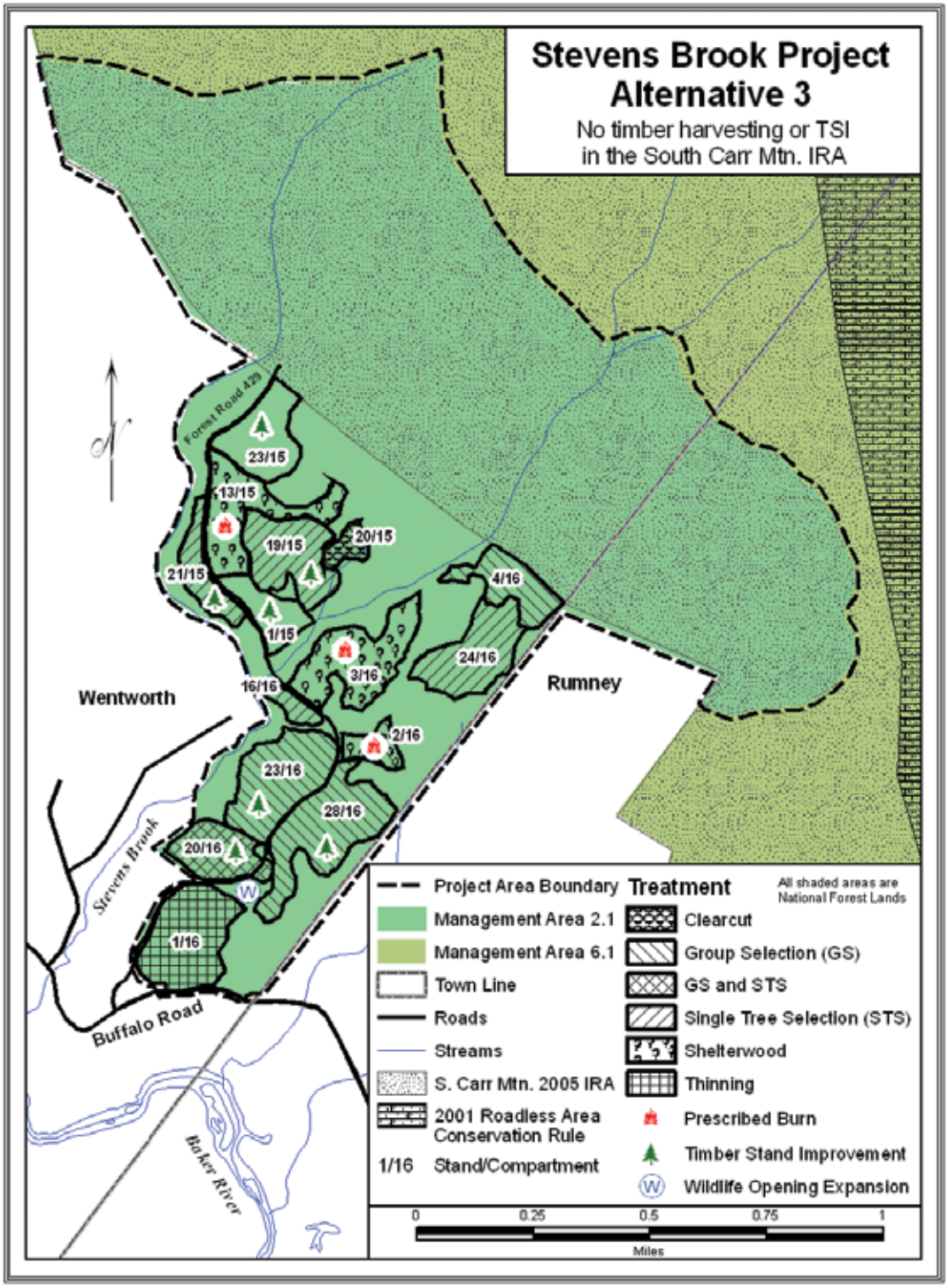
IRAs were delineated during Forest Plan revision for the purpose of evaluating areas having potential for Congressional designation as Wilderness. The evaluation did not recommend this IRA for Wilderness. The Forest Plan subsequently allocated the land to various management areas, including MA 2.1 which allows timber harvest and road work. See Appendix C of the Final Environmental Impact Statement (USDA Forest Service 2005b pp C-92 to C-100) for details and results of the South Carr IRA evaluation.

See Table 2 for details on treatment proposed in this alternative, which differs from Alternative 2 as follows.

1. There would be no timber harvest in Compartment 15, Stands 2, 3, 5; Compartment 16, Stands 10, 11, 17, 19, 30, 35; and a portion of Compartment 4. This alternative proposes harvest on 229 acres to remove an estimated 1.9 million board fe.
2. There would be two fewer landings, thus two fewer temporary wildlife openings established after harvesting.

All other activities and design features not associated with the above would be implemented as described in Alternative 2.

Map 4. Alternative 3.



2.3 Development of Alternatives

As stated in Chapter 1, public comment was sought on the Stevens Brook Project, and Appendix A contains the comments we received along with Forest Service responses. The comments helped identify the issue of Inventoried Roadless Area characteristics, and the Pemigewasset Ranger District considered that issue when developing the management alternatives in this EA. While all three alternatives provide a wide range of multiple uses and goods and services, each addresses the issue in a different way.

Comparison of Alternatives

Table 2. Proposed Activities by Alternative

Activity	Unit	Alternative 1 No Action	Alternative 2 Proposed Action			Alternative 3 No Activities within IRA
			Outside IRA	Within IRA	Total	
Vegetation Management						
Clearcut (Regeneration Cut)	Acres	0	6	43	49	6
Group Selection	Acres	0	58	72	130	58
Single Tree Selection	Acres	0	47	18	65	47
Single Tree & Group Selection	Acres	0	13	0	13	13
Shelterwood	Acres	0	56	24	80	56
Commercial Thinning	Acres	0	22	0	22	22
Timber Stand Improvement	Acres	0	27	0	27	27
Total Area	Acres	0	229	157	386	229
Harvest Volume	MBF	0	1,900	1,100	3,000	1,900
Prescribed Fire Treatment	Acres	0	56	24	80	56
Transportation System						
Road Maintenance (pre-haul)	Miles	0	1.8	0	1.8	1.8
Landings used: Existing/Constructed	#	0	3/3	0/2	3/5	3/3
Road Decommissioning	Miles	0	2.0		2.0	2.0
Road Construction	Miles	0	0	0	0	0
Socio-Economic Factors						
Estimated Timber Receipts	$	0	305,540	198,601	504,141	305,540
Net Value (Receipts – costs)	$	0	243,549	186,847	430,496	243,549

2.4 Design Features

Three types of protective measures are integrated into the Stevens Brook Project design to give specific technical direction for managing resources: Forest Plan Standards and Guidelines, in Chapters 2 and 3; State of New Hampshire Best Management Practices; and additional design features as described below. Design features define how and/or where particular Forest Plan standards and guidelines

are applied to the project. They may also be management activities that are not directly associated with standards and guidelines but will be implemented on the ground to address site-specific safety or resource needs. Design features are applied only if the affected area or stand is included in the alternative ultimately selected by the Responsible Official. The standards and guidelines, BMPs, and design features are based on best available science coupled with decades of monitoring and observation of their effectiveness on numerous previous projects.

In the citations throughout this document, G-# refers to a guideline; S-# is a standard. See the Glossary for definitions of these.

Air Resources

1. Notify the public prior to ignition of the prescribed burns in Stands 5/15, 13/15, 2/16, and 3/16.

Fire

2. During prescribed fire treatments, place fire control lines at terrain breaks to ensure protection of private property, streams and any associated wildlife corridors. Past prescribed burns have shown that fire control lines, in conjunction with fire control pumps and hose, engines, and personnel, will ensure the prescribed burn remains within the prescribed area. (Forest Plan, G-1, p 2-33)

Heritage Resources

3. Known heritage sites located in or near proposed activities will be protected by marked reserve areas. No harvesting or equipment would be allowed in the known heritage reserve areas. Evidence from other harvest activities on White Mountain National Forest timber sales shows that heritage site locations are maintained when this design feature is applied. (Forest Plan, G-1, p 2-7).

Recreation

4. Place caution signs as necessary to alert visitors to logging operations. This safety measure has been effective on past harvests on the WMNF, with no adverse consequences.

Riparian and Aquatic Habitat

5. Forest Plan Riparian and Aquatic Habitat standards and guidelines for perennial streams and vernal pools would be applied to Stevens Brook and unnamed tributaries in Stands 2-30, 2-45, 2-59, and 2-34d, and to vernal pools in the project area. (Forest Plan, G-1, 2, 5, 6, 11, pp 2-24 to 2-26)
6. The operating period of timber sale activities is limited to a specific season of harvest and/or ground conditions specified in the timber sale contract to minimize adverse environmental effects such as sedimentation. The harvest season is incorporated into the timber sale contract or other relevant documentation used for the timber harvest removal. In addition, on-the-ground conditions are monitored during timber sale activities by the Timber Sale Administrator

(TSA), who limits or halts operations when conditions could result in resource damage.

7. Skidding patterns and locations of skid roads and trails are designed to fit the terrain to control the volume, velocity, concentration, and direction of runoff water in a manner that will minimize erosion and sedimentation. This preventive practice would be achieved by minimizing the length of skid trails, locating the skid trails in advance, adding drainage features such as waterbars, and designing skid trails to cross streams at right angles. While the exact locations of one pass skid trails are unknown prior to implementation, these locations are limited to suitable locations by numerous mitigative practices, including Forest Plan Standards and Guidelines, adherence to state BMPs, and other practices applied to this sale. Areas with specific concerns, such as stream crossings and wet areas, were located with the input of the hydrologist (field notes) or soil scientist. The actual placement on-the-ground would be implemented by the Timber Sale Administrator.
8. Upon completion of harvesting operations, skid trails will be closed and bare ground seeded as needed in areas where soil erosion potential occurs, such as steep ground and near stream crossings. The Timber Sale Administrator will designate the areas of disturbed soils that must be treated, and monitor effectiveness of treatment.

   The erosive effects of water concentrated by roads will be minimized by practices such as constructing cross-drainage structures and dispersing runoff away from surface water. This is a preventive practice that would be monitored by the Timber Sale Administrator until the ground is stabilized.

   The number of stream crossings is minimized. Meetings and field notes document the discussions regarding stream crossing locations. Necessary crossings are designed to provide for unobstructed flows during bankfull conditions, as well as for the passage of debris and aquatic organisms. All temporary stream crossings would be removed following use. The Timber Sale Administrator would visually monitor stream crossing sites to catch and rectify any problems in the early stage. This monitoring would continue until the area has successfully stabilized.
9. Proposed and existing roads would be maintained to prevent rutting and failures. Adequate maintenance and/or restriction of use can minimize erosion problems. The Timber Sale Administrator would visually monitor roads proposed for use and prescribe corrective measures as needed.

Scenery Management

10. Remove slash within fifty feet of Forest Road 429, Buffalo Road, and National Forests boundaries. Lop and scatter slash to lie within three feet of the ground for an additional fifty feet along Forest Road 429 and Buffalo Road to maintain scenic quality. Evidence from other harvest activities on White Mountain

National Forest timber sales shows that foreground views are reasonably maintained when this design feature is applied. (Forest Plan, G-8, p 2-30)

Soils

11. The following soil conservation practices are emphasized for this project (Forest Plan, S-1, p 2-30).
    - To limit the area subject to soil compaction, new log landings will be the minimum size necessary to meet the requirements of the equipment, the quantity and type of forest products, and safety. This limitation of the size of the landing minimizes the area on which soil disturbance and compaction would occur (Oregon State University Ext. 1983; Martin 1988; BMP NH 2004).
    - Harvested whole trees may be skidded to landings and the tops and limbs will be scattered on landings, skid trails, and within stands to retain soil nutrients and to reduce compaction and erosion during and after operations as needed (Forest Plan, exceeds G-5, p 2-30 and exceeds S-1, p 2-30). Several studies show that placing logging slash in the skid trails reduces compaction (Martin 1988; Oregon State University Ext. 1983; Poff 1996).
    - Skidding patterns are designed to fit the terrain to control the volume, velocity, concentration, and direction of runoff water in a manner that would minimize erosion and sedimentation (Oregon State University Ext. 1983: *Woodland Workbook on Designated Skid Trails to Minimize Soil Compaction*; Martin 1988; BMP NH 2004).
    - Where exposure of mineral soil is expected, skid trails should generally be located on grades of less than 20 percent, with only short steeper pitches. Limiting locations for skid trails (pitch) insures that the potential for erosion is reduced (Forest Plan, G-5 p 2-30; Oregon State University Ext. 1983; BMP NH 2004).
    - Upon completion of operations at a landing, the area of disturbance would be graded and stabilized as needed to prevent erosion. Even though these surfaces are nearly flat, this action insures that runoff from the landing would not erode soils (BMP NH 2004). Waterbarring and seeding as needed on sections of skid trails has proven to work on the White Mountain National Forest and in other places implementing Maine and NH BMPs (see NCASI 2000 *Handbook of Control and Mitigation Measures for Silvicultural Operations*, and USFS Handbooks 2509.18 and 2509.22). The expansion of the existing two-acre orchard opening by approximately three acres would require stump removal and grading described above and would follow the same standards and guidelines and BMPs.
    - The operating period of timber sale activities is limited to specific season of harvest and/or ground conditions specified by harvest unit in the timber sale contract to minimize adverse soil and water environmental effects. The Timber Sale Administrator will monitor. This insures that erosion and

compaction would be minimized and no long-term soil productivity effects would occur (Martin 1988).

Wildlife and Habitat

12. To maintain hard mast component as a food source for wildlife, the oak in Compartment 15/Stand 5 and Compartment 16/Stands 1 and 3, and the beech trees with abundant bear-claw marks should not be marked for cutting unless the tree is expected to die in the near future. In areas with a heavy concentration of bear-clawed trees, patches of habitat will be reserved to minimize damage to the trees (Forest Plan, G-2 and 3, p 2-33 and G1, p 2-35). Exceptions may include hazardous trees, trees located where there are skid trails or landings that cannot be moved because of land features, and trees with greater than 75 percent crown damage since there is a high probability they will die in the near future. Retaining heavily clawed beech trees is effective because these are the most productive beech trees, repeatedly producing beech nuts, as evidenced by foraging black bears (DeGraaf and Yamasaki 2001; NHFG 2006).
13. Protect known active raptor nest areas. Avoid marking trees with evidence of raptor nests and report their presence to the district biologist, who will determine the level of protection needed (Forest Plan, S-3, p 2-33). This standard is effective because it would not reduce nest sites and would provide a no-disturbance buffer of at least 66 feet around nest sites from the nest-site selection to fledging period, generally March through July (*Good Forestry In The Granite State* 1997; Forest Plan Revision Rationale for Development of Wildlife Goals, Objectives, Standards, and Guidelines, 2005).
14. When harvest reduces the basal area of a stand below thirty square feet per acre, uncut patches totaling five percent of the harvested area must be retained, with each at least one quarter acre in size (Forest Plan, S-1, p 2-35).
15. To protect RFSS American ginseng and butternut, all ginseng will be excluded from harvest unit boundaries and the butternut located in units proposed for treatment will be left uncut (Forest Plan, S-2 and G-3, p 2-13). Butternut requires open forest, field, or light gap conditions in order to effectively germinate and compete with other tree species. Butternut occurs in three stands proposed for harvest. Compartment 15/Stands 13 and 19 are proposed for single tree and shelterwood treatments; Compartment 16/Stand 24 is proposed for single tree and TSI. Other tree species surrounding butternut trees will be removed to create suitable open conditions to allow for recruitment and establishment of butternut.

Chapter 3 — Affected Environment and Environmental Consequences

3.1 Introduction

This chapter addresses the site-specific effects of the proposed activities on each resource element considered relevant for the Stevens Brook project. Effects analyses can change from project to project depending on the land features, project proposals, new science, and results of public scoping. Each resource section includes:

- A description of affected environment (the existing condition).
- An analysis of direct and indirect effects on the resource (by alternative).
    - Direct effects occur at the same place and time.
    - Indirect effects are later in time or farther removed in distance, but are still reasonably foreseeable.
- An 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.

The Final Environmental Impact Statement (FEIS) for the Forest Plan is the programmatic-level analysis for all resource discussions in this chapter, and serves as the foundation for all project-level analysis. The proposed activities in Alternatives 2 and 3 are typical management actions on the White Mountain National Forest, each falling within the range of actions anticipated and included in the conclusions reached in the FEIS. This project-level analysis is tiered to the FEIS, and where it is appropriate to do so, the FEIS is incorporated by reference, with project information summarized here.

Past, Present, and Reasonably Foreseeable Future Projects

Cumulative effects analyses require consideration of past, present, and reasonably foreseeable future projects in the analysis area studied for each resource. The geographic area and the temporal scope for cumulative effects analyses are chosen for each resource based on what makes sense for the relevant elements of the resource. They are the same for some resources and different for others. In all cases, the rationale for the area and time period is noted in individual resource sections in this chapter. Activities on private lands are also considered when appropriate for the resource.

Below are lists of projects considered in cumulative effects analyses in various geographic areas associated with the Stevens Brook project.

Upper Rattlesnake Habitat Management Unit (HMU) — See Map 5

Past Projects (20 years): Forestry activities occurred on one separate project (Stevens Brook Timber Sale, 1990) in the Upper Rattlesnake Habitat Management Unit in the last 20 years. These treatments occurred on 147 acres, or slightly more than one percent of the project area. They included 116 acres using uneven-aged management, such as group selection and individual tree selection, and 31 acres using even-aged management, such as patch cut, clearcut, and seed tree cut.

Other projects in this HMU include ongoing maintenance of one permanent wildlife opening. Other past projects in this HMU are discussed in other resource sections because they occurred within the twenty-year timeframe.

Present Projects: Alternatives analyzed in this EA.

Reasonably Foreseeable Future Projects (10 years): Management activities in the next ten years include ongoing maintenance of permanent wildlife openings through mechanical methods and ongoing maintenance of trails. No National Forest timber sales after the Stevens Brook project are planned in the next ten years.

South Carr Mountain Inventoried Roadless Area — See Map 6

Past Projects (10 years): Portions of four timber sales (Batchelder Brook, 1997; Batchelder Brook, 2007; Bagley Brook; Blodgett Brook) totaling 611 acres of timber harvest since 1997.

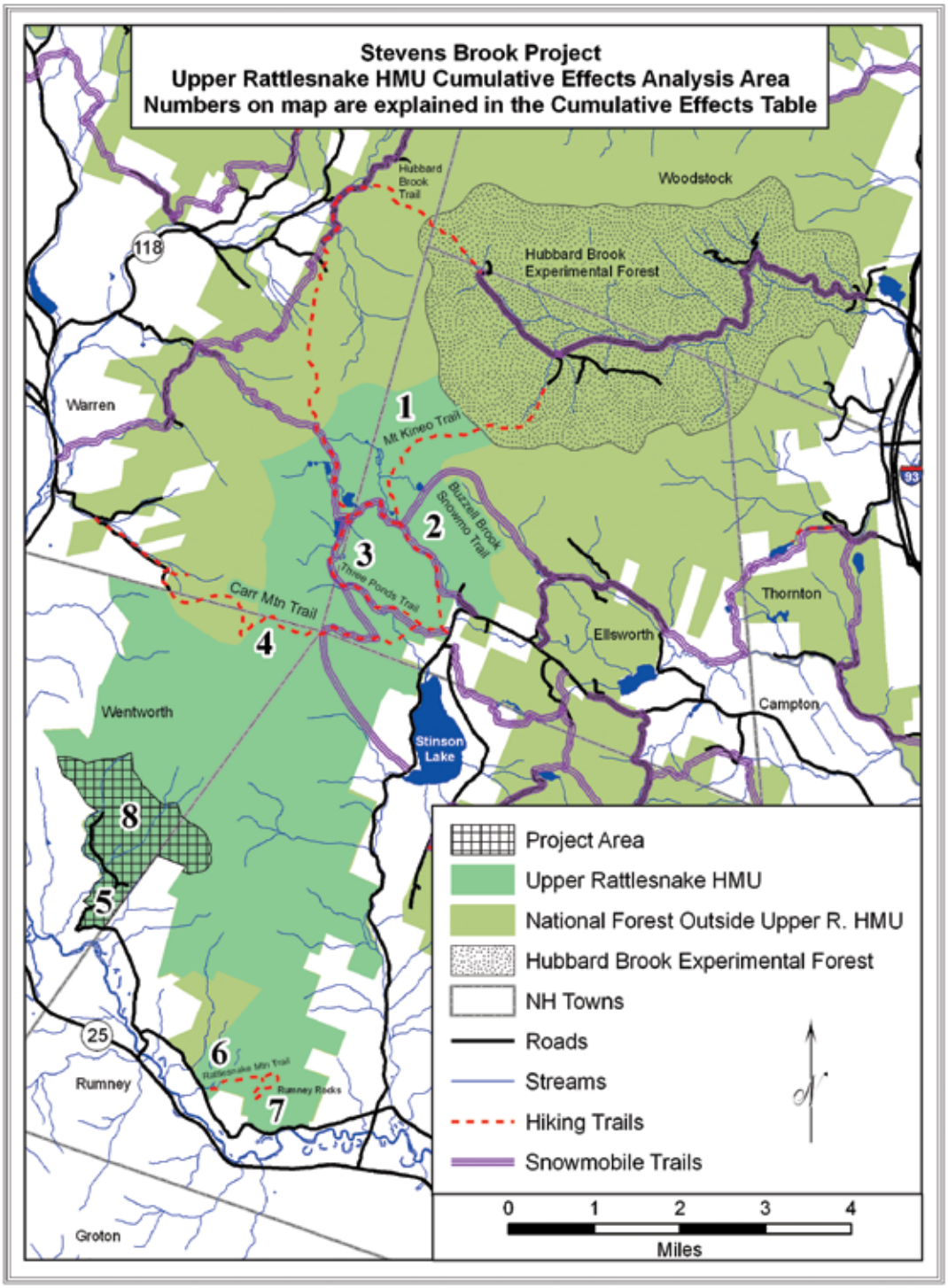
Present Projects: Alternatives analyzed in this EA.

Reasonably Foreseeable Future Projects (10 years): Trail rehabilitation — Mt. Kineo, Three Ponds, Rattlesnake Trail, Rumney Rocks Day Use area.

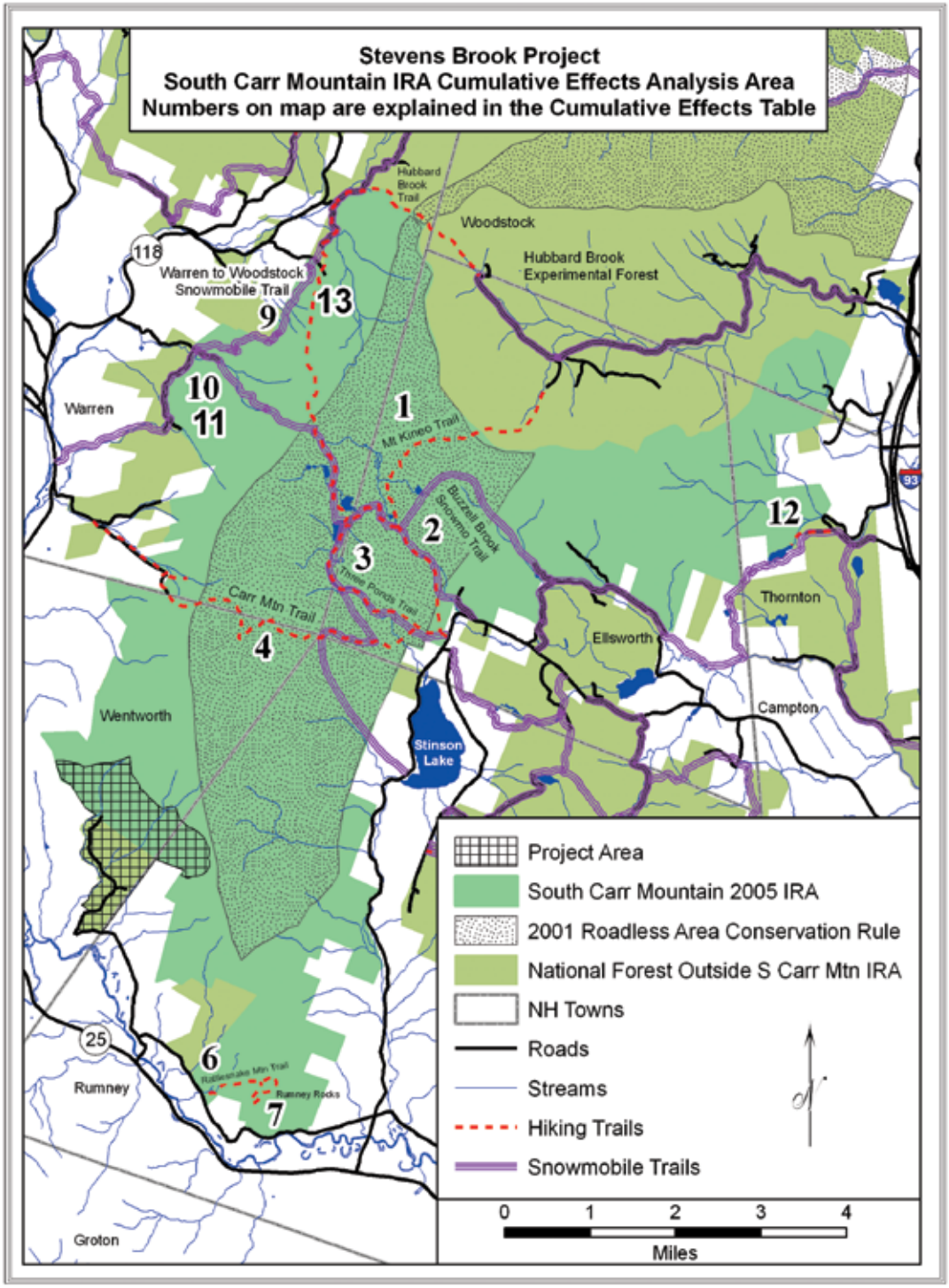
Adjacent Private Lands

People responding to our scoping report commented about harvesting done in recent years on private lands in and near the project area. Complete information regarding past harvest dates, types of harvest, and future harvest plans is not available; however, cumulative effects analyses for timber and wildlife resources reviewed digital orthophotos. Timber harvest in the area is expected in the next ten years, but the type, level, and location are unknown.

Map 5. Upper Rattlesnake Habitat Management Unit (HMU) — Cumulative Effects.



Map 6. South Carr Mountain Inventoried Roadless Area (IRA) — Cumulative Effects.



3.2 Roadless/Wilderness Character

Executive Summary

This section analyzes the direct, indirect, and cumulative effects of each of the three alternatives on Inventoried Roadless Area (IRA) evaluation criteria and wilderness capability criteria as described in the Forest Service Handbook. No alternatives propose any activities in 2001 Roadless Area Conservation Rule (RACR) Inventoried Roadless Areas. Alternatives 1 and 3 propose no activities in Forest Plan (2005) Inventoried Roadless Areas, while Alternative 2 proposes no road construction but approximately 157 acres of timber harvest in the 2005 South Carr IRA. None of the proposed activities in any alternative would result in an irreversible or irretrievable change in the condition of the South Carr IRA, its potential to be included in future roadless inventories, or its future eligibility as potential wilderness.

Introduction

The subject of "roadless" has generated much confusion and controversy over the years. To help dispel some of the confusion, this section of the EA provides an explanation and brief history of inventoried roadless areas, describes the analysis method used to evaluate project-level effects on these lands, and then details the potential effects of the alternatives on the South Carr Mountain inventoried roadless area.

Background

When developing or revising a Forest Plan or when directed by Congress, the Forest Service is required to determine which National Forest lands meet the baseline criteria of size and condition to be considered for possible wilderness study or designation. This inventory identifies inventoried roadless areas, or IRAs. These areas are not management allocations; they are purely the first step in identifying lands that may be suitable for wilderness designation. Once the inventory is completed, we evaluate the IRAs for their wilderness characteristics to determine if they are capable of providing wilderness conditions, how their value as wilderness compares with their value for other purposes on the Forest, and how they would contribute to the National Wilderness Preservation System. This whole inventory and evaluation process can have two results: either lands are recommended to Congress for designation as wilderness consistent with the Wilderness Act of 1964, or lands are placed into management area allocations to meet other purposes, such as recreation or timber harvest.

The Forest Service is guided by the Forest Service Handbook (FSH) in this two-part process of identifying and evaluating lands for wilderness potential. FSH 1909.12 Chapter 70 sets objective criteria for determining whether National Forest lands meet the baseline standard to be identified as inventoried roadless areas. Some of the criteria apply nationwide; other criteria apply only to National Forests in the Eastern U.S. in recognition of the history of human use and modification and the

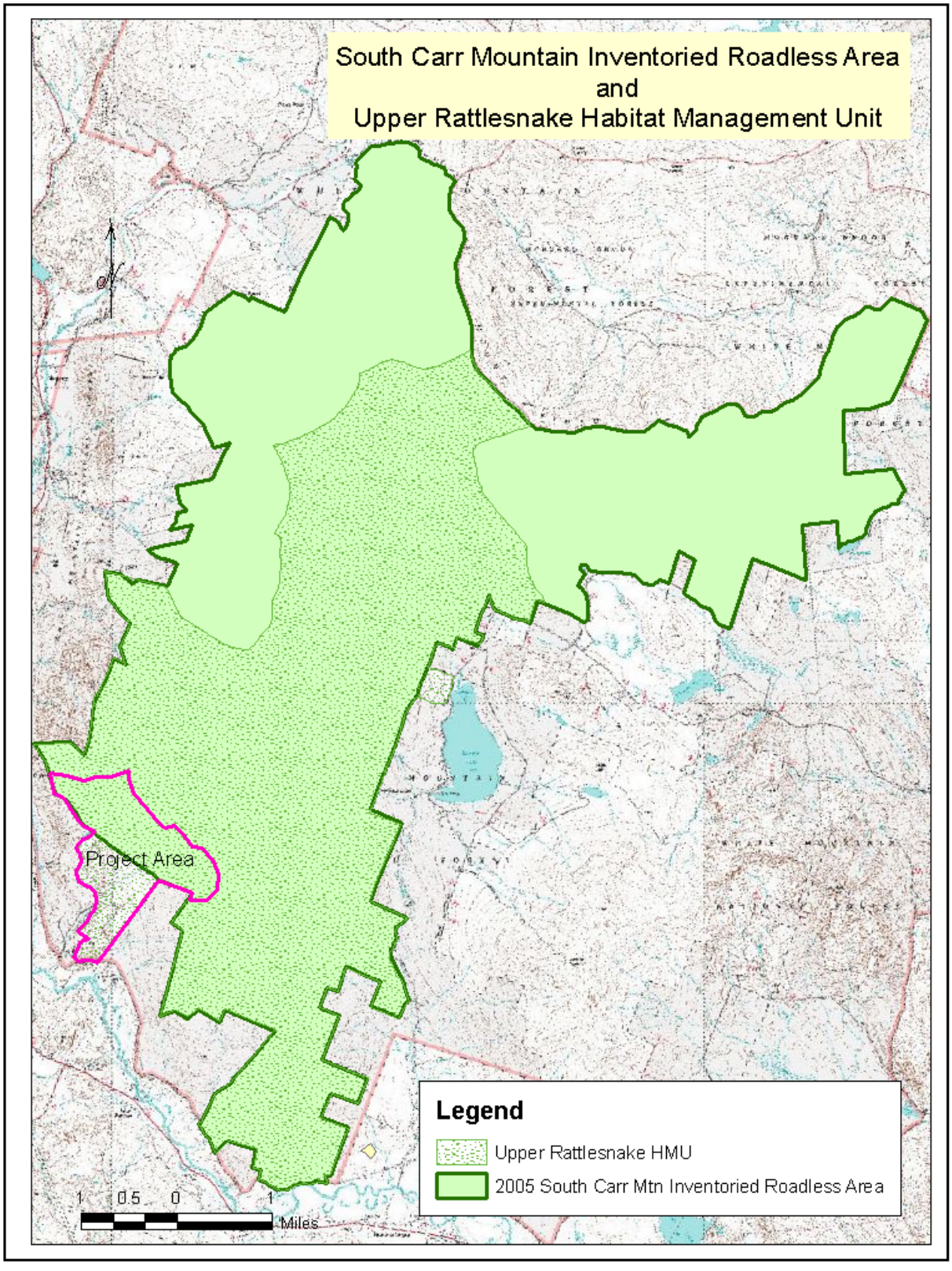
natural ability of these lands to recuperate. The following criteria apply on the White Mountain National Forest.

- The area contains at least 5,000 acres or, if it is smaller, is either contiguous to an existing wilderness or similar allocation or can be managed as a separate unit of the National Wilderness Preservation System.
- The land is regaining a natural, untrammeled appearance.
- Improvements in the area are being affected by the forces of nature rather than humans and are disappearing or muted.
- The area has existing or attainable National Forest System ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness values.
- The location of the area is conducive to the perpetuation of wilderness values.
- The area contains no more than ½ mile of forest roads under Forest Service jurisdiction for each 1,000 acres.
- No more than 15 percent of the area is in non-native, planted vegetation.
- Twenty percent or less of the area has been harvested within the past ten years.
- The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on wilderness characteristics of National Forest lands.

Once IRAs are identified, the lands are evaluated according to FSH direction to determine their capability and availability as wilderness and their need or the degree of contribution they would make to the National Wilderness Preservation System. *Capability* is an evaluation of the degree to which the area has the basic characteristics that make is suitable for wilderness recommendation. What traits are desirable in wilderness varies across the country; several basic characteristics that should be considered are identified in the Wilderness Act. *Availability* is an evaluation that weighs the trade-offs (e.g., social, economic, recreational, ecological) that would result from wilderness designation as compared to management for other uses. The evaluation may also consider public desire for a particular wilderness versus desire for other uses in that area. *Need* is determined by assessing the degree to which an area would contribute to the overall wilderness system. This analysis should consider factors such as the geographic distribution of areas and representation in the system of landforms, ecosystems, and opportunities.

The inventory and evaluation process, and the decision whether to recommend an area for wilderness designation or to manage it for multiple uses other than wilderness, is typically documented in an EIS related to a Forest Plan revision or other large-scale programmatic analysis. Project-level analyses then evaluate the potential of a project to impact the roadless and wilderness characteristics of an area. If the area is not recommended for wilderness study or designation, effects to these characteristics are allowed as long as they are properly analyzed and disclosed through project-level environmental documentation.

Map 7. South Carr Mountain IRA and UpperRattlesnake HMU.



Brief History

The White Mountain National Forest completed a Forest Plan revision in 2005. The roadless area inventory and the evaluation of each IRA for wilderness capability, availability, and need (site-specific evaluation) are documented in Appendix C of the FEIS for the Plan (2005c).

For this process, the Forest began with an inventory of lands previously identified as roadless through earlier evaluations. In the early 1970s, the Forest Service had conducted an examination of all National Forests as part of the Roadless Area Review and Evaluation (RARE I); this was revised in 1979 (RARE II), and the results documented in the FEIS for that national process. In the late 1990s, the agency was directed to analyze new management direction for inventoried roadless areas (those identified in RARE II and subsequent inventories, such as the 1986 Forest Plan) as part of the Roadless Area Conservation Rule (RACR). This rule was finalized in 2001, and established management direction to limit road building and timber harvest on lands included in the inventory, except in special circumstances.

During the recent Forest Plan revision effort, the WMNF used the 2001 inventory as a starting point for a new roadless inventory and wilderness evaluation. Through planning team analysis and with Regional direction, it became evident that additional lands — areas outside the RACR IRA boundaries — would meet the roadless area inventory criteria in the FSH. A new inventory was conducted and presented to the public in the Draft EIS for the Forest Plan. Through public involvement, further analysis, and extensive field verification, additional adjustments were made to the inventory, which resulted in 27 IRAs on the WMNF, totaling about 403,000 acres. Each IRA was then evaluated for its capability, availability, and need as wilderness (2005c).

Ultimately, the Record of Decision for the revised Forest Plan recommended to Congress that 34,500 acres be designated as wilderness in the Wild River valley and around the existing Sandwich Range Wilderness. Congress followed these recommendations with passage of the New England Wilderness Act in December 2006, creating the 24,000 acre Wild River Wilderness and adding 10,800 acres to the Sandwich Range Wilderness.

The remaining lands in the roadless area inventory were assigned to management areas, consistent with Forest Service Handbook direction. Most of the land within IRAs was allocated to management areas that emphasize semi-primitive conditions and recreation use; other lands were assigned to management areas that emphasize timber harvest and wildlife habitat creation. Allocations were made based on on-the-ground conditions and with the goal of providing a balanced mix of uses across the Forest.

The management of inventoried roadless areas has been under considerable legal scrutiny over the years. The RACR, and its associated management direction for IRAs, was enjoined in a Federal District Court in 2003. It was then replaced by the State Petition Rule, an entirely new regulation that was put into place in 2005. The

State Petition Rule was then challenged and a recent 2006 court ruling struck it down and re-established the Roadless Area Conservation Rule of 2001. As a result, management on all lands included in the RACR inventory must be consistent with the Roadless Area Conservation Rule. On lands that were included in IRAs during the recent Forest Plan revision, but were not part of the RACR inventory, management must be consistent with Forest Plan direction.

Analysis Method

This section describes the approach for evaluating the effects of the Stevens Brook Project on the potential for inventoried roadless areas to remain in the inventory and on their wilderness characteristics.

We first considered whether the proposed activities would alter the degree to which lands included in an IRA would meet the inventory criteria from the FSH (1909.12, Chapter 70, Section 71) during and following project implementation. Table 3 shows the inventory criteria and the method used to measure project-level effects on each criterion.

Table 3. Inventory Criteria and Measurement Indicators.

Criteria Description		**Indicators for Measuring Project Effects or Rationale for Excluding the Criteria from Analysis**
1	The land is regaining a natural, untrammeled appearance.	Measured by acres of harvest and miles of new road construction.
2	Improvements in the area are being affected by the forces of nature rather than humans and are disappearing or muted.	Measured by miles of new road construction.
3	The area has existing or attainable National Forest System ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness values.	Measured by total acres of national forest ownership.
4	The location of the area is conducive to the perpetuation of wilderness values. Consider the relationship of the area to sources of noise, air, and water pollution, as well as unsightly conditions that would have an effect on the wilderness experience.	Measured by total acres of harvest and total miles of new road construction.
5	The area contains no more than ½ mile of forest road under Forest Service jurisdiction for each 1,000 acres.	Measured by total miles of existing improved road and total miles of proposed new road construction.
6	No more than 15 percent of the area is in non-native, planted vegetation.	Measured by total acres of non-native planted vegetation.
7	Twenty percent or less of the area has been harvested within the past ten years.	Measured by total acres of harvest.
8	The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on natural conditions of Federal lands.	Measured by total number of private dwellings and access needs.

After taking a hard look at whether lands within the IRA would continue to meet roadless inventory criteria during and after a project implementation, we evaluated the degree to which possible wilderness characteristics of lands within the IRA would be affected by the proposed project. As stated earlier, for this part of the analysis we used the wilderness capability evaluation criteria from the FEIS for the Forest Plan.

Table 4. Wilderness Capability Evaluation Criteria and Measurement Method.

Criteria		Method for Measuring Project-level Effects on the Criteria
1	Natural Integrity and Appearance	Ecological processes of the area are substantially free from the effects of modern civilization and generally appear to have been affected primarily by forces of nature. • Addressed by describing the effects a project may have on natural processes in the IRA, the extent of modification that will occur in the IRA (e.g. length of roads built, facilities constructed), and how apparent impacts will be to the visitors in the short and long-term.
2	Undeveloped Condition	Area is without permanent improvements or human occupation. • Measured by reviewing the number of structures, amount of road and facility construction, and other evidence of human use and occupation.
3	Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Area provides the opportunity to be isolated from the sights, sounds, and presence of others, feel part of the vastness of nature, and experience a degree of challenge and risk while using outdoor skills. • Addressed by describing how project activities might affect the size of the area, the number and type of primitive recreation opportunities available, the opportunity to experience natural quiet, and the addition or absence of facilities.
4	Special Features and Values	Area has unique or outstanding ecological, geologic, scientific, scenic, educational, historic, or cultural features or values. • Addressed by describing the effect proposed activities would have on identified special values.
5	Manageability as Wilderness	Ability to manage the area as required by the Wilderness Act. • Addressed by evaluating whether the alternatives would alter the IRA boundary location or change access to the area.

Considering the effects of the project against these criteria allows us to determine whether proposed activities would be of such intensity or duration that implementation would preclude future land use options, including possible wilderness recommendation.

It should also be noted that the process in the Forest Service Handbook for evaluating lands within IRAs for wilderness *availability* and *need* is an inherent part of land allocation planning (such as Forest Plan revisions). Consequently, those criteria are not useful or practical in judging the effect of project-level actions on lands within an IRA and are thus not part of this analysis.

Affected Environment

The South Carr IRA identified in the 2005 Forest Plan inventory is 22,265 acres in size. Approximately 17,219 of these acres were identified in the earlier Roadless Area Conservation Rule inventory (USDA FS 2000). The Stevens Brook project proposes no activity on lands identified as part of the RACR inventory.

None of the South Carr IRA was recommended for wilderness designation in the revised Forest Plan (USDA FS 2005). Lands in this IRA were allocated to Management Areas 2.1 and 6.1. The portion of the IRA that is in the project area is within MA 2.1.

The South Carr IRA lies in the towns of Warren, Ellsworth, Rumney, Woodstock, Thornton, and Wentworth, Grafton County, New Hampshire (see Map 7). It is accessed by several roads: NH State Route 25 to the south, Route 118 to the north, Buffalo Road to the southwest, and Stinson Lake Road to the southeast. There are currently 1.9 miles of forest roads in the IRA, for a density of 0.08 miles per 1,000 acres.

Recreation in the IRA consists primarily of hiking, snowmobile use, and hunting. Five snowmobile trails cross some portion of the IRA: Three Ponds, Annie's Loop, Donkey Hill Cut-off, Buzzell Brook, and Warren to Woodstock trails. The area contains 20 miles of hiking trails, including the Three Ponds, Mt. Kineo, Carr Mountain, and Rattlesnake Mountain trails. The Hubbard Brook Trail parallels the northern boundary of the Inventoried Roadless Area. There is one Adirondack-style shelter with a 12-person capacity at Middle Pond within this IRA.

The IRA is primarily mature forest. To hikers and casual observers, the area appears predominantly unaffected by human activity, with the exception of the evidence of historic harvest activities, including old railroad grades and logging haul routes. Revegetation on these old roads is generally well-established. In the last decade, 472 acres have been harvested within this IRA. The 2008 Batchelder Brook Project Decision Notice identifies 139 acres for harvest in the South Carr IRA. An additional 157 acres of harvest are currently proposed within this IRA in the Stevens Brook Environmental Assessment. Past harvests were a mix of treatments, including clearcuts, thinning, and single-tree selection.

There are no existing non-recreation structures or facilities in this IRA. Black Hill, east of the Three Ponds area and outside the project area, is a relatively rare geologic formation on the WMNF. There are no other special features identified within the South Carr IRA.

There are off-Forest intrusions, including highways, towns, and timber operations that are visible or audible from this IRA. Additional information on the condition of the South Carr IRA is available in Appendix C of the Forest Plan FEIS.

Direct and Indirect Effects

The **analysis area for direct and indirect effects** on inventoried roadless areas is the South Carr IRA. This single IRA was selected as the analysis area because the expected direct and indirect effects are localized and would not extend into any other IRA. The next closest IRA is the North Carr Mountain IRA, abutting the north side of Hubbard Brook Experimental Forest, approximately seven miles north of the project area as the crow flies. The **temporal scope of this analysis** is the actual duration of the Stevens Brook Project, expected to be 2-5 years depending on the alternative selected and sale operations. Direct and indirect effects are of a type that would not be expected to continue once the proposed activities are completed. The direct and indirect effects of each alternative on indicators for inventory criteria and wilderness capability are summarized in the project record (see Wilderness Attribute Table).

The proposed activities in the South Carr IRA do not set a national precedent. Implementing the proposed activities, including harvesting timber, does not make a commitment to take similar actions in any other White Mountain National Forest IRA or any other inventoried roadless area in the country.

Alternative 1

Selection of Alternative 1 would have no direct or indirect effects on lands within the South Carr IRA.

Direct/Indirect effects on the degree to which lands would meet IRA inventory criteria:

Inventory criteria 1 and 2: Under the No Action alternative, the area would continue to regain a natural, untrammeled appearance and would appear to be largely affected by the forces of nature.

Criterion 4: There would be no change in the relationship of the area to sources of noise, air, or water pollution, or other effects on the wilderness experience.

Criteria 5 and 7: There would be no increase or decrease in miles of improved road and the IRA would remain at less than 3 percent of the area harvested since 1997.

Criteria 3, 6 and 8: Ownership patterns would not change, no planting would occur, and no dwellings or access would be constructed.

If the No Action alternative is selected, the lands identified as the South Carr IRA would continue to meet the criteria for inclusion in a future inventory of roadless areas.

Effects on the degree to which lands meet wilderness capability criteria:

Capability criteria 1 and 2: Under the No Action alternative, the area would retain the current degree of natural integrity and natural appearance.

Criterion 3: The present opportunities for experiences often unique to wilderness would remain.

Criteria 4 and 5: There would be no changes to any special features of the area, and the ability to manage the area as wilderness would remain the same.

Selection of Alternative 1 would not preclude any future land use options, including the possibility of including some or all of the South Carr IRA for potential future wilderness designation.

Alternative 2

Alternative 2 would have short-term direct and indirect effects on roadless inventory criteria and wilderness capability characteristics in some portions of the South Carr IRA. This alternative proposes approximately 157 acres of timber harvest in the IRA, prescribed fire in one stand in the IRA, no new road construction and the decommissioning of one existing forest road within the IRA.

Direct/Indirect effects on degree to which lands would meet IRA inventory criteria:

Inventory criterion 1: Timber harvest activities would create skid trails, stumps, and openings, which would affect the untrammeled, natural appearance of this specific portion of the IRA. These effects would be temporary, moderating as trees regenerate following harvest. Short-term effects to natural appearance would be greatest during actual harvest operations due to the presence of machinery and vehicles. Short-term effects would also be increased during prescribed fire operations due to the presence of fire personnel and equipment. Visual evidence of harvest activity does not automatically exclude lands from inventoried roadless areas (see criterion 7), and these proposed activities do not approach an intensity, duration, or permanence such that the lands within the IRA would no longer meet criteria for inclusion in a future roadless area inventory as a result of project implementation.

Criteria 2 and 3: No road construction would take place and ownership patterns would not change.

Criterion 4: A short-term increase in noise from timber harvest and truck traffic would occur within 1 to 2 miles of harvest activity for the duration of the project. This amounts to 31 percent of the IRA. This estimate is based on data and analysis gathered by a recent study that measured the decibel levels of various harvesting machinery measured over distance from the specific source (Neitzel and Yost 2003). The sound-to-distance estimate does not take into account the buffering effects of vegetation, wind or topography which would further reduce the distance from the activity that sound could be heard on any given day (Timerson 1999). These impacts would last for the duration of the project (2-5 years). The proposed decommissioning of FR 4194 is an administrative process, requiring only a database adjustment rather than on-the-ground activity. The prescribed fire in stand 5 would temporarily increase noise and air pollution in the immediate area.

As discussed in the Air Resources analysis of this EA, a short-term increase in air pollutants can be expected due to exhaust from trucks, skidders, and harvesting equipment, as well as from prescribed burning operations. These are temporary

sources of emissions and particulate matter; they would occur in the context of larger sources such as vehicle use along Buffalo Road and NH Route 25 and snowmobile use elsewhere in the IRA. In this context, the relatively small-scale increases associated with the project would be of an intensity or duration such that lands within the IRA would continue to meet criteria for inclusion in a future roadless area inventory.

When harvesting and prescribed fire operations are complete, the only noise, air pollution, and other impacts to potential wilderness values in the IRA would be those that currently exist from NH Routes 25 and 118 and other existing roads and snowmobile trails used by visitors.

Forest Plan Standards and Guidelines, BMPs, project design features, and timber sale contract provisions are expected to prevent any negative effects to water quality or quantity as a result of harvest activity or other project activities. Consequently, lands within the IRA would continue to meet criteria for inclusion in a future roadless area inventory. See the Water Resources section for more information.

Forest Road 429, the only designated forest road in the project area, is closed to public motorized use and ends approximately at the IRA boundary. Forest visitors hiking beyond the end of this road may enter harvest units in the IRA. The visual impact of harvest in these areas would only be apparent to those engaged in off-trail travel. See Criterion 1 for more impacts to natural appearance.

Criterion 5: The South Carr Mountain IRA currently contains 0.08 miles of improved road per 1,000 acres. Under this alternative, no road construction would occur, and proposed road decommissioning would result in a net reduction in road density for this IRA.

Criterion 7: Between 1997 and the present, 472 acres were harvested in the IRA. This constitutes just over 2 percent of the IRA harvested in the last 10 years. The Batchelder Brook project proposes harvest of 139 acres in this IRA, and the Stevens Brook project proposes to harvest 157 more acres (0.7 percent) in the IRA, bringing the total to 768 acres or 3.5 percent of the IRA, well below the 20 percent criterion. The 20 percent criterion is intended to represent harvest in a 10-year period, while the 768 acres actually represents a greater-than ten year period (1997 through project implementation). Consequentially, the actual ten-year percentage will be even less than 3.5 percent.

Criteria 6 and 8: The project does not propose planting non-native vegetation, nor does it propose the construction of any dwellings or access within the IRA.

Direct/Indirect effects on the degree to which lands meet wilderness capability criteria:

Capability criterion 1: As described above, timber harvest would result in modification of the natural appearance of approximately 157 of the 22,265 acres in the IRA. These activities would be apparent only to visitors traveling off-trail in the IRA during the project, and only for about 20 years after harvest (Forest Plan FEIS). The limited scope of this project is not expected to have any effect on the

long-term ecological processes within the IRA, as discussed in specific resource analyses within this document. Design features, such as removing logging slash from 50 feet of roadsides, should make the harvest less apparent to visitors, even in the short-term.

Due to the limited area of activity and the natural recuperative abilities of the land, implementation of Alternative 2 is not expected to affect natural appearance or integrity such that the option of considering this portion of the IRA for any future land use, including possible wilderness recommendation, would be precluded.

Criterion 2: Alternative 2 does not propose construction of any permanent improvements.

Criterion 3: The limited amount of harvest proposed in this alternative would not affect the size of the IRA in future inventories. No hiking or snowmobile trails would be closed during operations. The availability and challenge of recreation opportunities in the IRA would remain the same during and after project implementation. Alternative 2 would not affect solitude in the South Carr Mountain IRA core area, which encompasses over 11,000 acres (FEIS, Appendix C), because none of the activities proposed under Alternative 2 are within or adjacent to the core area of solitude. Localized noise associated with harvest would be audible within approximately 1 to 2 miles of stands proposed for harvest within and adjacent to the IRA. Assuming the maximum distance of two miles, it is possible that noise could be audible on, at most, up to 31 percent of the 22,265 acre IRA. These impacts would be temporary, lasting only during times of actual operations for the duration of the project (2-5 years). This estimate is based on data and analysis gathered by a recent study that measured the decibel levels of various harvesting machinery measured over distance from the specific source (Neitzel and Yost 2003). The sound-to-distance estimate does not take into account the buffering effects of vegetation, wind, or topography, which would further reduce sound (Timerson 1999). No trails in the IRA are within two miles of any harvest units. Consequently, only visitors traveling off-trail in this specific portion of the IRA while operations were occurring would experience these effects to the opportunity for solitude. Opportunities for challenge and primitive recreation would not drastically change during harvest activities, though the hunting experience would likely be negatively affected in localized areas during harvest operations.

Criterion 4: The Black Hill geologic formation is well outside the project area and would not be affected by any of the alternatives. No other special features have been identified in this IRA.

Criterion 5: Selection of this alternative would not alter the boundary of the IRA or change access to the area. Management and boundary considerations would remain essentially the same as prior to project implementation.

To summarize, Alternative 2 would have only limited, short-term impacts on the appearance of the IRA and visitor experience. None of the proposed activities would result in an irreversible or irretrievable change in the condition of the area, its potential to be included in future inventories, or its future eligibility for wilder-

ness recommendation. During and following implementation of Alternative 2, the area identified in 2005 as the South Carr IRA would continue to meet all criteria for inclusion in a future roadless inventory.

Alternative 3

Selection of Alternative 3 would have no direct effects, and only short term indirect effects to the South Carr IRA.

Direct/Indirect effects on degree to which lands meet IRA inventory and wilderness capability criteria:

Inventory criteria 1 and 2, capability criterion 1: Because no activities would occur within the IRA, the area would continue to regain a natural, untrammeled appearance and appear to be primarily affected by the forces of nature.

Inventory criterion 4, capability criterion 3: The noise and possible minor air pollution associated with harvest activities in stands outside the IRA boundary could affect the opportunity for solitude in a small portion of the IRA within 1 to 2 miles of harvest operations. Twenty-one percent of the IRA is within two miles of the harvest units.

Activities proposed outside the South Carr Mountain IRA might be seen or heard by visitors to the IRA. Recreationists bushwhacking on the southwestern slope of Carr Mountain may be near enough to the project area that harvesting activity would be visible or audible. It is unlikely that hikers on the Carr Mountain Trail (the nearest trail within the IRA to the project area) would hear or see evidence of harvest activity.

Because this alternative proposes no activities in the IRA, it would have no effect on roadless criteria 1-3 or 5-8, nor on wilderness capability criteria 1, 2, 4, or 5. To summarize, Alternative 3 would not affect the appearance of the IRA and would have minimal effects on visitor experience in the IRA. None of the proposed activities would result in a change in the condition of the area, its potential to be included in future inventories, or its future eligibility as potential wilderness.

Cumulative Effects

See Map 6 for location and projects considered in the following cumulative effects analysis.

The **analysis area for cumulative effects** on inventoried roadless areas is the South Carr Mountain IRA. This is the same as the analysis area for direct and indirect effects and the rationale for using this area is the same. The **temporal scope for the analysis** is the past decade, present, and foreseeable future (the next 20 years). We examined activities over the past decade because the FSH uses this period of time as a basis for evaluating whether lands meet IRA inventory criteria. The analysis looks 20 years into the future because the 2005 FEIS states that it takes about 20 years for signs of timber harvest activities to "become essentially unnoticed by the casual visitor" (FEIS, p 3-312).

Cumulative effects on degree to which lands would meet IRA inventory criteria:

Alternative 1

Implementation of Alternative 1 would have no cumulative effects on IRA inventory criteria within the South Carr IRA because there would be no direct or indirect effects.

Alternative 2

Criteria 1 and 7: Harvest of 157 acres within the IRA would occur under Alternative 2. This activity would cumulatively affect inventory criteria 1 and 7 due to the addition of these acres to the total of 472 acres harvested since 1998 and the 139 acres of harvest proposed in the Batchelder Brook project. Total harvest acres over this 30-year timeframe would constitute less than 3.5 percent of the IRA — well below the 20 percent within a 10-year period for this criterion.

Criterion 4: As stated in the direct effects section, it would be possible to hear noise within 1 to 2 miles of harvest activities, and there would be minor air pollution associated with vehicle and machinery exhaust and prescribed fire. These effects could be magnified if these activities were to occur simultaneously with other operations in certain stands of the Batchelder Brook project. Effects of these activities are temporary and would not establish a permanent, irretrievable source of mechanized noise or air pollution within or in proximity to the IRA. Due to their short duration, the cumulative increases in noise and air pollution would not prevent lands from meeting this criterion. None of the project proposed in this area would affect water quality; therefore no cumulative effects are expected.

Alternative 2 would have no cumulative effects on Criteria 2, 3, 6 or 8; no road construction, plantings, or changes in dwellings or access are proposed. The cumulative effect of decommissioning approximately two miles of Forest roads (half of which are within the IRA) would be the same as the direct effect — a slight reduction in road density (Criteria 5). The current boundary of the South Carr IRA would remain the same following implementation of Alternative 2.

Alternative 3

Criteria 4: Because harvest activities would occur outside but adjacent to the IRA if Alternative 3 is selected, there would be similar, though lesser effects associated with noise and air pollution as under Alternative 2. Because lands within the IRA would continue to meet this inventory criterion with selection of Alternative 2, it follows that the same would be true of Alternative 3, which proposes fewer activities.

Criterion 5: The cumulative effect would be the same as the direct effect: a net loss of approximately two miles of Forest roads (approximately half of which are within the IRA) and a slight reduction in road density in the IRA.

Inventory criteria 1-3 and 6-8: Alternative 3 proposes no harvest or other activity in the IRA and therefore would not contribute to any cumulative effects to these criteria.

Cumulative effects on degree to which lands would meet wilderness capability criteria:

Alternative 1

Because no proposed activities would occur under Alternative 1, this project would have no cumulative effects on the wilderness capability characteristics of the South Carr IRA.

Alternative 2

Capability criteria 1 and 3: If either Alternative 2 or 3 were selected, and harvest activities were to occur simultaneously with other operations in or adjacent to the IRA (as currently proposed in the Batchelder Brook Project — see cumulative effects Table 2), there could be short-term decreased opportunities for solitude and primitive recreation and a short-term change in appearance within the IRA during times of increased noise or human presence in or adjacent to the IRA. These effects would be temporary and would cease following completion of harvest. Short-term changes in forest structure due to harvest operations would be present, but would minimally impact visitors to the area.

Alternative 2 would have no cumulative effects to capability criteria 2, 4, and 5.

Alternative 3

Capability criteria 1, 2, 4 and 5: Because this alternative proposes no activities in the IRA and has no direct or indirect effects on these criteria, it will have no cumulative effects on these criteria.

Capability criterion 3: The cumulative effect on solitude resulting from noise and air pollution would be similar to, though lesser than, Alternative 2 due to fewer proposed activities, all of which would be located outside the IRA. Since no direct or indirect effects to opportunities for challenge and primitive recreation are anticipated, no cumulative effects would result either.

Cumulative effects on the South Carr Mountain IRA would not compromise the ability of the area to meet Forest Service wilderness capability criteria under any alternative. Roadless area values and vegetation management activities have coexisted in this area previously, as evidenced by the area's historical treatments and its inclusion in the most recent roadless inventory. Selection of any alternative would not preclude any future land decision, including possible wilderness recommendation, for lands within the South Carr Mountain IRA.

3.3 Vegetation

Executive Summary

This section analyzes the direct, indirect, and cumulative effects of the three alternatives on the vegetation resource. Under Alternative 1, No Action, trees will respond to natural conditions and will move toward a climax type forest. Shade intolerant species will be replaced with more shade tolerant trees. Under the action alternatives, trees will be harvested and will either provide room for others to grow or will be replaced with young stems (see Table 6).

Affected Environment

Within the Stevens Brook Project Area in the Upper Rattlesnake HMU, northern hardwood forest predominates (69 percent). Species composition, site factors, and other resource values have been analyzed for each stand to determine if management is appropriate, and whether even-aged or uneven-aged management is the most desirable type of silvicultural treatment.

Portions of the project area are former pastures and croplands, cleared in the 1800s. Not surprisingly, these now contain most of the oak-pine habitat; as the fields and pastures reverted back to forest, white pine and red oak colonized the open space and gained a foothold. There is no recorded history of natural or human-caused fire in the project area, although portions of the nearby Rattlesnake and Carr mountains have burned, and it is likely that the pastures and hayfields have been intentionally burned by landowners in the past.

Many of the stands within MA 2.1 in the Upper Rattlesnake HMU that have been identified for vegetative treatment are well-stocked mature northern hardwood, oak-pine, paper birch, or mixedwood stands (see Table 5 for the existing condition of stands identified for treatment). They contain trees that have low timber quality, are approaching an age where mortality is imminent, or have some damaged component within the stand. This means that the stands are at least 60 years old for the hardwoods and 40 years old for the softwoods and aspen-birch. According to the *Silvicultural Guide for Northern Hardwood Types in the Northeast* (Leak et al. 1987) and the *Silvicultural Guide for Paper Birch in the Northeast (revised)* (Safford 1983), harvesting trees and controlling stocking in these stands would improve the quality and vigor of remaining trees.

Since the lands came into public ownership, they have avoided conversion to other uses such as homes. There has also been an opportunity to manage stands over long time periods, resulting in high quality sawtimber. There are no large industrial timber operations adjacent to the project area.

Tree mortality due to insect and disease is minimal in the Upper Rattlesnake HMU. Borer damage to sugar maple is occasional, while much of the beech in all of the stands proposed for treatment suffers from beech bark disease (*Nectria ditissima*).

Table 5. Existing Conditions for Stands Identified for Vegetative Treatment.

Stand	Forest Type	Acres*	Species Mix	Comments
1-15	Northern Hardwood	9	Northern Hardwood with Oak	Improve stand quality
2-15	Northern Hardwood	7	beech, aspen, paper birch	Previous group and single tree selection harvest
3-15	Mixedwood	37	Mix of hardwood and soft-wood	Group Selection in 1991
5-15	Oak	24	Red Oak, white pine, red pine, hemlock and some hardwoods	Oak/pine seed source
13-15	Northern Hardwood	24	Red oak, beech, sugar maple, ash and other hard-woods	Red oak, sugar maple and hemlock seed source
19-15	Northern Hardwood	18	Sugar maple, beech, ash	Basswood and smooth bark beech
20-15	Northern Hardwood	6	Mix of hardwoods, with paper birch, aspen	Over mature trees
21-15	Mixedwood	8	Hardwood with hemlock	Overstocked
23-15	Northern Hardwood	18	Northern Hardwood with Oak	Improve stand quality
1-16	Red Oak	22	Red Oak, Sugar Maple, White Pine, Ash	Some Sugar Maple Borer
2-16	Pine	5	Red oak, white pine, red pine, hemlock and hardwoods	Larger trees mostly pine
3-16	Mixedwood	27	Red oak, white pine, red pine, hemlock and hardwoods	Larger trees mostly pine
4-16	Northern Hardwood	45	Variable	Thinned 1970's
10-16	Paper Birch	9	Paper Birch and Aspen	Mature paper birch and aspen
11-16	Paper Birch	7	Paper Birch and Aspen	Mature paper birch and aspen
16-16	Mixedwood	3	Hardwoods with hemlock	Overstocked
17-16	Northern Hardwood	8	Northern Hardwood with hemlock	Strong hemlock component
19-16	Paper Birch	12	Paper Birch and Aspen	Mature paper birch and aspen
20-16	White Pine	13	White Pine and Hardwoods	Low quality "Old field pine" some weevil damage
23-16	Mixedwood	23	Highly variable	Desirable White Pine, oak, Sugar Maple and yellow birch seedlings
24-16	Mixedwood	18	Softwoods with hemlock	Some oak and beech present
28-16	Mixedwood	25	Variable	Group selection in 1991
30-16	Paper Birch	8	Paper Birch and Aspen	Mature birch and aspen
35-16	Northern Hardwood	10	Hardwood with hemlock and some softwoods	

The Stevens Brook area has long been actively managed for wood products due to its capability to regenerate and sustainably produce crop trees. Logging has played an important role in the White Mountains since the 19th century, and present vegetative conditions are largely the result of historical logging practices, previous agricultural use, and more recent forest management. There is no documentation or other evidence that this area was ever considered prime farmland, although there is evidence of homesteads. Some of these same areas are still maintained as wildlife openings.

Historically, harvest operations were scheduled by calendar dates established by seasonal weather patterns and/or resource or silvicultural requirements. For example, fall and winter operations are required when dry or frozen ground conditions are necessary to protect soil and water resources, or in partial cuts where frozen conditions are necessary to minimize bark damage on residual trees (trees are more susceptible to bark damage in summer). Summer is chosen when operations on bare ground are required to create a seedbed necessary to establish regeneration of particular tree species, or where harvest prescriptions would remove all trees from a site, such as clearcuts and patch cuts (there are few residual trees so there is low potential for bark damage), and where soils can support equipment without adverse effects.

Today, operations take place when site conditions are appropriate rather than what the calendar says. For example, winter harvest might take place in November instead of December if the ground is sufficiently frozen. Conversely, they would be shut down if conditions are unsuitable, even during a "winter" month. Dates established to protect nesting wildlife, however, do not change. As in the past, harvesting operations are overseen by a Timber Sale Administrator who has the authority to cease operations at any time to protect resources.

Measuring Effects to Timber Resources

The relevant timber element for the Stevens Brook project is forest health and productivity, which refers to the mix of stand conditions such as age, density, diversity, and land suitability that contribute to the stand's susceptibility to damage and disease and its ability to thrive with optimum growth. Measuring effects to forest health and productivity is a qualitative prediction, based on the typical vegetative responses of various silvicultural treatments, other proposed activities, or natural forces, as described below.

Road decommissioning would have no measurable effects on timber resources in the analysis timeframe, because any decommissioned roads would be returned to forest productivity further into the future.

Development of the 2005 Forest Plan used the best available science to develop goals, objectives, standards, and guidelines for vegetation management on the White Mountain National Forest. The analysis used to evaluate effects to vegetation for the Stevens Brook project incorporates by reference information from the Final Environmental Impact Statement (pp 3-73 through 3-164), as well as literature cited in this report.

Direct and Indirect Effects

The **analysis area for direct and indirect effects** on timber resources is the MA 2.1 lands within the Upper Rattlesnake HMU. This analysis area was used because MA 2.1 lands are the National Forest lands within the HMU where vegetation management using various silvicultural techniques is appropriate. Any noticeable direct and indirect effects on timber resources will be in and near the harvested stands. The MA 6.1 lands within the Upper Rattlesnake HMU are not subject to vegetation management. The analysis area encompasses approximately 2,700 acres of the 13,000 acres of National Forest within the HMU.

The temporal scope for direct and indirect effects on timber resources is up to twenty years after the proposed activities occur on the ground. This time period was chosen because it represents the length of time for regeneration to become established in the understory.

Alternative 1

Under the No Action Alternative, all stands would continue to grow and mature. Some trees would die from natural forces related to size, competition, ice damage, or age stress. Other similar or more shade-tolerant individuals would replace these trees. Over a long period of time, the stands would begin to resemble a climax vegetation type, though not in the analysis timeframe. There would be a species shift from stands that may contain paper birch, red maple, white pine, ash, oak, and aspen to stands dominated by beech, sugar maple, yellow birch, and spruce-fir. Natural disturbances such as wind, rain, and ice events could influence the succession by temporarily providing forest openings that would encourage establishment of less shade-tolerant species.

Older trees would die out and the remaining, healthy trees would grow larger. As shorter-lived species (aspen, balsam fir, paper birch) grow older they will become more susceptible to natural mortality, ice damage, wind throw, and forest pests. Susceptibility to natural forces over time results in tree mortality that may occur in small pockets or over larger areas. Overall, stand vigor may decline because the opportunity to reduce competition among trees would be foregone.

Dominant and co-dominant oaks in the overstory of oak stands would continue to control site conditions in these stands. However, without periodic disturbance and silvicultural treatments to reduce competition, there would be too much shade for oak seedlings and young oak trees to become established. The indirect effect of no action would be continuation of the gradual conversion of oak stands to northern hardwood stands.

Harvest prescriptions that would increase growth rates on selected quality sawtimber trees would not be implemented. Neither the Forest Plan goal nor the Stevens Brook Purpose and Need for providing high quality sawtimber and other timber products on a sustained yield basis would be met. A direct effect of Alternative 1 is that no young stands would be created. An indirect effect of No Action would be that the timber stands in question would continue to age. With each year that

passes there would be a shift to the older age classes. That would continue the overall trend of few stands in the regenerating age classes being represented in the project area and in the forest. Most stands currently are in the mature age class.

Butternut (*Juglans cinerea*) is being killed throughout its range in North America by *Sirococcus clavigignenti-julandacearum*, a fungus of unknown origin causing multiple branch and stem cankers that eventually girdle infected trees. Butternut is valued for its wood for furniture, paneling, specialty products, and carving, and for its nuts. Ecologically, butternut is an important source of wildlife mast, especially in the northern portion of its range where walnut is not present. Butternut is not commonly found growing in great numbers anywhere in its range, so there is a concern to maintain a viable butternut population to preserve biodiversity in the eastern forests. Butternut is a shade intolerant species; successful regeneration requires that competition be controlled with the small openings created by single-tree or group selection on in larger clearcuts (Ostry et al. 1994). In the No Action alternative, the opportunity to regenerate butternut would be lost.

Alternative 2

Implementing the Proposed Action would maintain a mosaic of vegetative conditions and improve species composition by specifically increasing the amount of oak-pine, aspen, and birch, which is a desired future condition (see HMU Rationale in project record). Much of the vegetation in the Stevens Brook Project Area has been managed in the past, most recently in the mid-1990s. A variety of harvest methods were used.

Stands planned for **group selection** (130 acres) would have regeneration cuts that are 1/2 to 2 acres in size, located throughout the stand. These groups would regenerate, on average, 20 percent of the stand area. In some instances, group selection would be continuing the practice in these stands from past management activities and would be continued in future management entries. Regeneration would tend toward a broad mix of shade-intolerant, intermediate, and shade-tolerant species. Nearly all the species currently represented in the stored seed mix, or those originating from nearby seed trees, would have an opportunity to germinate and grow in these varied light conditions. There would be some variation in species mix from year to year due to seed periodicity and dispersal. Where advanced regeneration is present, such as spruce and fir in the mixed hardwood/softwood stands, it would be strongly represented in the resulting stocking.

Single tree selection harvests would release or regenerate hardwood and softwood species by removing older or lower quality trees. In these stands, a portion of the trees would be cut and removed to stimulate regeneration and to harvest defective, declining or mature trees. Less than a third of the stocking would be removed to create space and light for seeds to germinate and for young trees to grow. Poorer quality trees would be cut from all age classes, leaving stands of trees of various diameters with a dense understory of tree regeneration and other woody plants. Over time, residual tree growth and in-growth would fill in and return the stand to full stocking. The residual stand would restrict sunlight so that the treatment

would favor shade-tolerant plants. There would be a shift in species toward beech, sugar maple, and hemlock. Eventually, other species would be eliminated from the population. Single-tree selection allows managers to improve the quality of shade-tolerant growing stock. Beech trees that are genetically susceptible to beech scale disease or sugar maple trees affected by the sugar maple borer would be harvested and removed from the stocking. These treatments would maintain uneven-aged stands leading to greater diversity of age classes and species. Species diversity would be enhanced by retaining any advance regeneration, particularly spruce and fir in the mixed hardwood/softwood stands.

Single tree and group selection harvests would be used to release or regenerate white pine by removing older or lower quality trees. In some areas of each stand, group selection would promote a mix of faster-growing hardwood species, including paper birch, yellow birch, aspen, and white ash. These treatments would maintain an uneven-aged stand, leading to greater diversity of age classes and species. Species diversity would be enhanced by retaining any advance regeneration, particularly pine and oak. These treatments would also be used to encourage regeneration of butternut.

The **shelterwood** treatment would create growing conditions for species that are tolerant of shade. Delayed shelterwood, where the overstory is retained for a longer period of time, can also be used for regenerating species that are somewhat tolerant of shade, such as yellow birch and white ash. This type of shelterwood can be effective in regenerating oak and pine when a lower residual basal area of 20-30 square feet per acre is retained. These species can occur in the most open and disturbed locations within these shelterwoods, such as near skid trails, intersections, and log landings. Softwood species such as white pine and red spruce, and hardwood species such as oak and black cherry, may exist as seedlings or saplings in the understory of stands proposed for delayed shelterwood. These species would be released to grow better by the shelterwood harvest, and species diversity would improve. Some new seedlings of these species could become established as a result of the harvest and reduction of shade.

In Alternative 2, prescribed fire would be applied in stands 5 and 13 in Compartment 15, and stand 3 in Compartment 16. These stands contain oak-pine habitat types that require periodic disturbance in order to regenerate or maintain dominance in a stand. These habitat types are also well-adapted to fire. Mortality of trees stressed by insect, disease, or damage may be increased as a result of prescribed burning in Alternative 2.

Oak-pine is a less common habitat type on the WMNF. The treatment goal for these stands is to improve the growing conditions for eastern white pine and northern red oak. Eastern white pine has the ability to colonize both open, disturbed sites and small gaps in the overstory. In both cases, however, white pine would eventually be succeeded by more shade tolerant hemlock and northern hardwood species. White pine's optimal regeneration will occur in areas with low levels of understory shade and exposed mineral soils. The proposed treatment in stands 5-15, 13-15, 2-16, and 3-16 would create these conditions, with an initial shelterwood cut that

leaves a partial overstory to promote seedling establishment, followed by a prescribed burn that would reduce the understory shade and remove accumulated leaf litter and logging slash from the ground. A spring burn would also help to control white pine cone beetle larvae incubating in dead cones on the forest floor. The prescribed burn would be timed to take advantage of a good white pine cone year so a maximum amount of seeds would be available to regenerate. Several low intensity fires may need to be applied to the site. Similar burns in other locations on the WMNF have proved effective at reducing the overstory and preparing a seedbed while minimizing damage to mature white pine (see project record).

The interruption of the natural fire regime in oaks has been cited as the main reason for their decline in the East. Northern red oak is neither an aggressive colonizer like aspen nor a slow growing, shade tolerant species like sugar maple. Red oak relies on advance regeneration to take advantage of gaps that appear in the canopy through windthrow, fire, or logging. The treatment goal is to create these conditions with an initial shelterwood cut followed by a prescribed burn. The initial shelterwood cut would increase light in the understory, improving conditions for oak establishment and regeneration without stimulating growth in more shade intolerant species. Prescribed fire would then be used to further reduce competing species, prepare a seedbed, and increase soil warming. An added benefit to fire would be the interruption of the curculio weevil lifecycle. Several applications of fire would be needed for optimal results in these stands.

A low to moderate intensity backing fire would be applied in the oak-pine stands, where flame lengths should not exceed 2 feet. Past experiences burning in similar oak-pine stands have shown relatively low mortality in the mature red oak and white pine, but some damage and crown scorch would be expected.

The location of fire control lines, using the contour of the slope as a guide and implementing post burn erosion control measures where needed, would minimize the short-term impact on exposed soil by preventing the erosion of topsoil, and would aid in reestablishing vegetation on the site. The prescribed burns would be conducted during the spring or fall months, when there is sufficient soil moisture to prevent soil damage and erosion.

The highest priority before and during the prescribed burns is public and firefighter safety. A prescribed burn plan would be written for each stand, outlining the goals and objectives of the treatment and explaining how to safely and effectively achieve them. The burn plans must be reviewed and signed by a burn boss, the WMNF Fire Management Officer, and the District Ranger. Prior to implementing the prescribed burns, fire control lines would be placed around each stand which, in conjunction with fire control pumps and hose, engines, and personnel, would ensure that the prescribed burn remains controlled, as well as protecting any adjacent private land and structures. Similar prescribed burns in oak-pine habitat are planned by the WMNF in the towns of Rumney, Ellsworth, Warren, and Easton.

Clearcuts are proposed in areas of low quality or mature trees to allow the next generation of trees the opportunity to grow at their full potential. Clearcut treat-

ments would promote a mix of trees that require sunlight, such as aspen and paper birch. Paper birch requires large openings and full sunlight for successful regeneration. It is intolerant of shade and competition from older trees, woody shrubs, and herbaceous species (Safford 1983). Stands 2 and 20 in Compartment 15, and stands 10, 11, 19, and 30 in Compartment 16 (proposed for clearcutting) are generally of poor quality and declining growth rates due to stand maturity. The time is right to harvest these stands to provide regeneration forest habitat while salvaging timber value and promoting the regeneration of vigorous, fast-growing trees that can effectively use the site.

There are 49 acres of mature trees that would be regenerated with clearcuts. A few species of woody or herbaceous vegetation that have seeds with a long period of dormancy, such as raspberry and pin cherry, would have an opportunity to germinate and become part of the ecosystem for a period of time. This would increase species diversity.

A direct effect of clearcutting in northern hardwood stands is the promotion of suckers and stump sprouts in species such as aspen and red maple. 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 begin in the first growing season after harvest. Within five years after cutting, young, dense stands were established on all four sites. Stocking surveys conducted on the Forest three years after treatment have shown successful regeneration in even-aged and uneven-aged harvested stands (see project record). This harvest method is most likely to result in aspen and paper birch representation in the regeneration mix; it also produces the most productive, managed, early-successional habitat.

The thinning in Stand 1-16 would reduce the basal area through the removal of dying and defective trees, undesirable species, or acceptable trees crowding high-value stems. By removing low quality trees, future harvesting in these stands should lead to a higher percentage of quality sawlogs. The objective is to provide adequate growing space for the stems with highest value (Leak et al. 1987), which would lead to a higher percentage of sawlogs in the future.

Timber Stand Improvement (**TSI**) is thinning of young stands using hand tools. It is applied in stands with dense growth to increase the growth of residual stands and shorten rotation length, increase potential stand value by encouraging the development of the good quality growing stock, and improve or maintain species composition. In the Stevens Brooks project area, the objective is to improve the composition by releasing high value stems such as sugar maple from suppression by undesirable species such as red maple or other poorly formed stems.

Creating a new **permanent wildlife opening** and expanding the existing wildlife opening would convert three acres of tree production to a shrubby, herbaceous condition. Regular maintenance of these sites would discourage growth of woody vegetation and favor herbaceous plant species such as goldenrod and raspberries. The direct and indirect effects of removing this land from timber production would

be the lack of opportunity to produce forest products, including quality sawlogs. There would be no diversity of tree species on these sites as long as they are maintained as wildlife openings.

There is a potential for windthrow in the partially cut stands. Stands adjacent to patch cuts and clearcuts may have increased windthrow until crowns expand to fill the canopy and the roots become windfirm.

Some residual tree damage would occur from harvesting operations, but skid trails would be planned adjacent to trees marked for removal in order to provide adequate working space for logging equipment without damage to residual trees.

Connected Actions and Other Proposed Activities

Road maintenance activities would most likely result in the occasional removal or trimming of vegetation in some areas to accommodate equipment.

Alternative 3

The direct and indirect effects would be similar to Alternative 2 but would occur on fewer acres because less timber harvest is proposed (229 acres rather than 386 acres). Alternative 3 would maintain a mosaic of vegetative conditions and improve species composition by specifically increasing the amount of oak-pine, aspen, and birch, which is a desired future condition (see HMU Rationale in project record).

Cumulative Effects

The **analysis area for cumulative effects** on vegetation encompasses approximately 20,000 acres:

- National Forest lands in the Upper Rattlesnake HMU (total 13,000 acres); and
- Adjacent private land in the Towns of Rumney and Wentworth (outside of the National Forest boundary: total 7,000 acres).

This area was chosen because it includes the Proposed Action (in the Upper Rattlesnake HMU) and past harvest on adjacent private land.

The **temporal scope for cumulative effects** on timber resources is twenty years in the past and twenty years in the future (1986 to 2026). Twenty years is important in tracking effects because it is the length of time after an uneven harvest (such as a group selection) that the stand will be considered for re-entry.

Map 5 shows the cumulative effects analysis area and the location of past, present, and future projects on Forest Service land. When considering the past and future harvest in the cumulative effects area, the cumulative effects would be the same as direct and indirect effects. The majority of the northern hardwood and mixed wood stands are at least 80 to 90 years old and growth is slowing. By harvesting now, sites supporting these slow growing trees would be restocked with younger, more rapidly growing trees and therefore the average future growth per acre would increase (Forest Plan FEIS). Overall, removing diseased, damaged, and low quality

trees promotes a healthy, vigorous future forest that increases in value over time due to higher quality residual trees.

Alternative 1

This alternative will not contribute incrementally to the effects of timber harvest or land clearing over the 40-year period from 1986-2026. Without the proposed timber harvest, species, age class, and structural diversity would remain static or diminish. Diversity may be enhanced by natural disturbance such as a weather event, fire, disease, or an infestation that can create forest openings and provide some limited opportunities for shade-intolerant plant species. However, on National Forest lands, regenerating and young stands would age and grow closer to the surrounding canopy of mature stands. Sunlight to the forest floor would diminish, and so would shade-intolerant species. Mature stands of the short-lived (40-60 years) paper birch and aspen community types would continue to age toward mortality, many to be replaced by shade-tolerant species now growing in the understory of these stands. Butternut is a shade intolerant species; successful regeneration requires competition be controlled. Alternative 1 does not meet the minimum requirements for the regeneration of butternut.

The Forest Service may evaluate harvest opportunities in the future in the compartments in the eastern portion of the Upper Rattlesnake HMU, however, the extent of foreseeable future harvesting is not known and would be determined by future stand exams. Timber harvest on private lands has and will continue to result in changes in age class and distribution.

The cumulative effects would be the same as direct and indirect effects.

Alternatives 2-3

The effects of Alternatives 2 and 3 are consistent with those anticipated and analyzed in the FEIS (pp 3-73 to 3-164). Even-aged harvests and the additional acres of permanent wildlife openings would have the effect of reducing the acres in closed-canopy forest and contributing to age class and species diversity in the forested landscape.

Data regarding timber harvests in the cumulative effects area was collected from National Forest databases, roadside assessments, and inspection of aerial photos. As expected, a variety of activities are taking place in the analysis area, including timber harvest in the form of commercial thinnings, clearcuts, group selection, and individual tree selection. The following information is known.

Past Harvesting:

- In the past twenty years, 226 acres of National Forest lands were harvested in the Upper Rattlesnake Brook HMU.
- In the past, approximately 114 acres (2 percent) of private inholdings adjacent to the HMU were heavily harvested.

Future Harvesting:

- The Forest Service may evaluate harvest opportunities in the future in the compartments in the eastern portion of the Upper Rattlesnake HMU. The extent of foreseeable future harvesting is not known and would be determined by future stand exams.
- In the next twenty years, harvesting is expected to continue in the Towns of Rumney and Wentworth. Although types and amounts of harvests cannot be known, it is expected that past harvesting trends will continue.

Table 6. Comparison of Silvicultural Treatments by Alternative.

Activity	Alternative 1 Stand Acres	Alternative 2 Stand Acres	Alternative 3 Stand Acres
Even-Age Management			
Clearcut	0	49	6
Shelterwood	0	80	56
Thinning	0	22	22
Timber Stand Improvement	0	27	27
Total	**0**	**178**	**111**
Uneven-Age Management			
Single Tree Selection	0	65	47
Group Selection	0	130	58
Single and Group Selection	0	13	13
Total	**0**	**208**	**118**

Figure 3. Local mills use products from the White Mountain National Forest. After lumber is cut from the logs, the remainder is processed as wood chips for fuel and finally sawdust for mulch. (WMNF photos by Janice Mulherin)

3.4 Socio-economic Assessment

Executive Summary

This section analyzes the direct, indirect and cumulative effects of each of the alternatives on the socio-economic conditions in Rumney and Wentworth. None of the alternatives would adversely affect the quality of life or the rural character of the area. The No Action alternative would not generate funds through the NH Timber Tax nor the 25% Fund. The action alternatives would provide the communities of Wentworth and Rumney revenue in the form of timber tax and 25% Fund. There is little potential for minority and low-income populations to be disproportionately affected by the proposed activities

Affected Environment

The Final Environmental Impact Statement for the Forest Plan details the social environment of the White Mountain National Forest in terms of populations, demographics, partnerships, values, uses of the Forest, and attitudes toward land management (FEIS, pp. 3-472 to 3-486), and the Forest Plan recognizes the Forest's support to local and regional economies (p 1-3). While many of the communities surrounding the National Forest share a history of reliance on natural resources and tourism for their livelihoods, it is recognized that social and economic patterns are now changing, with marked differences between the south and north. Populations and the economy are growing in the communities surrounding the southern portions of the Forest, while those in the north have slower economic growth, some decline in populations, and a greater dependence on traditional natural resource-based manufacturing industries.

The project area is located in the Towns of Rumney and Wentworth, Grafton County, at the southwestern section of the White Mountain National Forest. Rumney was incorporated in 1761 and covers about 42 square miles of land. The population has declined from a high of 1,479 in 2000 to a reported 1,439 residents in the 2006 census. Wentworth was incorporated in 1766 and also covers about 42 square miles of land. The population had a slight decline from a high of 797 in 2000 to a reported 783 residents in the 2006 census. In both Rumney and Wentworth, most (approximately 76 percent) of employed residents work elsewhere, commuting to jobs in other towns or states (Economic and Labor Market Information Bureau, NH Employment Security 2007).

While recreation use is relatively low when compared to other parts of the National Forest, local residents use the Stevens Brook area for walking, fishing, and other recreational pursuits. Recreation values and uses are described in the Recreation section (3.11). A few visitors are drawn to Plummer's Ledge, a 3.0 acre, untrailed area that features several glacial potholes located adjacent to the project area.

New Hampshire is the second most forested state in the nation, with 84 percent of the state's total land covered with trees. Forest land plays a significant role in the state's economy. The forest-based manufacturing economy provides employ-

ment for almost 9,600 people and generates payrolls of $320 million. Wood provides approximately 6 percent of energy use in New Hampshire annually (NEFA 2007). The 2005 Forest Plan (Goals, p 1-3) recognizes the Forest's contribution to regional economies. The Forest Plan's FEIS (pp 3-491 to 3-520) provides detailed information regarding the economic environment that the Forest operates in and the recent revenue contributions to regional and state governments. It also states that the "loss of land dedicated to producing commercial timber appears to be a continuing trend off-Forest." (Thorne and Sundquist 2001) New Hampshire is losing about 17,500 acres of forestland every year. The remaining large forests south of the WMNF are getting smaller (SPNHF, 2005). This has implications for the Forest in that the economic importance of its lands that permit timber management will likely continue to rise.

There are several sawmills and forest product-based manufacturers within close proximity to the project area that purchase timber from the White Mountain National Forest. The project is located in what is locally referred to as "Mill Alley." Secondary manufacturing of wood products (furniture, pallets, and dozens of specialty products) is scattered throughout Vermont, New Hampshire, and Maine, with products supplied to businesses throughout the East. While the number of sawmills has decreased in recent years, these mills have a production output near record high levels as compared with historic production highs in the 20th century (NEFA, 2007).

The Forest Service recognizes the Forest's support to local and regional economies and strives "to provide both healthy ecosystems and a sustainable yield of high quality forest products, with special emphasis on sawtimber and veneer." (Forest Plan, pp 1-3 and 1-17). Many local forest product manufacturers are within viable hauling distance to the project area, and it is reasonable to assume that products from the Stevens Brook timber harvest would supply some of these businesses. Forest products for local markets are also available from private land, as well as state and town forests.

A steady demand remains for timber products sold by the National Forest, as reflected by bids on timber sales. The Forest's high value sawtimber, especially, represents a key niche in the region, and has impacts on the local economy (FEIS, p 3-498).

Planning costs for the Stevens Brook project include planning and analysis as documented in this EA — field surveys and examinations, literature reviews, surveys, public involvement, and preparation of documents. If the decision is made to move forward with either Alternative 2 or 3, costs would be incurred for timber sale preparation; contract preparation, appraisal, and sale; contract administration; and personnel time for preparing and implementing the mowing and stumping of the wildlife opening and prescribed fire activities.

Funding options for some of the proposed work include money authorized by Stewardship Contracting or Knutson-Vandenberg (K-V) laws, which allow the retention and use of timber receipts to accomplish restoration and improvement

projects in and near the project area. For the Stevens Brook project, the wildlife opening maintenance and prescribed burning would be considered for these funding sources.

Reimbursements would be made to communities in which National Forest timber is harvested.

- The New Hampshire Timber Yield tax averages about 10 percent of the value harvested. The timber purchaser would be responsible for the payment to the towns of Rumney and Wentworth where the harvesting occurs.
- Under the 25 Percent Payment-to-States Fund (25% Fund), New Hampshire collects 25 percent of the annual revenue generated in the White Mountain National Forest from timber harvest and other revenue-producing activities. The state then transfers a portion of the revenue to the county or town in which the activities occur, with the amount transferred depending on the amount of National Forest land within it. If the activities occur in an unorganized township, the money is transferred to the county. If the activities occur in an organized town, the money is transferred to the town government. For the Stevens Brook timber harvest proposal, the calculation for the estimated funds would be 25 percent of the net timber value multiplied by the percent of national forest land in the towns of Rumney and Wentworth. The money is to be used for the benefit of public schools.

Measuring Socio-Economic Effects

On a project level, examination of social and economic effects is required if they are important to a reasoned decision. Also required is the consideration of effects to low income and minority populations (FSH 1909.15 Section 15). Although social and economic factors are not a significant issue in the Stevens Brook analysis and not a component of the Purpose of and Need for the project, comments and questions regarding social and economic effects were raised in the scoping period and, where the comments are relevant to the project, are responded to in this section and in Appendix A.

Social impacts analyzed in the Forest Plan were in the context of what people value about the Forest, and the effects of national forest management on the *quality of life* and *rural character* of the Forest Region. Effects were based primarily on assessments of trends across the four counties in which the WMNF is located (FEIS, p 3-487); however, these elements and others can be measured at the project level as follows.

- Rural character may be measured by changes in human activity because of changes in development levels and access. For the Stevens Brook project, there are no changes in development levels proposed, but changes in human activity and access are expected.
- Quality of life may be measured by the changes in safe drinking water, recreational opportunities, healthy ecosystems, scenic beauty, and the natural and cultural heritage of the area.

- Public health and safety is an important social element when proposing timber harvest and other activities using large equipment and public travel ways, and may be measured by changes in traffic patterns.
- Executive Order 12898 (Environmental Justice) requires investigation as to whether minority and low-income populations may be disproportionately affected by the proposed activities, as measured by the potential for them to be affected.

Economic elements analyzed in the FEIS included regional employment and labor income as affected by an array of factors such as timber harvest, road construction and maintenance, recreation management and trends, state and local government activities, and the structure of the forest products industry (FEIS, p 3-509). Relevant, measurable economic elements at the project level are:

- Costs and revenues of planning and implementing the proposed activities.
- Timber tax payment to the towns of Rumney and Wentworth.
- Reimbursement to WMNF communities under the 25 Percent Payment-to-States Fund.

The Forest Service is not required to select the alternative with the highest timber volume or revenue. Many social and economic effects are not tangible and cannot be quantified, and are recognized as either beneficial or not, depending on one's values and perspectives. For example, clearcuts may have adverse visual effects to some, but may be viewed as valuable wildlife habitat by others. Overall, the Forest Service strives to preserve and enhance natural resources for the benefit and enjoyment of the Forest as part of its mission in serving the public.

The Stevens Brook proposals that could have a measurable effect on socio-economics are timber harvest, road maintenance, and wildlife opening maintenance.

Direct and Indirect Effects

The **analysis area for direct and indirect effects** on socio-economics is the towns of Rumney and Wentworth because all of the proposed activities would occur there. In addition, because a large portion of both towns is in National Forest ownership, they would be most affected socially and economically by the proposed activities. The Town of Rumney encompasses 27,270 acres, with 11,572 acres in National Forest ownership. In the Town of Wentworth, of the 26,963 acres, 3,752 are in National Forest ownership.

The **temporal scope for direct and indirect effects** is the duration of the project activities because any direct or indirect effects would occur during or soon after operations.

Table 7. Timber Economic Characteristics by Alternative.

	Alternative 1	Alternative 2	Alternative 3
Costs			
Environmental Analysis and Project Planning	$42,000	$42,000	$42,000
Timber Sale Preparation	$0	$20,386	$12,697
Timber Sale Administration	$0	$7,924	$5,222
Road restoration cost	$0	$3207	$1944
TIMBER HARVEST TOTAL COSTS	—	$73,517	$61,863
Revenues			
Harvest Volume (MBF)	0	3,300	2,000
Stumpage Receipts	$0	$504,141	$305,540
Estimated 25% Fund Payment	$0	$126,035	$76,385
10% Timber Yield Tax to Rumney/Wentworth	$0	$50,414	$30,55
Net Value (timber receipts – timber cost)	—	$430,496	$243,549
Unit Cost (timber cost/MBF)		$130	$200

NOTE: Costs for Planning, Preparation, and Administration are based on average costs per acre displayed in Table B-11 of the FEIS (p B-20) and include costs for regeneration surveys. Alternative 2 proposes 258 acres of regeneration surveys; Alternative 3 proposes 124 acres of regeneration surveys.

Table 8. Estimated Costs of Non-Timber Activities.

Wildlife Opening Maintenance	Alternative 1	Alternative 2		Alternative 3	
Stumping	$0	3 ac.	$3,000	3 ac.	$3,000
Prescribed Fire	$0	80 ac.	$16,000	56 ac.	$11,200

Alternative 1

No revenue would be generated and no reimbursements would come to the towns. The cost of project planning and environmental analysis is approximately $42,000 regardless of the alternative selected. There would be no changes in rural character or public health and safety because no activities would be implemented. The recreational component contributing to quality of life would be slightly affected because hunting opportunities that would have been available in newly harvested areas would be foregone.

Alternatives 2-3

See Tables 7 and 8 for estimated costs and revenues associated with implementing either Alternative 2 or 3. Alternative 3 does not include harvesting in the Town of Rumney; therefore, no timber tax would be received for that town.

Direct and indirect effects to quality of life and rural character are expected to be minimal because the proposals mirror traditional activities occurring on private lands in the region and town. Recreation use would be negatively affected during the actual harvest, but enhanced by increased hunting opportunities for several years after harvest (see Recreation section).

Scenic quality and heritage resources would be protected through the Forest's Scenery Management System and standards and guidelines, as described in the Scenic Resource and Cultural Heritage sections.

Human activity would be increased for the duration of project operations as work crews and Forest Service personnel implement the proposed activities, but not to the level of having a noticable effect on the rural character of the analysis area. No new developments, roads, or trails are proposed, so access would not change. The road decommissioning would not change public access because the road segments proposed for decommissioning are not currently used for public access. Human activity in the area would increase only for the duration of the operations.

Direct and indirect effects to public health and safety, as measured by changes in traffic patterns, would occur with traffic increases on NH Route 25 and the Buffalo Road. Visitors on FR 429 would notice increased use by trucks and large equipment associated with timber harvesting. This noticeable traffic increase is not without precedent, due to the traffic associated with timber harvests on private land in and near the project area over the past 15-20 years.

Cumulative Effects

The **analysis area for cumulative effects** on socio-economic conditions includes the towns of Rumney and Wentworth because they are adjacent towns, each with National Forest ownership and each with recent and proposed National Forest timber harvest activity. Rumney has 42 percent of its landbase in National Forest ownership and Wentworth has 14 percent National Forest ownership.

The **temporal scope for cumulative effects** on socio-economics is ten years past and ten years into the future (1998-2018) from when the harvest would occur.

Alternative 1

Revenue generated cumulatively from timber harvesting on National Forest lands and on private lands would continue to contribute to town budgets. The recent Right Angle and Camp 7 timber sales have contributed or will contribute approximately $223,000 from the 25% Payment to States Fund and the 10% Timber Yield Tax. As explained previously, there would be no changes to the existing rural chararacter, quality of life, or public health and safety with this alternative.

Alternatives 2-3

Cumulatively, human activity associated with timber harvest operations on national forest and private lands would continue to be steady and noticable. There have been no permanent developments or changes in access resulting from past timber sale harvests, and none are proposed or planned, so no cumulative effects to the rural character of the towns are anticipated. Human activity associated with timber harvest may be viewed as a beneficial effect in this area, as several lumber mills are located within the towns of Rumney and Wentworth.

It is impossible to predict what effect private timber harvests may have on ecosystems within the towns, although New Hampshire Best Management Practices are

assumed to be implemented in order to protect ecosystems. Forest Plan Standards and Guidelines, Best Management Practices, and design features are integrated into all past and planned timber harvests to protect soils, water, scenery, and heritage resources, so there would be no cumulative effects to those aspects of the existing quality of life in the towns. Timber harvest prescriptions are site-specific and designed to promote healthy ecosystems, so no adverse cumulative effects are anticipated as a result of national forest timber harvests.

Cumulative effects to recreational opportunites would be minimal and are described in the Recreation section. Cumulative effects to public health and safety (i.e., changes in traffic patterns) would be noticable but not considered a threat because logging traffic to the Right Angle project and the proposed Stevens Brook project would be on different Forest Roads over the course of 5-8 years in various seasons. There would be additional logging traffic on NH Route 25.

Assessing the cumulative economic effects for the Stevens Brook project includes the past and predicted payments to the towns from timber receipts, as displayed in Table 9. There are no other National Forest revenue-producing activities in the cumulative effects area that would contribute to the 25% Payment to States fund.

Table 9. Potential payments to Grafton County and Town of Rumney & Wentworth, 1998-2018.

Timber Sales since 1998		
• Total Timber Value	$637,154	
• 25% Payment to States Fund	$159,288	Total $223,003
• 10% NH Timber Yield Tax	$63,715	
Proposed Stevens Brook Timber Sale		
• Total Timber Value – Alternative 2	$504,141	
• Potential 25% Payment to States Fund	$126,035	Total $176,449
• Potential 10% NH Timber Yield Tax	$50,414	
TOTAL POTENTIAL PAYMENTS (1998-2018)		$399,452
• Total Timber Value – Alternative 3	$305,540	
• Potential 25% Payment to States Fund	$76,385	Total $106,939
• Potential 10% NH Timber Yield Tax	$30,554	
TOTAL POTENTIAL PAYMENTS (1998-2018)		$329,942

Because each timber sale is site-specific and different in acreage, timber volume and value, road costs, harvest prescriptions, and the need for regeneration surveys, total costs vary widely. There are no cumulative effects associated with project planning, preparation, and administration. Costs are incurred as funding allows to implement the Forest Plan and carry out the Forest Service mission, with many resulting non-commodity and unquantifiable benefits associated with the cost of public land management.

Environmental Justice

Less than 3 percent of Grafton County is considered to be minority populations, and there are no recorded minority populations in the Towns of Rumney and Wentworth (Economic and Labor Market Information Bureau, NH Employment Security 2007). About 4.9 percent of Rumney's population is below the poverty level, as is 6.1 percent of Wentworth's population. Both are below the state average of 6.5 percent and the Grafton County average of 10.1 percent (US Census Bureau). No concerns about these populations were raised during scoping and because they comprise a small percentage of the overall population in the towns, there is little potential for minority and low-income populations to be disproportionately affected by the proposed activities.

Wentworth (above) and Rumney, New Hampshire.
(WMNF Photos by Janice Mulherin)

3.5 Wildlife

Executive Summary

Existing Condition: The Upper Rattlesnake HMU (includes the Stevens Brook Project Area) is dominated by northern hardwood forest type with mixedwood, spruce-fir, aspen-paper birch, and oak-pine and beech components. The mature age class dominates all the forest types, and there is no regeneration age class and very little young age class habitat in the HMU and the project area. The red oak and beech produces hard mast for foraging black bear and white-tailed deer in the project area, and the softwood habitat is part of the Stevens Brook deer wintering area. There is one permanent two2-acre apple orchard opening in the project area.

Summary of Effects: Alternative 1 does not meet the Purpose and Need and would not move the forest towards the desired future condition for the regeneration age class or habitat diversity on MA 2.1 lands in the Upper Rattlesnake HMU identified in the Forest Plan.

The No Action and both action alternatives would not adversely affect WMNF MIS in the project area or MIS population trends and viability within the Forest-wide planning area. A Biological Evaluation (BE) for Federally Threatened, Endangered, Proposed (TEPS) and Regional Forester Sensitive Species (RFSS) was completed for the Stevens Brook project. There is habitat for and/or documented occurrence of several RFSS in the project area. The BE details the potential direct, indirect, and cumulative effects to these species and their habitat. The action alternatives would not cause any adverse effects on TEPS or RFSS.

Both action alternatives would cause relatively minor and localized effects on wildlife habitat on MA 2.1 lands within the Upper Rattlesnake HMU analysis area (including the Stevens Brook Project Area). Neither action alternative would cause any adverse effects on the Stevens Brook deer yard, but would perpetuate softwood and oak habitat and create hardwood browse adjacent to the deer yard. Both action alternatives would increase wildlife habitat diversity within the project area and HMU (Alternative 2 has more potential compared to Alternative 3).

The private land adjacent to the HMU contains a mix of habitat types and paved and dirt roads and developments. The adjacent private land contributes to habitat diversity, but not substantially to the 0- to 9-year-old age class by forest type. Future activities on private land are not expected to create substantial amounts of regeneration age class habitat.

Affected Environment

Extensive scientific studies and literature reviews conducted by DeGraaf and Yamasaki (2001) and DeGraaf et al. (2006) document that a wide array of wildlife uses the WMNF seasonally or year-round. These species use a variety of habitat types and age classes for all or part of their life cycle needs. Many species use multiple age classes and habitat types.

The WMNF Forest Plan used the best available science to develop goals, objectives, standards, and guidelines to manage wildlife species and their habitats. The Plan established Forest-wide vegetation and age class composition objectives for a desired range of habitat conditions well distributed across the Forest to support all wildlife species (Forest Plan, pp 1-20 to 1-22). Habitat Management Units (HMUs) are blocks of land approximately 6,000 to 49,000 acres established across the WMNF to help achieve the Forest-wide objectives. Species and age class composition objectives are set for each HMU based on land capability, which contributes to the Forest-wide objectives. The 2005 Forest Plan FEIS evaluates the impact of meeting those objectives and proposed management actions on populations of MIS at the landscape scale. This EA also uses the best available science and current habitat conditions in and around the Stevens Brook Project Area to evaluate the effects of the Proposed Action and alternatives on those habitat conditions and wildlife, including MIS and TEPS.

Upper Rattlesnake HMU

The Upper Rattlesnake HMU contains approximately 13,225 acres of National Forest land, of which approximately 2,705 acres (or 20 percent) are in MA 2.1 lands, and the remaining acres are in MA 6.1. Of the 2.1 lands in the Upper Rattlesnake HMU, approximately 890 acres (or 33 percent) are unsuitable for timber harvest. The MA 2.1 lands suitable for timber harvest to achieve the composition and age class objectives in the Upper Rattlesnake HMU amount to approximately 1,815 acres (or 14 percent of the HMU). The current condition and desired habitat objectives for MA 2.1 land in the Upper Rattlesnake HMU are displayed in Table 10.

Table 10. Current & Desired Objectives for the Upper Rattlesnake HMU.

Habitat Type	% MA 2.1 in HMU		MA 2.1 % Desired Age Class Objectives			
	Current	Desired	Regeneration	Young	Mature	Unsuitable[1]
Northern Hardwood	69	58	5	20	47	28
Mixedwood	7	3	1	5	50	44
Spruce-Fir	5	15	2	6	48	44
Aspen-Birch	1	2	7	21	23	49
Oak-Pine	14	18	([3])	([3])	([3])	40
Hemlock	4	4	([3])	([3])	([3])	54
WL Opening	0	<1	n/a	n/a	n/a	n/a
Other[2]	**0**	**<1**	**n/a**	**n/a**	**n/a**	n/a

All figures are approximate.
Regeneration = 0-9 years for all types.
Young = 10-59 yrs for northern hardwoods and mixedwood and 10-39 yrs for all other types.
Mature = 60-119 yrs for northern hardwood and mixedwood and 40-89 yrs for spruce-fir, 40-69 for aspen-birch.

[1]Land unsuitable for harvest located in MA 2.1, which currently could be in the young or mature age classes.

[2]Non-forested, not a Wildlife Opening (i.e. wetlands, rock, alpine habitat).

[3]The oak-pine & hemlock objectives for this HMU are to maintain and/or increase these habitat types were possible.

In comparing the Current with Desired Future Condition, the mature age class dominates all the forest types and there is no regeneration age class and very little young age class habitat in the HMU and the project area. The percent of spruce-fir habitat type falls short of the HMU objective (five percent vs. 15 percent). Over the very long term of one to two hundred years, some mixedwood and northern hardwood stands will naturally convert into spruce-fir. Uneven-aged management of mixedwood and hardwood stands with a spruce-fir component will gradually favor spruce-fir over several decades.

Much of the aspen-birch type on the WMNF (including the Stevens Brook Project Area) is degenerating and immediate regeneration might not result in pure aspen-birch stands. The WMNF FEIS describes the age class objective for the first decade is to regenerate higher levels of aspen-birch before it degenerates further, eventually allowing for long-term maintenance within the specified age-class regime. Management of aspen-birch is focused on maintaining the percentage of the stands currently in this habitat type. This includes converting some mixedwood or northern hardwood stands to aspen or paper birch where it has a good chance of survival (such as the Stevens Brook Project Area), and letting the existing aspen-birch convert to another habitat type where it has low capability to regenerate. Management of other habitat types (oak-pine and hemlock forests, permanent wildlife openings) will focus on maintaining these types and establishing new openings where uplands rank high in providing herbaceous or shrubby habitat features and have access for maintenance (Forest Plan). The White Mountain National Forest Terrestrial Habitat Management Reference Document provides additional guidelines for management of wildlife habitat at the HMU level (USDA-FS 2006a).

White Mountain National Forest Management Indicator Species (MIS): Table 11 discloses the WMNF MIS (FEIS) and their representative habitat in the analysis area (MA 2.1 lands in the HMU including the project area). MIS probability of occurrence was based on known documented occurrence and/or suitable habitat present in the analysis area (suitable habitat was assumed occupied).

Stevens Brook Project Area

The existing condition of the project area is based on several multi-year, multi-seasonal, and site-specific surveys and database reviews (Costello 2006; Fife 2004; Mattrick 2006; NHNHB 2008; NHNHI 1993; NHFG 2006; USDA-FS 2006, 2006c, and 1990; Williams 2007; Wingate 2006).

The project area is approximately 1,000 acres located in MA 2.1 land in the Upper Rattlesnake HMU, and contains Stevens Brook and unnamed perennial tributaries that are part of the Baker River Watershed. The project area (and HMU) contains predominately northern hardwood forest with mixedwood, spruce-fir, aspen-paper birch, and oak-pine components. The mature age class dominates all the forest types; there is no regeneration age class and very little young age class habitat in the HMU and the project area. There is a two-acre orchard opening in Stand 21 of Compartment 16, and three vernal pools in this compartment.

Table 11. Probability of Occurrence of WMNF MIS Within The Analysis Area.

MIS	Representative Habitat Condition	Habitat and/or MIS in the Analysis Area	MIS Population Trends
Chestnut-sided warbler	Regeneration age class hardwoods (predominantly seedling / sapling stages of northern hardwoods, but could include some scattered regeneration softwoods).	0 acres regeneration hardwood habitat in MA 2.1 land in the HMU. No chestnut-sided warblers seen or heard during several field reviews of the project area.	WMNF breeding bird monitoring & BBS data show a statistically significant declining trend. The amount of regeneration age habitat on the WMNF has declined in recent decades
Scarlet tanager	Mature hardwoods (predominantly northern hardwood, could include scattered pole-size softwoods).	1,718 acres mature hardwood habitat in MA 2.1 land in the HMU. Suspect tanager could occur in the analysis area, but none seen or heard during several field reviews of the project area.	WMNF bird monitoring shows a declining trend since 1992. BBS data shows a stable trend last 4 decades (NH data show declining trends, while VT & ME show increasing trends).
Magnolia warbler	Regeneration age softwoods (predominantly spruce-fir, but could include some scattered regeneration age hardwoods).	0 acres regeneration age softwood habitat in MA 2.1 land in the HMU. No magnolia warblers seen or heard during several field reviews of the project area.	WMNF bird monitoring data shows no statistically significant trend. BBS data shows stable trend (trends declining in northern NH & ME & increasing in southern NH & northern VT).
Black-burnian warbler	Mature softwoods (predominantly spruce-fir, but could include some scattered regeneration age hardwoods).	106 acres mature softwoods present in MA 2.1 in the HMU. Suspect this warbler could occur in the analysis area, but none seen or heard during several field reviews of the project area.	WMNF bird monitoring data shows no statistically significant trends. BBS data shows a stable trend.
Ruffed grouse	All ages of aspen / paper birch.	18 acres total aspen/ birch in MA 2.1 land in the HMU. Grouse seen in the project area during several field reviews of the project area.	WMNF bird data shows no statistically significant tends. BBS data shows gradual decline from large peak in mid 1970s, but overall trend stable.

WMNF breeding bird monitoring survey data (MacFaden and Capen, 2000).

BBS = Breeding Bird Survey data (Sauer et al., 2003).

Suitable Habitat = Meets species' life history needs (food, cover / shelter, water, breeding, and young rearing). Range and suitable habitat definitions taken from USDA-FS FEIS 2005; DeGraaf et al. 2006; DeGraaf and Yamasaki 2001. The determination of no occurrence of MIS considers the potential for occasional, incidental and infrequent travel through or flyover of a species within the Analysis Area (including the project area).

Outstanding Natural Communities

The WMNF FEIS (3-293 to 3-298) identified outstanding natural communities (ONC) that would receive additional protection (old growth enriched upland forest; montane circumneutral cliffs and talus; northern white cedar communities; and pitch pine-scrub oak woodland). There are no stands specifically identified as old growth forest within the project and no other ONC in the project area, based on multi-year, multi-seasonal, and site-specific plant and wildlife surveys. Therefore, the action alternatives would not cause any direct, indirect, or cumulative effects on ONC and are not addressed further in this EA. Also, there are no alpine ravines, bog meadows, caves, or mines in the project area.

Black Bear-clawed Beech Trees

The project area contains red oak and American beech that produce acorns and beechnuts, a food source for black bears and other wildlife. Concentrations of beech trees clawed by foraging black bear were observed in portions of the project area during field reviews (NHFG 2005; USDA-FS 2005b). NH Fish and Game manages black bear as a game species harvested annually, and their populations are viable in the state and on the WMNF, with population trends increasing (NHFG 2007a).

White-tailed Deer Wintering Areas

The availability of quality wintering areas (dense softwood stands) for deer can be a limiting factor in their survival during severe winter conditions. A management goal for most wintering areas, regardless of species composition, is to intersperse mature softwoods with small openings to perpetuate critical softwood cover, maintain deer mobility and access throughout the wintering area during harsh winter months, and maintain high quality preferred accessible browse production, (Society for the Protection of NH Forests 1997; NHFG 2006).

The known Stevens Brook deer wintering area (yard) is located in Compartments 15 (upper yard) and 16 (lower yard), which historically covered approximately 200 acres and was used by approximately 10 to 15 deer annually (USDA-FS Multi-dated historic compartment records). The Stevens Brook Project Area contains softwood habitat that is used by white-tailed deer, and is part of the Stevens Brook deer yard. Pre-project monitoring of the Stevens Brook Project Area included site-specific field reviews of stands with softwood components to determine deer use (NHFG 2006; USDA-FS 2006c). Also, multi-year and multi seasonal site-specific field reviews detected moderate levels of recent deer use (summer and winter fecal pellets, browsing pressure, bark-scarred trees, and scattered game trails) throughout the project area (Fife 2004; USDA-FS 2006, 2006c; NHFG 2006). These reviews indicate that white-tailed deer do occupy and travel through the project area throughout the year, especially during winter. NH Fish and Game manages white-tailed deer as a game species harvested annually, and their populations are viable in the state and on the WMNF, with deer trends fluctuating (NHFG 2007a).

White-Nose Syndrome

Recently, White-Nose Syndrome (WNS) has been detected in bats in hibernacula in New York, Vermont, Connecticut, and Massachusetts. Very little is known about the cause and potential spread of WNS; the most recent scientific information is available on the USFWS website: http://www.fws.gov/northeast/white_nose.html.

WNS has not been confirmed in New Hampshire (USFWS Endangered Species Biologist S. von Oettingen, personal communication with WMNF Wildlife Biologist Lesley Rowse, 2008). There are no known bat hibernacula on the White Mountain National Forest and none in the Stevens Brook Project Area. The WMNF is in close contact with USFWS and the New Hampshire Fish and Game Department regarding this issue, and will take appropriate action, as needed, regarding WNS.

Direct and Indirect Effects

The **analysis area for direct and indirect effects** on wildlife species (including MIS) and their habitats for all alternatives is the MA 2.1 lands in the Upper Rattlesnake HMU. This analysis area was used because 1) the habitat objectives are based on Ecological Land Type (ELT) capability of MA 2.1 lands within the HMU and provide a measurable assessment of how the Proposed Action and alternatives contribute to the Forest-wide habitat objectives defined in the 2005 Forest Plan; and 2) the scale is large enough to include the site-specific project area, and home ranges of varying sizes for an array of wildlife species. The **temporal scope** for all alternatives is the past and future 10 years (1998-2018). This timeframe was used because 1) the benefits of regeneration age class for some wildlife species diminish after approximately 10 years (DeGraaf and Yamasaki 2001); and 2) this timeframe spans past and current WMNF Forest Plans with S&Gs that have protected and would protect and maintain wildlife and habitat.

Alternative 1

Direct Effects

Alterative 1 would not cause any direct effects of tree removal, soil or snow compaction, noise from harvesting or tree and stump removal for orchard opening expansion, or smoke from prescribed burning. There would be no effects of mortality, displacement, or interruption of wildlife travel to, from, or within the project area from vegetation management at this time. Alternative 1 would have no direct effects on bear-clawed beech trees or deer wintering habitat in the project area or the HMU.

Forest habitat would continue to grow and mature and openings in the forest canopy would likely result from mortality of individual trees or pockets of blow down. Changes in the existing habitat types or age classes would occur through the natural processes of forest succession or through larger scale natural disturbances such as wind throw, ice storm, hurricane, fire, or infestation, which tend to be infrequent and sporadic occurrences in the New England Region (Lorimer and White

2003). Spruce-fir understory in hardwood and mixedwood stands on spruce-fir Ecological Land Types would remain the same. Balsam-fir in mature spruce-fir stands would continue to die gradually; understory species would take their place. Young age class forest would evolve into mature forest with no new regenerating forest to take its place unless stand-replacing natural disturbances occur. Over time, Alternative 1 has a greater potential for development of large diameter cavity trees and accumulation of downed woody material for wildlife habitat compared to the harvest units proposed for treatment under the action alternatives.

Indirect Effects

The lack of even-aged and group selection harvests in the next several years would perpetuate the lack of regeneration age class habitat (0- to 9-years old) that is already absent in the project area and the HMU (see project record). Lack of this age class could cause wildlife species to not occur in the area (including MIS chestnut-sided warbler). There would be an increase in the amount of mature forest as young forest matured. The mature age class is already dominant in the project area, the HMU, and Forest-wide, and is available to wildlife species including MIS scarlet tanager and blackburnian warbler.

The No Action alternative would perpetuate the lack of regeneration age class and the decline of the aspen-paper birch (an early successional forest type) in the 2.1 lands in the HMU (currently there is zero acres of regen, and nine acres of young age class in the project area). There would be lost opportunities to improve wildlife habitat in the project area (expand the orchard opening by three acres, regenerate oak via harvest and prescribed fire, and regenerate aspen-birch for MIS grouse). Beyond the analysis timeframe, the loss of regeneration and young age classes and loss of oak and aspen-paper birch habitats would cause long-term, adverse indirect effects of a decline in habitat diversity for a wide array of wildlife species (including some MIS) in the project area. Chestnut-sided warbles and ruffed grouse would likely not occur in portions of the project area due to the lack of regeneration age class habitat in the HMU. Alternative 1 would have an indirect effect of perpetuating the lack of regeneration age class hardwood (as browse for deer) within the project area. There would be lost opportunities to perpetuate oak (as food source) for bear and deer, to perpetuate the softwood, or speed conversion of mixedwood into softwood habitat type.

Therefore, Alternative 1 does not meet the Purpose and Need, and would not move the forest towards the Desired Future Condition identified in the Forest Plan for the regeneration age class or habitat diversity on MA 2.1 lands in the Upper Rattlesnake HMU.

Alternatives 2-3

Direct Effects

The action alternatives would cause a minor, localized, and short-term increase in human presence in the project area from timber harvesting, stump removal for orchard opening expansion, prescribed burning in oak-pine stands, and timber

stand improvement. Direct effects could include mortality and/or displacement of nesting birds or denning mammals, or temporary alteration of wildlife travel patterns, including amphibians and reptiles and small and large mammals. Beneficial effects include expanding the existing orchard opening by three acres, regenerating oak via harvest and prescribed fire, regenerating aspen-birch for MIS grouse, increasing mobility for some species on snow compacted by skidding, and increasing browse for moose and deer from residual treetops scattered on the ground. There would be relatively minor differences in the level of direct effects between the two action alternatives. Alternative 2 would have more minor negative and beneficial effects compared to Alternative 3, based on the amount of harvest acres and similar treatment types proposed.

The season when a unit is harvested may directly affect wildlife and their habitat, especially during critical times in their life cycle such as breeding, rearing young, feeding, and winter survival. Individuals could be displaced or killed during any season of operation. Summer harvest could affect species that use trees for nesting, cover, and foraging (including breeding birds MIS scarlet tanager, MIS blackburnian warbler, and MIS ruffed grouse that use mature habitat), and ground disturbance could affect ground dwelling species (amphibians, reptiles, and insects). Fall harvest would affect fewer nesting species but could potentially affect autumn breeding species, including some amphibians, species that feed on fall mast (acorns and beechnuts) such as black bear, and small ground-dwelling mammals. Some species could be affected by winter harvest, such as owls that breed in the winter. White-tailed deer gather, or "yard," in areas of lowland conifers where cover and warmer temperatures provide protection from the elements, and where they would also be vulnerable to disturbance during this time of year. The project area contains softwood habitat that is part of the Stevens Brook deer wintering area (three areas ranging from approximately 14 to 33 acres were surveyed in 2006 where deer yarded up). Species that utilize cavities in winter, such as chickadees and nuthatches, or species that den, such as squirrels and raccoons, could be affected if roost or cavity trees were harvested. Raptors start to breed in February, with young fledging in June and July (DRED & SPNF 1997), so they could be affected by both winter and summer harvest.

Table 3 (Chapter 2) shows a comparison of alternatives by operating season. Winter harvest typically occurs from December through March; summer /fall/winter harvest usually occurs from June through March; and fall/winter harvest from August through March. In both action alternatives, the majority of stands would be harvested in fall/winter or winter only. There would be very minor differences in magnitude of effects to wildlife from season of harvest because the difference in possible acres of summer or fall harvest is minor. While conducting spring breeding bird surveys that included portions of the recently completed Moose Watch Timber Sale (located on the WMNF in Bethlehem, NH), the district biologist observed that winter harvest operations (frozen ground conditions) were effective in protecting vegetation, water, and soil substrates for wildlife habitat (see project record).

Under Alternatives 2 and 3, the direct effects of prescribed burning on wildlife and their habitat may vary by species and conditions. Burning would occur between November 1st and May 15th, thereby avoiding direct effects to most nesting birds and roosting bats. No raptor nests were found in the proposed harvest or prescribed burn units during site-specific surveys of the project area (USDA-FS 2006, 2006c; NHFG 2006). A stick nest was located in a forest stand that is not proposed for harvest treatment, but skid access through the stand to reach a harvest unit is proposed. This stick nest was monitored and appears to be unoccupied (Costello 2006; Williams 2007). If raptors (such as Northern goshawk) nest before May 15th in a burn or harvest unit, they are often vocal and would likely be detected during harvesting and pre-burn inspections of the unit. Any active raptor nest that was detected in a burn or harvest unit would be protected under Forest Plan Standards and Guidelines as stated in wildlife design feature 14 (Chapter 2). The district biologist observed that the standards and guidelines were effective in protecting raptor nests during active harvest and sale area closure work on the recently completed Moody Ledge Timber Sale located on the WMNF in Benton, NH (see the project record).

Indirect Effects

Even-aged harvest methods and regeneration age habitat

Forest-wide, less than one percent of the WMNF is in the 0- to 9-years old regeneration age class (USDA Forest Service 2005). There are zero acres of existing regeneration age northern hardwood forest in the project area compared to a Desired Future Condition of approximately 94 acres in MA 2.1 land in the Upper Rattlesnake HMU. Alternative 2 proposes treating approximately 151 stand acres via even-aged harvest methods (clearcut, shelterwood, and thinning). Alternative 3 proposes treating approximately 84 stand acres with the same even-aged harvest methods.

Under the action alternatives, site conditions on the forest floor within the harvest units would be hotter and drier for about 2 to 5 years after cutting, with increased decomposition of leaf litter. This micro-site condition could adversely affect some species of amphibians, such as the red-backed salamander (DeMaynadier and Hunter 1998). If they do not relocate, individual salamanders in large unshaded openings would likely not survive. Amphibians and small mammals in clearcuts would likely be more vulnerable to predation. Forest Plan Standards and Guidelines that reserve patches of trees within the harvest units would continue to provide some escape and hiding cover for these and other wildlife species (Forest Plan). The district biologist observed effective, intact patches of trees reserved in harvest units being used by wildlife in the past Moody Ledge and Moose Watch project areas on the district and at the Bartlett Experimental Forest (see the project record); the same standards and guidlines would apply to the Stevens Brook project as well.

The clearcuts under Alternatives 2 and 3 are consistent with the Forest Plan Standards and Guidelines, which reserve large mature and overmature trees within the

harvest units. Eventually many of the reserved trees become cavity trees, providing vertical structural diversity available to forest bats, songbirds, small mammals, hawks, and woodpeckers as roost and nesting habitat. Approximately 150 species use northern hardwood regeneration habitat for all or part of their life cycle (DeGraaf and Yamasaki 2001; DeGraaf et al. 1992), including MIS chestnut-sided warbler and MIS ruffed grouse. The male aspen-birch buds and catkins are an important food for MIS ruffed grouse (DeGraaf and Yamasaki 2001; DeGraaf et al. 1992). Even-aged management with clearcut regeneration provides large patches of early successional habitat, young forest, and mature and old forest conditions in a shifting mosaic over time. Such management provides habitat for the most diverse wildlife community and maintains forest and wildlife diversity through time. Most of the wildlife diversity is associated with seedling and sapling stands. Once beyond the pole timber stage, stands have about the same wildlife species whether they are even-aged sawtimber or old forest. MIS chestnut-sided warblers are among the first birds to breed in hardwood clearcuts. They abandon the site after about ten years, when dense foliage is no longer present within three feet of the ground (DeGraaf et al. 2005).

Habitat Connectivity

Forest-interior birds such as the ovenbird are vulnerable to brood parasitism by the brown headed cowbird, and predation by blue jays, raccoons, and red squirrels, particularly in forests fragmented with agricultural land with pasture used by cattle. A local study on the WMNF by DeGraaf and Angelstam (1993) on depredation of artificial ground and cup nests in even-aged seedling/sapling, pole, and mature stands of northern hardwood forest found no increase in the nest predation rate in the early stages of stand growth (e.g., 0-9 age class), nor was rate of predation related to stand area. This study indicates nest predation of forest interior species in largely forested landscapes is not influenced by the presence of clearcuts. Another study in the same forest type compared predation rates in large blocks of managed areas vs. remote reserved areas. No differences in nest predation rates were found for either ground or shrub nests between the even-aged clearcut regenerated areas and the reserved forest blocks (DeGraaf 1995). On the WMNF, Forest-wide bird monitoring detected six cowbirds within managed, unmanaged, and remote areas, and during wetland inventories. Conversely, forest interior ovenbirds were found at over 90 percent of the survey points (USDA-FS 1993, Monitoring Report). Relevant studies on the WMNF show no increase in brown headed cowbirds (Yamasaki et al. 2000). Breeding Bird Surveys (1966-98) within Partners In Flight Physiographic Area 28 (includes WMNF) show significant declining brown-headed cowbird population trends (Rosenberg and Hodgman 2000). Since occurrence of cowbird and elevated predation rates are usually indicators of forest fragmentation, the results of these local and relevant scientific studies (plus over ten years of Forest-wide songbird monitoring on the WMNF) suggest that hardwood-dominated forests in northern New England are not fragmented by even-aged management.

The action alternatives would increase northern hardwood regeneration age forest and habitat diversity in the HMU and the Stevens Brook Project Area for wildlife that use shrub layers, herbaceous ground vegetation, soft mast, and minimal overstory components (Alternative 2 more than Alternative 3, based on the amount of clearcut and shelterwood harvest proposed). Alternatives 2 and 3 would create short-term, localized edge habitat along the proposed clearcut boundaries and group selection units until the new and released vegetation attained vertical height. Because some bird species prefer edge habitat, young successional stages within older forests can enhance species diversity. Ovenbird habitat use and reproductive success were examined in northern NH to determine the effect of edge in predominately-forested landscapes. The proportion of nests that failed from all causes, including predation, was higher along edges in 1992 but not in 1993. The number of young fledged per female and the proportion of pairs fledging at least one young did not differ between edge and interior in either year. This local study concluded that the effects of clearcutting are moderated by the abundance of mature forest cover in the region and ovenbirds tend to re-nest after initial nest failure (King et al. 1995 cited in Harlow et al. 1997). These local and relevant scientific studies suggest applying a mix of both even-aged and uneven-aged methods in the WMNF would cause no adverse effects to wildlife including Neotropical migrant songbirds.

Creating aspen-birch regeneration age class habitat

There are zero acres of regeneration age class aspen-birch habitat in the HMU. The action alternatives would create regeneration age class habitat via clearcutting (Alternative 2 approximately 49 clearcut acres and Alternative 3 approximately six clearcut acres) and encourage aspen-birch. Clearcuts benefit species that use shrub layers, herbaceous ground vegetation, soft mast, and minimal overstory, such as MIS chestnut-sided warbler and MIS ruffed grouse. Without some type of disturbance, aspen-birch succeeds into northern hardwoods or softwoods.

Reducing mature northern hardwood age class habitat

The action alternatives would cause a relatively minor decrease in the existing high amount of mature northern hardwood acres within the project area and the HMU (Alternative 2 more than Alternative 3, based on amount and type of treatment acres). This would cause a minimal short-term change in the amount of mature age class in the MA 2.1 lands in the HMU, as the young age class will move into mature age class relatively soon. There is an abundance (81 percent) of mature age class across the WMNF landscape (FEIS, p 3-84) available to MIS scarlet tanager and ruffed grouse as available habitat.

Uneven-aged treatments

Alternative 2 proposes approximately 208 stand acres of uneven-aged harvests (groups, single-tree, and group/single-tree combined), and Alternative 3 proposes approximately 118 stand acres (see **Table 3 in Chapter 2**). These harvest treatments would remove some mature trees to open the canopy to partial sunlight, causing minor changes to shading of the forest floor. The open canopy would release the

understory to create vertical structure and layers, diversifying the stand structure and increasing understory vegetation and browse availability for wildlife, but to a less-concentrated extent than even-aged harvests. The uneven-aged treatments would maintain the mature character of the stands. The group selection harvests would perpetuate spruce-fir, and would move pine, northern hardwood, or mixed-wood types on ELTs that indicate softwood capability towards spruce-fir (favorable to MIS magnolia and MIS blackburnian warblers). This would move the project area toward the long-term objectives of the HMU to maintain a high percentage of mature age class within each habitat type and move stands with softwood ELTs towards a spruce-fir habitat type (Alternative 2 more than Alternative 3, based on the amount of proposed acres of uneven-aged harvest). After uneven-aged harvest, there would still be habitat diversity in the MA 2.1 land in the HMU (including the project area) for wildlife that use closed canopy forest, beech mast, dead trees, or softwood cover (DeGraaf and Yamasaki 2001; DeGraaf et al. 1992).

Shelterwood treatment with under-burning in mature oak/pine habitat

Alternative 2 proposes approximately 80 acres of shelterwood/prescribed burn treatments in stands with an oak-pine component in Compartment 15 (Stands 5 and 13) and Compartment 16 (Stands 2 and 3). Alternative 3 proposes approximately 56 acres of the same treatment in Compartment 15 (Stand 13) and Compartment 16 (Stands 2 and 3). These treatments would maintain the mature character of the stands and encourage regeneration of oak and pine over existing northern hardwoods or spruce/fir/hemlock regeneration. One HMU objective is to maintain the oak and pine (see HMU Rationale in project record). There would be a temporary reduction of understory vegetation in these stands from proposed site prep and prescribed burning that would affect wildlife species that use understory vegetation. Prescribed fire has few discernible impacts on birds and large and small mammals, and has relatively little direct mortality and little effect on overall amphibian abundance and diversity. Prescribed fire may decrease the abundance of invertebrates, with some recovery or increases in a year to two, which is related to litter cover and depth. (Fire in Eastern Oak Forests: Delivering Science to Land Managers Conference 2005).

Dead and down wood recruitment

In the proposed clearcut and shelterwood units of Alternatives 2 and 3, there would be less large, dead and down wood (>11" DBH) on the forest floor for 10 to 60 years post harvest. Residual trees in all other harvest units would continue to supply a component of standing and down woody material as trees die, branches break, and annual litter builds up. Over a period of 16 years, the district biologist has observed that Forest Plan Standards and Guidelines for retaining wildlife trees in harvest units (pp 2-35 to 2-36) have been effective in ensuring that an adequate amount of cavity trees and dead and down wood is available for wildlife that use these habitat features.

Orchard Opening Expansion and Timber Stand Improvements (TSI)

Expansion of the existing two-acre apple orchard opening by three acres would release some old apple trees and move the HMU towards the opening objective. TSI would create browse available on the ground for some wildlife, and regenerate patches of aspen-birch that would create habitat diversity in the project area (Alternative 2 and Alternative 3 propose the same amount of approximately 27 acres of TSI).

Black Bear-clawed Beech Trees

While the action alternatives could result in removal of some bear-clawed beech trees, causing a slight reduction of fall foraging habitat, wildlife design feature 15 would minimize this effect within the proposed harvest unit (see Chapter 2). Observations by the district biologist over a 16-year show that this design feature is effective. Fall harvesting could temporarily displace bears feeding in beech trees, but they would likely move to adjacent hardwood stands until harvesting ended. There is mature northern hardwood habitat with a beech and red oak component in the MA 2.1 lands in the HMU that would not be affected under the action alternatives. Prescribed burning in the fall would likely not affect bears feeding in beech trees because burning is prescribed for oak/pine stands that do not have beech.

White-tailed Deer Wintering Areas

The action alternatives would increase the amount of limbs and tops on the ground from timber harvest, which would provide a localized, short-term source of browse for deer when they need it the most for overwinter survival. In a couple years, the clearcuts would create browse for moose and deer. The removal of individual trees and group cuts would enhance and perpetuate the existing softwoods, possibly providing winter cover for deer in the future. The proposed prescribed burning (Alternatives 2 and 3) would not occur in deer wintering habitat. In the long term, prescribed fire may increase some oak regeneration within the project area, providing a source of hard mast in the future. The action alternatives would not adversely affect mobility patterns of large mammals such as moose and deer traveling to, from, or within the project area and private land. These large mammals have large home ranges, and appear to adjust quickly to displacement from human activity and may adjust their foraging behavior to avoid human activity.

Having worked 16 years on the WMNF, the district biologist observed effective practices of placing small harvest groups in softwood habitat to perpetuate cover and placement of clearcuts or larger groups in hardwood or oak habitat to create browse near softwood stands on numerous vegetation management projects across the district. This effective practice was photo documented at the recently harvested Right Angle Timber Sale located in Rumney, NH (see the project record). The action alternatives would follow WMNF Forest Plan S&Gs that would avoid impacts to softwood habitat that is necessary to support wintering populations of white-tailed deer.

In summary, the action alternatives would maintain habitat connectivity and wildlife mobility to, from, or within the HMU and the project area, and would not cause fragmentation. The action alternatives would not introduce new or increase predators already known or expected in the project area (barred owl, red-tailed and broad-winged hawks, raccoon, mink, weasel, fisher, fox, coyote, bear, bobcat), nor alter existing predator-prey relationships. These are based on 1) existing species or their signs noted during site-specific field reviews of the project area; 2) wildlife monitoring data in similar habitat as the project area located in adjacent watersheds and HMUs; 3) and the BE for the Batchelder Brook Project located in the adjacent HMU north of the Stevens Brook Project Area.

Summary of Potential Effects on Management Indicator Species

Table 12 shows the effects on the amount and quality of habitat for MIS within the analysis area (includes the Stevens Brook Project Area). The No Action and the action alternatives would affect the amount and quality of habitat for MIS differently.

Alternative 1 would not create any new habitat for MIS that use regeneration habitat (ruffed grouse, chestnut-sided and magnolia warbler). The MIS scarlet tanager and blackburnian warbler would benefit in the long term through perpetuation of mature northern hardwood and softwood habitats respectively.

Under the action alternatives, these same MIS would benefit from the immediate establishment of regeneration age class habitat. Alternatives 2 and 3 would cause a relatively minor reduction in the overall amount and quality of existing mature habitats available in the HMU and the project area for these MIS (Alternative 2 more compared to Alternative 3 due to more acres proposed for treatment).

Cumulative Effects

The **analysis area for cumulative effects** on wildlife and their habitat for all alternatives includes all National Forest lands (MAs 2.1 and 6.1) in the Upper Rattlesnake HMU, totaling approximately 13,225 acres. The analysis area also includes approximately 11,365 acres of **private land** extending from the Upper Rattlesnake HMU boundary west along Clifford Book to the Baker River confluence, then southeast along the Baker River corridor to the unnamed Baker River tributary confluence, then north along the Stinson and Upper Rattlesnake HMU boundaries. This cumulative effects analysis area boundary was used because it: 1) includes the Stevens Brook Project Area and the larger HMU designed with logical watershed boundaries with habitat diversity objectives to meet the needs of an array of wildlife species; 2) it is large enough to address habitat connectivity and wildlife travel and migration corridors to and from private land, the project area, and the HMU; and 3) it addresses habitat diversity at the landscape level, such as the river, streams, Stinson Lake, roads, developed areas, manicured lawns, and a mix of open and forested habitat on private land.

Table 12: Effects on the Amount & Quality of Habitat by Alternative for MIS.

MIS	Alternative 1 0 stand acres	Alternative 2 386 stand acres	Alternative 3 229 stand acres
Chestnut-sided Warbler Regeneration (regen) Northern hardwood.	Perpetuates the lack of hardwood regeneration age class habitat in the project area.	Greatest increase in hardwood regen age class habitat via 49 clearcut; 80 shelterwood 22 commercial thin. 151 even-aged acres.	Lesser increase in hard-wood regen age class habitat via 6 clearcut; 56 shelterwood 22 commercial thin. 84 even-aged acres.
Scarlet tanager Mature Northern hardwood	Continued increase in the mature hard-wood age class that is already dominating the project area.	Decrease in mature hard-wood age class via 151 even-aged acres. (The 130 group; 65 singletree; 13 ST/group treatment acres would maintain mature forest at the stand scale with canopy gaps).	Decrease in the mature hardwood age class via 84 even-aged acres. (The 58 group; 47 singletree; 13 ST/group treatment acres would maintain mature forest at the stand scale with canopy gaps).
Magnolia warbler Regeneration Softwoods	Perpetuates the lack of softwood regen age class habitat in the project area.	Creation of softwood regen habitat via shelter-wood and GS treatments of 130 stand acres of pine & mixedwood.	Less amount of softwood regen habitat created via fewer shelterwood and GS treatments of 93 stand acres of pine and mixedwood.
Blackburnian warbler Mature Softwoods	Continued increase in the mature age class that is already dominating the project area.	18 acre decrease in mature softwood habi-tat via shelterwood and ST/groups in pine stands (groups would maintain mature forest habitat at the stand scale).	Same 18 acre decrease in mature softwood habi-tat via same amount of treatment in pine stands (groups would maintain mature forest habitat at the stand scale).
Ruffed Grouse No distinction for age class Aspen / Birch.	Perpetuates the contin-ued decline & long term loss of aspen-birch via no regen harvests.	Increase in aspen-birch habitat via: 49 clearcut; 80 shelterwood 22 commercial thin. 151 even-aged acres.	Lesser increase in as-pen-birch via 6 clearcut; 56 shelterwood 22 commercial thin 84 even-aged acres.

Acreage figures are approximate.

The **temporal scope for cumulative effects** on wildlife resources (including private land) for all alternatives is the past and future ten years (1998-2018) because: 1) the benefits of regeneration age class for some species of wildlife diminish after approximately 10 years (DeGraaf and Yamasaki 2001); and 2) this timeline spans past and current WMNF Forest Plans with S&Gs that have and would protect wildlife resources.

Table 13 shows the current condition of the Upper Rattlesnake HMU with a lack of regeneration age class (0-9 years) in all forest types.

Table 13. Current Conditions of the Upper Rattlesnake HMU.

Habitat Type	Current Acres in HMU (all MAs)	Current Acres in HMU (MA 2.1)	Current Acres in MA 2.1 by Age Class			
			Regen	Young	Mature	Unsuitable for Harvest(*)
Northern Hardwood	7,070	1,874	0	155	1,718	533
Mixedwood	2,179	189	0	4	184	83
Spruce-Fir	2,882	124	0	18	106	54
Aspen-Birch	107	18	0	9	9	9
Oak-Pine	602	389	0	12	376	155
Hemlock	249	102	0	0	102	56
WL Opening	16	10				
Other (**)	121	<1				
TOTAL	**13,225**	**2,705**				**890**

Most National Forest acres in the HMU located outside of MA 2.1 are mature forest, regardless of type.
Sporadic and infrequent natural disturbance may result in small amounts of regeneration and young age forest.
(*) Land unsuitable for harvest located in MA 2.1 that currently could be in the young or mature age classes.

In New England, catastrophic disturbances from wind-throw and fire occur at intervals of about 1,150 and 800 years, respectively. Some localized, mid-to large-size natural disturbances (some severe) do occur in the Northeast (including the WMNF), but they are infrequent, sporadic, and unpredictable (Lorimer and White 2003). Past field reviews and over-flights of the WMNF documented that the 1998 ice storm event affected mostly the hardwood forest type in other parts of the Forest (such as the Kilkenny Range) located outside of the Upper Rattlesnake HMU (including the Stevens Brook Project Area). The 1998 ice storm did not create early successional habitat within the HMU or the project area (see previously cited multi-FS field reviews). Although wind has a dramatic effect on overstories, it has little impact upon successional trends and overall species composition. The majority of wildlife on the WMNF use northern hardwood regeneration habitat for all or part of their life cycle (DeGraaf et al. 1992, DeGraaf and Yamasaki 2001).

The HMU is surrounded on 3 sides by private land. On the east side of the HMU, there are relatively small openings along Stinson Road for homes. South of Stinson Road and along Buffalo Road and State Route 25, there are larger openings, pastures, and developments in the Towns of Rumney and Wentworth. Timber management activities, land clearing for residential or commercial development, and agriculture have occurred on private land in the past ten years and are likely to continue over the next ten years. Based on recent activities on adjacent private land, these activities are not expected to create substantial amounts of regeneration age class habitat. The adjacent private land currently contributes to habitat diversity via a mix of habitats, but not substantially to the 0 to 9 year old age class by forest type. There is no guarantee that open habitat on private land created via agriculture would stay in an open state (i.e. maintained as permanent openings), and no guarantee that the 0 to 9 year old age class or some of the forested areas

(including mature forest) would not be converted from habitat to non-habitat such as permanent developments.

Alternative 1

The private land adjacent to the HMU does not contribute substantially to the 0-9 year old age class. Mature northern hardwood and mixedwood forest would continue to dominate the HMU (including the project area). Individual dead or dying trees would continue to fall to the ground via natural disturbances and create very small, infrequent, sporadic, and unpredictable canopy openings allowing sunlight to the forest floor and creating very limited amounts of regeneration age class (0 to 9 years old) habitat in the HMU. Alternative 1 would add an adverse cumulative effect to the lack of regeneration age class and add to the steadily decline in aspen-birch type in the analysis area and cause a lost opportunity to perpetuate oak mast.

Private land adjacent to the HMU does not contain much aspen-paper birch habitat. Aspen-paper birch habitat would be present in the HMU in 10 years, but would have matured and possibly begun converting towards northern hardwood or spruce-fir types. This alternative does not preclude future options for creating early-successional habitat or diversifying community types in the HMU. However, Alternative 1 would not move the HMU or the Forest toward the wildlife habitat diversity objectives outlined in the LRMP for the full range of wildlife species on the WMNF in the reasonably foreseeable future (USDA-FS 2005a, Chap. I, pages. 20-22). The Forest Service would maintain the road system within the project area and visitors would continue to use the area. The No Action alternative would not add a cumulative effect of increased human activity in the analysis area associated with vegetation management.

Alternatives 2-3

Map 5 shows the past, present, and reasonable foreseeable future Forest Service management activities in the Upper Rattlesnake HMU within the past and future 10 year temporal scope. These activities include vegetation management, wildlife opening maintenance, snowmobile and hiking trail construction and maintenance, and future Rumney Rocks Climbing Management Plan. These activities have and would affect wildlife and their habitat within the HMU.

The recreation and vegetation management projects have or would use a similar mix of standards and guidelines that protected riparian and wildlife habitat described in Chapter 2 and the previous direct and indirect effects section. The stands treated in the past vegetation management projects have grow out of the regeneration age class into the young age class. The current Upper Rattlesnake HMU analysis shows a. current lack of regeneration age class for all forest types within the cumulative effects area. The MA 6.1 land within the Upper Rattlesnake HMU is not subject to vegetation management and mature northern hardwood and mixedwood forests would continue to dominate the HMU and be available to MIS scarlet tanager, blackburnian warbler, and ruffed grouse. The 10,520 acres of MA 6.1 land plus

the 890 acres of 2.1 land unsuitable for harvest in the HMU would develop into older forest habitat.

Past, present and future timber harvest may have or could result in a minor reduction of bear-clawed beech trees in the HMU. The HMU contains substantial mature hardwood, mixedwood, and some oakl-pine forest, which provides hard mast for wildlife including black bears. It is unknown to what extent bear-clawed beech trees may have been affected by timber operations or residential development on private lands adjacent to the HMU, but there has likely been some loss of these trees, with more loss likely to occur with future development on private land. With use of design features (Chapter 2), the action alternatives would cause relatively minor direct and indirect effects to bear clawed beech trees within the project area; therefore, there would be no adverse cumulative effects to bear-clawed beech trees in the HMU.

The WMNF LRMP contains guidelines that ensure deer wintering habitat is maintained in the HMU and Forest-wide (USDA-FS 2005a, II-34, G-6). The past vegetation management projects within the Upper Rattlesnake HMU adhered to similar Forest Plan Standards and Guidelines that protected deer wintering habitat. Because the Stevens Brook Project would follow deer wintering habitat guidelines, Alternatives 2 and 3 would cause no adverse cumulative effects to deer wintering habitat within the HMU. Timber harvesting on private land adjacent to the HMU that emphasizes individual and group selection cuts in softwood or mixedwood stands would enhance softwood habitat. Even-aged harvest in softwood or mixedwood and clearing for residential development on private lands could reduce the amount of wintering habitat available to white-tailed deer.

Future projects (Three Ponds Shelter repair and the Rumney Rocks Climbing Management Plan and the other recreation and special use activities) within the HMU would also use similar standards and guidelines for protection of aquatic and terrestrial resources. As a result, there would be no adverse cumulative effects to wildlife or their habitat within the HMU including the project area.

Private Land: Activities on private land have and would affect habitat and would likely cause a minor cumulative effect of increased human presence adjacent to the HMU. Increased development of surrounding private lands may result in some increases in human presence in the HMU and project area over time, resulting in possible increased disturbance to wildlife.

In summary, based on relatively minor, localized, and short-term direct and indirect effects to wildlife and their habitat from past projects, the action alternatives of the proposed Stevens Brook Project (harvesting, prescribed fire, and TSI) would not add adverse cumulative effects to wildlife resources in the analysis area. The action alternatives of the Stevens Brook Project would move the forest toward the objective of providing wildlife habitat diversity (especially regeneration age class, early successional habitat, and conversion to softwood in the future) within the Upper Rattlesnake HMU (Alternative 2 the most, then Alternative 3 based on the amount and type of harvest proposed).

Table 14 summarizes the effects determinations of the No Action and action alternatives on WMNF MIS within the analysis area including the Stevens Brook Project Area. The effects to MIS and their habitat are within the range of those described in the WMNF FEIS (USDA 2005). The MIS framework is useful for indicating the effects of Forest Plan implementation. MIS may be affected by individual project actions or no actions. However, viable populations of MIS are to be maintained or monitored in the Forest-wide planning area (36 CFR 219.19).

Table 14. Effects of the Alternatives on MIS in the Analysis Area.

WMNF MIS	The No Action Alternative	The Action Alternatives
Chestnut-sided Warbler **Scarlet Tanager** **Magnolia Warbler**	Perpetuates the lack of regen age class, declining trend in aspen-birch and habitat diversity in the analysis area including the project area. Over the long term, MIS that prefer regen age class and paper birch habitats would decline within the analysis area including the project area and would seek these habitats elsewhere.	Would cause a relatively minor decrease in the dominant mature age class and inversely increase the amount of regen age class currently lacking in the analysis area including the project area. Aspen-birch would continue to occur and habitat diversity in the analysis area and project area would be maintained.
Blackburnian Warbler **Ruffed Grouse**	**The No Action alternative (in the near term) would not adversely affect population trends and viability of WMNF MIS within the Forest-wide planning area.**	**The action alternatives would not adversely affect population trends and viability of WMNF MIS within the Forest-wide planning area.**

Rationale:

1) The approximately 386 acres proposed under Alternative 2 of the Stevens Brook Project would only affect approximately 0.05% of the entire 752,000 acre WMNF (Alternative 3 even less (0.03%).
2) The action alternatives would increase the amount of regeneration age class hardwood and softwood acres in the project area enough for several breeding pairs of MIS chestnut-sided and MIS magnolia warblers, and increase age class diversity and the aspen-birch habitat type for MIS ruffed grouse.
3) The Stevens Brook Project action alternatives would not interrupt the processes necessary for genetic interaction for maintaining population viability of MIS within the Forest-wide planning area.

3.5.1 Threatened, Endangered, Proposed, and Sensitive Species (TEPS)

Multi-year, multi-seasonal, and site-specific surveys, field reviews, and database checks were conducted within the project area (Costello 2006; Fife 2004; Mattrick 2006; NHNHB 2008; NHNHI 1993; BCM 2004; NHFG 2006; USDA-FS 2006, 2006cb,). Also, several field reviews by the biologist and botanist and numer-

ous field visits by biological and forestry technicians were conducted within the project area. Information from these site-specific surveys, along with prior Biological Evaluations of TEPS for projects within adjacent watersheds and HMUs (e.g. Batchelder Brook Project and Warren to Woodstock Snowmobile Trail BEs) and results of wildlife monitoring data (gathered in adjacent watersheds and HMUs having similar habitat as the Stevens Brook Project Area), were used to determine potential TEPS species and / or habitat occurrence.

The **analysis area for direct and indirect effects** on terrestrial TEPS species and their habitat is MA 2.1 lands in the HMU (including the project area) for similar reasons described in the Wildlife Resources Section. Perennial streams in the project area were used for aquatic species due to restricted habitat needs and MA 2.1 lands in the project area were used for plants because plants are sessile. The **analysis area for cumulative effects** to terrestrial TEPS is all lands (MA 2.1 and 6.1) in the HMU and adjacent private land to address wildlife travel and migration corridors and habitat connectivity for similar reasons described in the Wildlife Resources Section. For aquatic species perennial streams in the HMU and adjacent private land were used due to restricted habitat needs, and MA 2.1 lands in the project area were used because plants are sessile. The **temporal scope** for direct, indirect, and cumulative effects for all TEPS species is the past and future ten years (1998-2018), for similar reasons previously described for wildlife resources.

Biological Evaluation

A Biological Evaluation (BE) for TEPS was completed for the Stevens Brook Proposed Action and alternatives. The process and the sources used to determine potential TEPS species or habitat occurrence are listed in the BE. Based on a review of all available information, the BE determined that potential habitat occurs within portions of the project area for five Regional Forester Sensitive animals (Eastern small-footed myotis, northern bog lemming, wood turtle, two Ameletid mayflies); and three Sensitive plants (Autumn coral-root, Butternut, American ginseng). The BE details the potential direct, indirect, and cumulative effects to these species and their habitat. The effects determinations with rationale taken from the Stevens Brook BE are summarized below (see Stevens Brook BE in Project Administrative Record). The BE and effects determinations were based on best available science, on internal and external database and scientific literature reviews, information from internal and external professional biologists, and on site-specific FS stream and plant surveys and field reviews.

BE Effects Determination and Rationale:

Regional Forester Sensitive Species:

Eastern small-footed myotis

Implementation of the No Action, Proposed Action, or Alternative 3 ***may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species*** of Eastern small-footed myotis *(Myotis leibii)*.

Rationale

This determination was based the best available science and site-specific Forest Service field reviews of the Stevens Brook Project Area, recent cave surveys in NH (von Oettingen 2008), forest-wide mist-net surveys on the WMNF (BCM 2002, 2004; Yamasaki 2000) and woodland bat surveys off forest in NY and VT.

1) There are no caves, mines, or tunnels as overwinter hibernacula or cracks & crevices in rock outcrops, talus slopes, or old buildings exposed to sun as roost sites (USDA-FS 2005a, Append. G, pgs 224-227) in the proposed treatment units in the project area.
2) The action alternatives would affect a very small percentage of potential bat habitats on the WMNF. Riparian and Wildlife S&Gs (USDA-FS 2005a, LRMP Chap. II 24-26 and 33-36) would maintain habitat diversity within the project area. Also, MA 6.1, 62 & 8.3 lands are not subject to vegetation management and woodland bat habitat would be available Forest-wide.
3) Winter harvest design features would avoid disturbance to bats due to hibernation elsewhere. Prescribed burning would occur when bats were not present (or would move away from smoke and fire). Harvest treatments, which open the canopy and allow sunlight into stands and adjacent areas, could improve solar conditions for roosting and open foraging habitat for woodland bats.
4) To date, White-Nose Syndrome has not been found in NH caves per recent surveys by bat experts.

Northern bog lemming

Implementation of the No Action, Proposed Action, or Alternative 3 would cause ***no impact*** to the population or species of Northern bog lemming *(Synaptomys borealis sphagnicola)*.

Rationale

This determination was based the best available science and site-specific Fs stream and plant surveys of the project area that included riparian areas, and past forest-wide directed searches for bog lemming.

1) No documented occurrences within the Stevens Brook Project Area and the likelihood of occurrence is extremely low to none. There are limited amounts of potential marginal habitat (riparian/vernal pools) in the project area, which would be excluded from harvest units and the timing and duration of prescribed fire would likely not affect the wetter areas where they could occur.
2) WMNF Forest Plan Riparian and Wildlife S&Gs would maintain existing dead and down woody materials and residual vegetation and provide cover for n. bog lemming if present in the project area (USDA-FS LRMP 2005a, II 24-26 and 33-36). Proposed winter harvest would limit soil and snow compaction.
3) NH State wetland and water quality laws would protect potential marginal habitat on private land adjacent to the HMU.

Wood turtle

Implementation of the No Action, Proposed Action, or Alternative 3 would cause ***no impact*** to the population or species of wood turtle *(Clemmys insculpta)*.

Rationale

This rationale was based on internal database checks and site-specific FS surveys of the project area.

1) There are no current or historic occurrences of wood turtle and only limited amounts of marginal habitat within the project area. Vernal pools/riparian/stream areas (where there is a very low probability the wood turtle could occur) are avoided.
2) Any change in habitat caused by the action alternatives would be relatively minor in magnitude causing no cumulative effects.
3) NH State wetland and water quality laws would protect potential suitable habitat on private land adjacent to the HMU.

Mayflies

Implementation of the No Action, Proposed Action, or Alternative 3 would cause ***no impact*** to the population or species of mayflies *(Ameletus browni)* or *(Ameletus tertius)*.

Rationale

The rationale is based on site-specific surveys of the streams in the project area and personal communication with external professional biologist.

1) There is recent known occurrence of A. tertius in a Stevens Brook tributary (Chandler 2006, unpublished data), but no known historic occurrences in of either species in Rumney and Wentworth
2) There are limited amounts of potential habitat within the project area.
3) WMNF FP Standards and guidelines protect riparian areas and maintain aquatic habitat for mayflies well-distributed across the Forest (USDA-FS 2005a, I 20-22, II 33-36).

Autumn Coral-root, Butternut, American Ginseng

Implementation of the No Action, Proposed Action, or Alternative 3 ***may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species*** of Autumn Coral-root *(Corallorhiza odontorhiza)*, Butternut (*Juglans cinerea*), American Ginseng *(Panax quinquefolius*).

Rationale

This rationale is based on multi-year, site-specific plant surveys, internal and external database and scientific literature reviews, and information from professional botanists

1) There is documented occurrence of butternut and American ginseng within localized portions of the project area, which would be protected. There would be no cutting of butternut, and removal of competing species around trees would improve growing conditions.
2) There are limited amounts of suitable habitat in the project area for other RFSS plants, but no documented occurrence and several multi-year and site-specific plant surveys found no other TEPS plants.

3.6 Soils

Executive Summary

Alternative 2 of the Stevens Brook Project would result in approximately 33.82 acres of soil disturbance, or 8.8 percent of the 386 acre project area. Alternative 3 would result in approximately 19.25 acres of soil disturbance or 8.4 percent of the 229 acre project area. Following the Forest Plan, Region 9 direction, Best Management Practices, and the design features listed in Chapter 2, this project action will not result in a loss of soil productivity. Action alternatives will have no detrimental affects on the soil productivity in the Stevens Brook Project Area.

3.6.1 Soil Erosion and Compaction

Affected Environment

The analysis area for direct and indirect effects on soil erosion and compaction is the stands proposed for treatment as part of the Stevens Brook Project, because that is where the effects will take place. Under Alternative 2, the stand area totals approximately 386 acres. Under Alternative 3, the stand area total is approximately 229 acres. The project analysis area lies almost entirely within the Middle Baker watershed. Part of analyzing the direct and indirect effects on soil erosion and compaction is considering how the soils have responded to effects of past similar actions.

The analysis area has soils common to the White Mountain National Forest, that is, moderate to well-drained fine sandy loam or sandy loam on average. The project area is too low on the landscape and gentle in slope to have dry debris slides that could lead to mass movement of shallow gravelly soils. It is low enough on the landscape to have deep soil slumps; however, field review of the units proposed indicates such a soil hazard does not exist here (Colter 2006). Therefore, only soil erosion and compaction are potential physical hazards resulting from the Proposed Action.

The project area is a mix of northern hardwood and softwood Ecological Land Types (ELTs). Ecological Land Typing is useful for making decisions about which method of harvesting to use (even- or uneven-aged management) and in what seasons harvesting can occur to minimize soil disturbance. Table 15 lists the ELTs represented in the Stand Area. Where clearcutting has occurred in the past, regenerated stands clearly show adequate stocking.

Effects are analyzed based on Forest Service Soil Quality Standards (USDA-Forest Service Handbook, Supplement R9RO 2509.18-2005-1), which define thresholds for soil characteristics that are used as indicators of detrimental soil disturbance.

Soil Erosion

Surface soil erosion is typically a concern related to roads and skid trails. A skid trails is defined as a temporary trail over which equipment moves more than three

Table 15. Ecological Land Type (ELT) by Forest Stand.

Stands	ELT	Description
All of 17/16, Part of 19/15, 20/15, 4/16, 24/16, 30/16, 35/16, and 10/16	115G	The climax species for this ELT is sugar maple and beech and red maple and yellow paper birch as subclimax species. It is usually found on broad basin-like areas on lower mountain slopes. The soil type is moderately drained, fine sandy loam. Surface soil erosion is high. These soils are moderately suitable for summer operations.
All of 5/15, 16/16, 28/16, Parts of 3/15, 2/15, 21/15, 13/15, 21/15, 3/16, 3/16, 23/16, 20/16, and 1/16	415A	The climax species for this ELT is a spruce and fir with a subclimax species of yellow birch, sugar maple, and paper birch. It is usually found lower slopes and intervals at lower elevations with slopes less then 30%. The soil type is moderately well drained, and is a fine sandy loam. Surface soil erosion is high. These soils have moderate to low suitability for summer operations.
Part of 23/16 and 20/16	402C	The climax species for this ELT is beech and sugar maple with subclimax species of yellow birch, paper birch and red maple. It is a moderately deep soil on hardwood ledge. The soil type is sandy loam. Surface soil erosion is high and is well drained. This soil has low suitability for summer operations.
Parts of 3/15, 13/15, 19/15, 20/15, and 19/16	102C	The climax species for this ELT is beech and sugar maple with subclimax species of yellow birch, paper birch and red maple. It is a moderately deep soil on hardwood ledge. The soil type is sandy loam. Surface soil erosion is high and is well drained. This soil has low suitability for summer operations.
All of 11/16, Parts of 21/15, 13/15, 19/15, 21/15, 3/16, 4/16, 24/16, 30/16, 35/16, 10/16, 3/16 and 1/16	115c	The climax species for this ELT is sugar maple and beech, with a subclimax species of yellow birch, red maple & paper birch. It is usually found lower slopes and intervals at lower elevations with slopes less then 45%. The soil type is moderately well drained, and is a fine sandy loam. Surface soil erosion is high. These soils have high for summer operations.
Parts of 3/15, 2/15, 19/16 and 4/16	2D	The climax species for this ELT is a red spruce and balsam fir with a subclimax species paper birch. It is a softwood ledge usually found on mountain slopes. The soil type is moderately well drained and is a fine sandy loam. Surface soil erosion is high. This soil has a low suitability for summer operations

times. Harvest equipment making less than three passes produces no measurable detrimental results. Past monitoring, an extensive review of the best available science, and regeneration exams of previous clearcuts show no loss in biomass accumulation on this Forest (project record). The 2005 FEIS notes that "research findings and on-the-ground experience for all [soil] hazard classes confirm that accelerated soil erosion due to roads and skid trails can be reduced – and its effects on streams largely eliminated – by timely application of well-known best management practices." (FEIS, p 3-29) The State of Maine recently published monitoring data that supports the conclusion that properly applied Best Management Practices will mitigate effects from soil erosion (Maine Department of Conservation, Maine Forest Service 2005; Maine Forestry Best Management Practices Use and Effectiveness 2001-2005, 2006), and while the results of a similar study in New Hampshire have not yet been published, Maine and New Hampshire BMPs and

soils are similar. It is therefore reasonable to assume that the effectiveness of these BMPs is also similar.

Roads and skid trails are a concern for soil erosion because they may expose mineral soil (Patric 1976). The act of cutting trees is not a source of soil erosion because it does not expose mineral soil (Stone et al. 1978). Classified, all-season roads in the stand area are maintained to Forest Service standards that help prevent concentration of water on the road surface.

Previously-used temporary roads and landings that were looked at on this project have stabilized, and several have revegetated, indicating no long-term detrimental disturbance. Waterbars (per BMPs) are in place on skid trails, and show no evidence of detrimental accelerated soil erosion (Colter 2006).

Soil Compaction

Improper harvesting operations could reduce forest productivity of subsequent timber stands by compacting soils to the extent that germination and root growth are inhibited, or by creating nutrient deficiencies. However, other than the effects of skid roads, compaction is seldom a concern on properly-conducted logging operations (Hornbeck and Leak 1992). Although more intensive mechanized harvesting systems can cause soil disturbance over more of a harvest unit (Martin 1988), the Timber Sale Administrator will monitor mechanized systems for evidence of increased compaction and take measures to mitigate this effect if it appears likely to occur (see Chapter 2, Design Features).

Soil compaction can also become more of a concern if skid trails are used when wet. BMPs recommend planning harvest operations during appropriate soil and weather conditions. Spreading slash from de-limbing trees at the log landings on skid trails reduces potential for compaction and erosion (see Chapter 2, Design Features). Research shows that immediately following winter harvesting, increases in bulk density occur in the upper 8 cm of soil on skid trails, but bulk density in these areas was not significantly different than control values three years following logging (Donnelly et al. 1991). Holman et al. (1978), working in areas near a spruce-fir site in Maine, concluded that the top 3 inches of mineral soil were compacted to a greater degree than the 3-6 inch depth. They also concluded that compacted soils can be restored to their original bulk density by freezing and thawing, wetting and drying, root penetration, and animal activity. They found that in non-skid trail areas of the harvest area, bulk density returned to pre-cut levels within one year. Bulk density of skid trails in winter harvest areas returned to normal after two winters. Field investigation, using the shovel test method for compaction on some of the trails, confirmed these results in the analysis area: none of the main skid trails tested exhibited residual effects of detrimental compaction from harvesting activity in the Stevens Brook sales of the early 1990s, the last time some of these trails were used (Colter 2006).

Existing log landings from previous sale activity are well located and stabilized, and field inspection of some of the landings found no detrimental signs of soil erosion or effects from soil compaction as a result of the last harvest activity in 1990s

(Colter 2006). Landings are not considered a significant source of soil erosion (Stone et al. 1978), but may sometimes present concerns about soil compaction. However, research reveals that bulk density of soil returns to pre-harvest levels two to three years after harvest (Donnelly et al. 1991).

Soil Quality Standards for the Eastern Region of the Forest Service recommend that soil disturbance (exposure of mineral soil) should be limited to no more than 15 percent of a land unit scale area (project area) (USDA-Forest Service Handbook, Supplement R9RO 2509.18-2005-1, Section 2.2).

Direct and Indirect Effects

The soils analysis uses the best available science, including opposing views on soil productivity, when looking at erosion, compaction, burned soil (from prescribed fire), displaced soil, rutting, climate change, biomass accumulation, as well as on-the-ground examination to evaluate the effects of this project.

Table 16 shows the ground disturbance by alternative.

Table 16. Ground Disturbance, by Alternative.

Activity	Alt 1	Alt 2	Alt 3
Existing Landings (acres)	0	3.75	2.25
New Landings (acres)	0	2.25	2.25
Wildlife expansion (acres)	0	3.00	3.00
Roads Construction (miles/acres)[1]	0/0	0/0	0/0
Roads Decommissioning	0/0	2.0	2.0
Road Maintenance (miles/acres)	0/0	1.8/4.32	1.8/4.32
Skid Trails (miles/acres)	0/0	7.7/18.5	3.2/7.68
Total Disturbed Acres	0	33.82	19.25
Total % of Project Area Disturbed	0%	8.8% of 386 acres	8.4% of 229 acres

[1]1 mile of road/skid trail/ski trail at an average disturbance with of 20' = 2.4 acres of disturbance/mile

[2]hiking trail with =5ft

Alternative 1

In the absence of activities such as timber harvest, no increase in surface soil erosion or soil compaction is expected with this alternative, because there is no reconstruction or re-established use of existing skid trails and landings. No indirect effects to soil erosion or compaction are expected from this alternative. See the Water Resources section of this document for analysis of the indirect effects of sedimentation.

Alternatives 2-3

Approximately 1.8 miles of existing road is proposed for restoration maintenance under Alternatives 2 and 3. This would involve improved drainage and surfacing. Road maintenance may involve cleaning culverts, blading the road surface, and road resurfacing. Although road maintenance may initially cause ground disturbance, improving and maintaining roads for their level of use can prevent future

erosion. Research has shown that maintenance, such as resurfacing roads with a layer of gravel, reduces sediment losses (NCASI 2000). Resurfacing and replacing culverts would help maintain the road and prevent future erosion problems (Moll et al. 1997). This is also true for access to log landings. Following use during the project, roads and trails would be rehabilitated to BMP standards, which have proven effective in preventing soil erosion (BMP New Hampshire 2004; Maine Forest Service 2002 and 2006; Stafford, et al. 1996). The proposed decommissioning of two miles of road is an administrative function involving updating the Forest database, and thus would not result in active changes on the ground, so there would be no soil disturbance.

The majority of the project area is moderately sloped, with steep slopes in some locations; however, harvest will occur only on slopes less than 35 percent. The lengths of these slopes are short enough to limit potential for notable soil erosion. BMPs would be followed to minimize erosion on skid trails during and after harvest operations. Slash from de-limbing trees at the log landings would be spread on skid trails to reduce potential for erosion and compaction (see Chapter 2, Design Features). The combination of moderately sloped terrain with post-harvest measures in accordance with Forest standards and guidelines and BMPs, such as stabilization and waterbars, should prevent soil erosion and promote revegetation (BMP New Hampshire 2004; Maine Forest Service 2005 and 2006; Stafford, et al. 1996).

Most units will be harvested only in the winter, while others have the option of summer or fall harvesting. With frozen soils, proper skid trail location, and careful closeout at the end of operations, minimal surface soil erosion or soil compaction is likely to occur (BMP New Hampshire 2004; Maine Forest Service 2005 and 2006; Stafford et al. 1996). Over-snow operations should produce very little compaction, since operations will not have direct contact with mineral soil and any effects from compaction should disappear by the following winter. Harvesting and skidding on stands during summer or fall will expose mineral soil, particularly on the main skid trails, and it is likely there would be site specific instances of surface soil erosion and compaction from loss of organic cover. Planned layout and management of skid trails, using breaks in terrain and avoiding steep slopes in accordance with Forest Plan standards and guidelines (Forest Plan, p 2-30), and limiting operations to dry conditions (New Hampshire BMPs), would largely minimize or avoid soil erosion. Some temporary compaction will be expected on main skid trails, but this would be minimized by design features and the soils should fully recover from any compaction within three years of the end of operations (Donnelly et al. 1991).

In Alternative 2, five existing and three new log landings are proposed for use during harvest. Alternative 3 proposes three existing and three new log landings. The landings are well placed because of their gentle terrain and well-drained soils. Truck traffic and skidder operation will churn the soil surface and expose mineral soil leading to on-site soil erosion within the boundary of the log yard; however, the combination of careful site selection and management of the log yard during use would limit the extent of erosion and prevent long-term soil erosion impacts. At the time of sale closeout, the log landings would be graded and stabilized to pre-

vent erosion before they can revegetate, and to accelerate recovery from temporary soil compaction (FSH 2509.22, Section 6.38).

In Alternatives 2 and 3, one permanent wildlife opening will be expanded by three acres. The opening is well placed, with gentle terrain and well-drained soils. Stumping operations will churn the soil surface and expose mineral soil, leading to on-site soil erosion within the boundary of the opening. However, the combination of careful site selection and management of the opening during use would limit the extent of erosion and compaction and prevent long-term soil erosion impacts. After a period of three to five years, the opening will be mowed or burned (depending on the time of year) to keep the vegetation lush for animals to feed on and to keep trees from growing and taking over the site. Neither process will produce erosion or compaction impacts because the soil will not be devoid of ground cover. The fires on this Forest, based on past monitoring, do not get hot enough to burn up all the surface organic material.

Approximately eighty stand acres in Alternative 2, and approximately fifty six stand acres in Alternative 3, in the project area are proposed for prescribed fire to help promote oak and white pine regeneration and to improve wildlife habitat. Prescribed burning would occur either in late spring, when the snow cover has melted, or in late summer/early fall, when temperatures have cooled. While some surface soil organic matter may be lost, actual experience does not indicate that prescribed burning affects rainfall infiltration rates. This is because most of the site continues to remain covered by organic matter, and mineral soil aggregation is not changed. The magnitude of these potential effects after prescribed fire is less than those of wildfires, since the prescribed fire is typically of low severity (Landsburg and Tiedemann 2000).

Sedimentation of streams is the most likely indirect effect from road restoration, culvert removal, skidding, stream crossings, stream restoration, and watershed rehabilitation. See the Water Resources section for an analysis of indirect effects of sedimentation.

As shown in Table 16, the action alternatives would result in soil disturbance on 33.82 acres, or 8.8 percent of the 386-acre analysis area (Alternative 2), and soil disturbance on 19.25 acres, or 8.4 percent of the 229-acre analysis area in Alternative 3. Neither alternative would cause soil disturbance to exceed the Soil Quality Standard threshold of 15 percent.

An indirect effect of activities that cause soil erosion or compaction is the rate and success of revegetation on skid trails and log landings. Studies in Maine and Vermont found that soil compaction on log landings and skid trails lasts two to three years after operations cease (Donnelly et al. 1991; Holman et al. 1978). Restocking surveys and field reviews on the White Mountain National Forest indicate that skid trails and log landings are revegetating rapidly and naturally (see project record). Well-distributed rainfall, abundant seed sources, and favorable seedbeds all contribute to rapid revegetation. Log landings typically revegetate first to raspberries and other herbaceous species, and then to forest species. Skid trails typically

revegetate to forest species because the trails are narrow enough that sunlight is usually limited, so herbaceous plants do not re-invade on these locations.

Timber harvest has the potential to effect forest productivity; however, 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 indicates no statistically-distinguishable change in forest productivity due to human impacts, even including the impacts of acid deposition (Nuegenkapian 1998; FEIS 3-13).

All earlier clearcuts in the vicinity have regenerated following harvest, and proposed clearcuts would be expected to do the same following this project. There is sometimes 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 redistributed in the upper mineral layers during harvest (Johnson et al. 1991; Johnson et al. 1997). Therefore this project is not likely to have a significant effect on forest productivity.

Cumulative Effects

The analysis area for cumulative effects on soil erosion and compaction is the Middle Baker River watershed. The total size of the watershed is approximately 2,838 acres. This scale is not so large that it spatially dilutes the cumulative sum of effects on soil resources, nor is it so small that it fails to identify and consider use and potential use on both National Forest and private lands relative to the proposed project.

The temporal scope for cumulative effects on soil erosion and compaction is seventeen years in the past and ten years beyond the Proposed Action and its alternative. This period was chosen to incorporate the last timber harvesting operations on National Forest lands within the analysis area (the Stevens Brook timber sales of the early 1990s), to consider present effects on soil resources resulting from any past soil disturbing actions, to allow time for the proposed activities to occur and be completed, and to consider any other foreseeable soil disturbing activities. This timeframe allows consideration of multiple uses, and provides enough time for the expected recovery of soils from erosion and compaction resulting from timber harvesting, as well as the projected recovery time from future activities. Evidence of erosion and compaction beyond the expected timeframe would imply that the soil is not recovering as expected, and effects from this and future activities could be additive and cumulative.

Although possible, no additional timber harvest is planned on National Forest lands within the cumulative effects analysis area over the next ten years, and no other projects are anticipated within this area during this timeframe that would use the skid trails or landings. The Forest classified roads, recreation trails, and permanent wildlife openings in the cumulative effects analysis area will continue to be maintained and used for public and administrative access. Any other past, present, and future projects listed in the EA are considered to be minute from a soil erosion and compaction standpoint.

Alternative 1

There will continue to be localized erosion related to ongoing maintenance of Forest Roads, recreation trails and private roads, and timber harvest on public and private lands. However, there would be no cumulative effects because there would be no direct and indirect effects

Alternatives 2-3

Compaction can accumulate due to repeated activities; however, there is little or no evidence of detrimental compaction from previous harvesting activities using the shovel test method to check some of the units from the Stevens Brook Timber Sales of the early 1990s (Colter 2006), implying that the soil has effectively recovered from this activity. Use of 2005 Forest Plan Standards and Guidelines, and BMPs, would minimize the hazard and duration of effects due to soil erosion and compaction (FEIS, p 3-29; BMP New Hampshire 2004; Maine Forest Service 2005 and 2006; Stafford et al. 1996). By using existing skid trails and landings, activities will occur where the soil has already demonstrated the ability to recover quickly from short-term effects of harvesting, due possibly to location, soil type, or post-harvest treatments.

Use of BMPs during timber harvest on private lands adjacent to the National Forest lands within the analysis area is expected to limit areas of soil disturbance and soil erosion and compaction (BMP New Hampshire 2004). Impacts of residential development depend on the amount of clearing, excavation, and landscaping for each site. Given the moderately-sloped terrain of the cumulative effects analysis area, the potential for steep, erosive access roads and building lots is less than might be encountered elsewhere within and adjacent to the National Forest. Landscaping and erosion control measures will determine whether effects of residential development are short-term or long-term.

Land management activities such as harvesting, prescribed fire, and permanent wildlife openings 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 Stevens Brook project will result in a short-term increase in the amount of the analysis area that has disturbed soils.

The cumulative effects watershed (Middle Baker River) totals approximately 2,838 acres, with privately-owned lands within it totaling approximately 698 acres. For adverse impacts to occur (15 percent disturbance of the land per Soil Quality Standards), 426 acres would need to be disturbed over the life of the cumulative effects period. The Forest Service proposes up to 34 acres (Stevens Brook Alternative 2), so more than half of the private lands would need to be disturbed in ten years to be over the disturbance threshold.

The action alternatives would cause some cumulative effects from soil erosion and compaction, but these are likely to be site-specific, limited in magnitude and duration, and well within the soil disturbance limits established by the Soil Qual-

ity Standards for the Eastern Region of the Forest Service (USDA-Forest Service Handbook, Supplement R9RO 2509.18-2005-1, Section 2.2), as well as the scope of effects anticipated and analyzed in the 2005 FEIS (pp 3-29 to 3-36).

3.6.2 Soil Productivity

The Forest Service defines soil productivity 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 (USDA-Forest Service, FSH 2509.18).

The 2005 FEIS identifies a general concern and analyzes in detail the potential impacts of acid deposition and timber harvest on soil productivity, including the cumulative impacts of these factors. The main focus of this analysis is on **soil calcium**, based on research on watershed studies (Federer 1989; Likens et al. 1998; Bailey et al. 2003), experimental watershed acidification (Fernandez et al. 2003), and retrospective soil analysis (Lawrence et al. 1997; Bailey et al. 2005). This analysis for the Proposed Action and its alternative incorporates by reference the soil productivity analysis in the Final Environmental Impact Statement, and summarizes key points relevant to this project level analysis (FEIS, pp 3-7 to 3-28).

- Estimated loss of soil calcium raises concerns about possible changes in forest health (dieback or decline), productivity, and forest species composition (FEIS, p 3-7).
- Factors affecting soil nutrients (including calcium) and long-term soil productivity include:
    - Soil physical and chemical characteristics: soils between 1,000 and 2,500 feet in elevation are generally considered acidic with relatively low base saturation; however, recent work is revealing a more complex situation, with a range in the concentration of soil calcium being likely (FEIS, p 3-10).
    - Land use history: intense early harvest may have removed one to two percent of the total calcium supply in some forest soils; however, areas below 2,500 feet in elevation on the White Mountain National Forest today support a well-stocked and growing forest with an average age of 80 to 85 years old or older (FEIS, p 3-11).
    - Soil mineralogy: mineral weathering is the major source of long-term soil calcium to support forest growth, and it mitigates the impacts of acid deposition (FEIS, p 3-11).
    - Atmospheric deposition: acid anions entering the soil via deposition may lead to the displacement of soil calcium and its replacement by aluminum, as well as loss of soil calcium to streams. Since 1955, research suggests there may be a net loss of soil calcium at some sites; however, research at Hubbard Brook Experimental Forest, using far more intense harvest than is practiced on the White Mountain National Forest, indicates no short-term

loss in exchangeable soil calcium fifteen years after whole-tree clearcutting in northern hardwoods (FEIS, pp 3-11, 3-12).

- Despite concern about calcium loss, there is no peer-reviewed evidence demonstrating that acid deposition affects the health or productivity of the northern hardwood forest on the White Mountain National Forest. Long-term biomass accumulation studies in hardwood (and softwood) forest starting in 1931 indicate no observable change in biomass accumulation trends (FEIS, p 3-13).
- Examination of forest regeneration success at all clearcut and selective cut sites on the White Mountain National Forest since 1986 indicates no instances of failed regeneration. This is particularly significant because restocking is the first step in re-accumulation of biomass, and therefore an important first step to indicating that long-term soil productivity has not been foregone or irreversibly impacted (FEIS, p 3-15).
- Changes in forest species composition may be an indicator of changes in soil nutrients. Current evidence does not indicate that change is occurring in species composition. The available evidence indicates that composition is a successional process based on site, and natural succession has been the dominant factor affecting species trends (FEIS, p 3-16).

In measuring effects, the FEIS states that "estimated losses of soil calcium may be attributed to acid deposition, declining contributions of calcium from atmospheric deposition, and forest harvesting. Losses are buffered by mineral weathering in the soil and some continuing calcium deposition. Biochemical modeling reveals that *atmospheric deposition*, (especially sulfate), had the greatest effect on estimated calcium loss, while *forest harvesting* led to only a slight decrease in exchangeable soil calcium." (FEIS, p 3-17)

The **direct effect** of timber harvesting is the removal of calcium with forest products. In general, harvest that removes only the bole of a tree removes only a portion of the calcium in the tree. Tree species vary in amount and distribution of calcium. Sugar maple is one of the most calcium rich, with the tops, limbs, and leaves equaling about 35 percent of the calcium in a tree (FEIS, p 3-17). Forest harvest removes calcium that would otherwise be recycled to the forest floor. Whole-tree clearcut harvest removes the most calcium from a site (FEIS, pp 3-18, 3-19, 3-27).

The **indirect effect** of timber harvesting includes possible changes in available (exchangeable) soil calcium, base saturation, and possible impacts on forest health, tree mortality and decay, productivity, or species composition that are attributed to forest harvest (as compared to acid deposition). (FEIS, p 3-18) No impact is expected on forest health or productivity related to the timber harvest program across the Forest during the next two decades (FEIS, p 3-27).

The **cumulative effects** are the impact of past, present, and foreseeable future actions, which in this case includes consideration of early land use (forestry, agriculture), long-term changes in atmospheric deposition (sulfate, nitrate, particulate matter), and future land uses (FEIS, p 3-18).

"No impact on long-term soil productivity is expected … given …; 1) the available evidence on exchangeable soil calcium impacts from timber harvest; 2) long-term observations about forest productivity; 3) long-term evidence about forest species composition; 4) the absence of inciting factors that affect forest health; 5) no link made on the White Mountain National Forest between forest health and soil calcium; and 6) the indications that long-term impacts are not irreparable, though it will take time." (FEIS, p 3-26) "The driving force in possible change is atmospheric deposition, due to the fact that the best modeling available indicates that harvesting is a small factor." (FEIS, p 3-27)

Affected Environment

The analysis area for direct, indirect and cumulative effects on soil productivity is the location of the actual harvest activities, since site-specific impacts related to soil or forest productivity are not likely to extend further. **The temporal scope for cumulative effects on soil productivity** is from 75 years ago, to consider early harvesting in the early 1900s, to ten 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.

The Stevens Brook Project has soils common to the White Mountain National Forest: moderately deep, well- and moderately-well drained, fine sandy loams on 10-30 percent slopes.

For the most part, soils are a mix of well- and moderately-well drained sandy loam and fine sandy loams corresponding to Ecological Land Types 115C and 115g – typical soils on lands suitable to timber harvest across the National Forest. These land types produce northern hardwood forest, with differing mixtures of sugar maple and beech becoming common in the more mature stands. There are a few small areas of spruce-fir on the moderately well-drained, fine sandy loams generally found on lower ground, with surface drainages being fairly common. These are ELTs 415a and 2d.

Early land use records indicate that in the early 1900s the project area was heavily culled (meaning a portion of trees was removed from the area, some areas being more impacted then others). Portions of these lands that were non-merchantable were left, including softwoods (Goodale 2003). Early historical records do not exist for all parts of the proposed sale area, but examining the vicinity overall, the records available appear representative.

Since those early times, there have been conventional, bole-only harvests in this vicinity, meaning the tops and limbs of the trees have been left in the forest, with the result that about 35 percent of the calcium that could be taken from the forest through harvest has, instead, been left on-site. Field examinations indicate that all stands previously harvested to regenerate new forest have met agency requirements for adequate stocking of years 3 and 5 post-harvest (see project record). This is consistent with Forest-wide re-stocking surveys, which show that all clearcut and selection harvests have restocked on a variety of soils, aspects, and topographic

positions. This is important because restocking 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 referenced in the 2005 Forest Plan.

Direct and Indirect Effects

Alternative 1

The No Action alternative has no direct impact on long-term soil productivity or forest health. Nor would there be any indirect impacts, possible changes in available (exchangeable) soil calcium, base saturation, or possible impacts on forest health, productivity, or species composition that are attributed to forest harvest (as compared to acid deposition). (FEIS 3-18) 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.

Alternatives 2-3

The Proposed Action and Alternative 3 are summarized in Table 17, which is organized by clearcut vs. selection + group + thinning. This distinction is made because the quantity of calcium removed in harvest varies by area and by harvest method. Clearcutting, for example, removes about 350 Kg/ha of calcium when bole-only harvest is used, and 539 Kg/ha when whole-tree harvest is proposed. The other methods remove about 25 percent of this, or 88 Kg/ha with bole-only and 134 Kg/ha when whole-tree harvest is proposed. Proposed harvesting in the Stevens Brook Project is bole-only. The 25 percent for other harvest methods represents the proportion of an area in Stevens Brook actually harvested; for example, a thinning removes the trees from approximately 25 percent of an acre because about 70 percent of the forest's 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 is used, compared to bole-only clearcut harvest or selective or thinning harvests. Thinning and selective harvest have less impact than clearcutting. However, over time, even-age harvests remove the same amount of forest as uneven-age methods, so the cumulative impact is nearly the same, though there are instances when uneven-age harvest actually removes more (Adams et al. 1996).

Table 17. Number of Stand Acres by Each Harvest Practice.

Alternative	Acres of Clearcut and Shelterwood	Acres of units with STS/GS/Thinning
2	129	257
3	62	167

Bole-only, clearcut harvest would remove an estimated 2 percent of the calcium from a site, and a whole-tree harvest clearcut would remove about 4 percent when compared to the total calcium that resides in the soil. The other bole-only harvest methods would remove up to 1 percent of the calcium when compared to the total

calcium that resides in the soil (FEIS 3-19). On this basis, Alternative 3 would have less impact on calcium, while Alternative 2 would have the greatest potential impact.

With respect to indirect impacts, based on actual on-site measurements at Hubbard Brook Experimental Forest over a period of fifteen years at sixty soil pits, soil exchangeable calcium was not lost due to forest harvest (FEIS, p 3-20). 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 1930s (FEIS, p 3-13). Also, recent measurements related to forest productivity at Hubbard Brook Experimental Forest, and elsewhere on or in the vicinity of the White Mountain National Forest, reveal similar results for both hardwoods and softwoods (FEIS, p 3-13). Therefore, indirect effects from harvest are not expected under any alternative.

Research has shown no change in exchangeable soil calcium and soil base saturation, and no change in biomass accumulation, as a result of timber harvest. Research is underway to determine additional sources of calcium (possibly deep rooting reserves or non-exchangeable reserves or calcium oxalate) not accounted for in existing studies that could be replenishing the exchangeable calcium reserve that is removed in the short-term by timber harvest (FEIS, pp 3-20 to 3-27).

The prescribed burning of the approximately eighty stand acres in Alternative 2, fifty-six stand acres in Alternative 3, and the permanent wildlife opening expansion would occur either in late spring, when the snow cover has melted, or in late summer/early fall, when temperatures have cooled. Some surface soil organic matter would be lost due to burning, but some nutrients are not affected. For example, soil calcium would not be reduced by burning, but it could be removed from a site by erosion. Some soil nitrogen would be lost when the organic matter burns, but nitrogen is not considered to be a limiting factor in tree growth on the White Mountain National Forest.

Cumulative Effects

The percent of total loss takes into account calcium depletion for the last 75 years, foreseeable calcium depletion for the next 10 years, previous harvests, and the proposed harvest.

Alternative 1

Early land use removed calcium from harvested forest stands (Hornbeck 1990). Within the analysis area, 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 percent of the calcium per acre of harvest (Fay 2003).

Atmospheric deposition may also remove calcium from the soil irrespective of timber harvest. The most recent small watershed studies suggest that the cumula-

tive loss of calcium due to atmospheric deposition, considering the buffering effect of mineral weathering, is about 4 percent over 120 years. (FEIS 3-24) Given that the cumulative effects time period goes back 75 years, it is possible that up to 3 percent of the total soil calcium may have been removed during that time due to atmospheric deposition, and another <1 percent due to early harvesting methods. Atmospheric deposition may continue to deplete soil calcium, though evidence indicates that soil and streams are recovering from the possible impacts of acid deposition (FEIS 3-26). So, up to 4 percent soil calcium may have been lost over 75 years.

On-site evidence during timber and other inventories has not revealed any unusual dieback or mortality. Stands previously harvested in this vicinity have adequately regenerated (project record). As previously noted, no change in biomass accumulation has been documented at the nearby Bartlett Experimental Forest. Thus, based on on-site evidence and the previously discussed research on biomass accumulation, it does not appear there are issues with soil productivity.

If Alternative 1 is selected, there would be on-going effects from past harvest and acid deposition. However, there would be no cumulative effects because there would be no direct or indirect effects to soil productivity.

Alternatives 2-3

Effects of past harvest and atmospheric deposition would be no different in the action alternatives than in the No Action Alternative.

The action alternatives have the potential to add new harvest impacts by removal of trees and their biomass. Alternative 2 would remove the most calcium because it proposes approximately 129 acres of clearcut, bole-only tree harvest and 257 sts/gs/ thinning bole-only tree harvest acres. Alternative 3 proposes to remove less calcium because it proposes approximately 62 acres of clear cut bole-only tree harvest and 167 sts/gs/ thinning bole-only tree harvest acres. (Table 18 shows percent of calcium loss.) However, modeling of soil exchangeable calcium and base saturation for a northern hardwood forest at the Hubbard Brook Experimental Forest has shown little long-term effect on these factors as a result of timber harvesting. Changes in exchangeable soil calcium and soil base saturation from 1850 to 2000 were nearly the same with and without forest harvesting (FEIS, pp 3-23 to 3-25). By applying Forest Plan Standards and Guidelines, tiering to the FEIS, and using best available science, no adverse effects on soil productivity are anticipated with any of the action alternatives.

Table 18. Estimated Calcium Removal Cumulative Effect total loss by Harvest Practice

No Action with One Previous Bole-only Clearcut Harvest	5.9% Estimated Ca loss
Bole-only Clearcut and One Previous Clearcut Harvest	9.1% Estimated Ca loss
Bole-only Thin and One Previous Bole-only Clearcut Harvest	6.0% Estimated Ca loss
Bole-only Uneven-Age and One Previous Bole-only Clearcut Harvest	6.7% Estimated Ca loss

3.7 Water Resources

The Stevens Brook Project Area is located within the watersheds of Stevens Brook (1920 acres = 3 mi^2), an unnamed perennial stream (730 acres = 1.1 mi^2), and on a slope in the area between the two watersheds (80 acres = .13 mi^2),. All of these areas drain to the Baker River from the northeast. These watersheds are within the 12-digit hydrologic unit code (HUC) Middle Baker River watershed (010700010405) which is 31.8 square miles.

3.7.1 Streams

The Stevens Brook watershed contains streams that have perennial parts which flow all the time except during extreme droughts, intermittent reaches which that dry up each year, and ephemeral channels which only flow in response to rainfall or snowmelt. Field review in summer of 2006 observed dry conditions in the east branch (2.7 miles) of Stevens Brook upstream of the confluence with the perennial main stream (4.2 miles). The small unnamed tributary (1.6 miles) that drains to the Baker River east of Steven Brook is also perennial since it was observed to be flowing in July 2007 during water quality collection and therefore is presumed to be perennial in its lower portions. The sideslope between the two watersheds is drained by ephemeral channels which only flow during snowmelt or precipitation events.

Some of the stream portions within the Stevens Brook Project Area have been classified using the Rosgen's (1996) stream types. This was done based on information observed during field visits and from subsequent analysis using GIS (see project record). These determinations were made using indicators as described in Rosgen (1996). Rosgen types are also listed in Table 19.

Table 19. Riparian Types within the Project Watersheds.

Rosgen Type	Miles	Brief Description	Comments
Aa+	2.9	Very steep, vertical steps with deep scour pools and flumes	Stable where bedrock and boulders dominate.
A	1.7	Steep, step-pool streams.	Stable where bedrock and boulders dominate.
B	2.3	Moderate gradient, riffle dominated channel	Stable banks

Riparian areas and streams including Stevens Brook and the other streams within the project watersheds are considered to be properly functioning. This means streams and their associated riparian areas exhibit the attributes and processes that are appropriate to each riparian area's capability and potential. Benefits applicable to riparian areas include dissipating stream energies associated with high flows, filtering sediment, development of diverse channel characteristics to provide habitat for aquatic biota, and protection of streambanks from scour (Prichard et al. 1998). While these attributes were observed during field visits, some potential risk factors were identified.

During a field visit in July 2006, the lowest reach of Stevens Brook was observed to be undergoing housing development on adjacent private lands. Some of these activities were resulting in clearing of riparian vegetation and loss of overflow channels. Continued activity of this type could result in a risk to proper functioning condition in this lower reach. In addition, earlier logging practices in the Stevens Brook watershed resulted in woody material removed from streams and trees from riparian areas on adjacent private land. Subsequent flooding and scour have added to these effects and resulted in portions of Stevens Brook with less than potential levels of woody material and loss of diverse channel and floodplain characteristics. Increased woody material contributes to the protection of stream banks, creation of habitat for aquatic species, and large woody material forms flat areas of accumulated sediment which allow for the reduction of flood flows and the creation of overflow channels. Forest management activities today allow large trees to grow in the riparian and floodplain areas of perennial streams leading to an upward trend of large woody material recruitment into streams from the riparian areas on the WMNF. Field observations in the summer of 2006 using the Proper Functioning Condition (PFC) assessment method confirmed that despite past and current management on private lands, these streams are in proper functioning condition.

Direct and Indirect Effects

The **analysis area for direct and indirect effects** on streams and stream condition (Table 20) are the reaches of streams adjacent to proposed timber harvest units during project activities. This is because the proposed units are located near these reaches and direct and indirect effects from proposed activities would be not expected to extend beyond these stream segments due to the use of Soil and Water Conservation Practices (SWCPs) and Best Management Practices (BMPs) as described in this report.

Table 20. Streams in or near Units.

Stand/ Compartment	Nearby Stream or wetland	Brief Description
5/15 3/15	Upper portion of west branch of Stevens Brook. Perennial, upper reach is intermittent.	Units are planned 100 feet or more outside of stream.
2/15	Small forested wetland area	Unit boundary is planned 100 feet or more outside of wetland area.
21/15	Lower perennial portion of west branch of Stevens Brook.	Unit is planned 100 feet or more outside of stream.
19/16 4/16 3/16	Intermittent east branch of Stevens Brook	Units are planned 100 feet or more outside of stream.
23/16	Main stream of Stevens Brook - perennial	Unit is planned 100 feet or more outside of stream.
28/16	West branch of unnamed perennial tributary to Baker River	Unit is planned 100 feet or more outside of stream.
20/15 19/15	Small unnamed intermittent tributary to east branch of Stevens Brook	Units are planned to retain trees providing stream stability and shade.

Alternative 1

There would be no new direct or indirect effects on stream condition from implementation of Alternative 1. No new management activities would be initiated as a result of this proposal. Streams would continue to function properly with a few risk factors as described in the affected environment section.

Alternatives 2-3

No measurable change in stream condition would be expected for several reasons. The first is that perennial streams and wetlands would be protected with buffers, retained trees would provide stability and shade for intermittent streams, and properly designed crossings would protect streams. Table XY shows how each stream is protected. More information on practices used to prevent and mitigate effects from the proposed actions is discussed later in this report, under the topic, BMPs. In addition, none of the action alternatives result in 25% or greater basal area reduction within the watershed, as described in the water quantity section of this report. Because of this, no measurable increase in discharge or peak flows is expected in the streams as a result of the proposed activities and there will be no channel adjustments related to increased discharge or peak flows.

3.7.2 Water Quantity

Water quantity in streams in the project area is related to the amount of precipitation and evapotranspiration that occurs throughout the year. At Hubbard Brook, 62 percent of approximately 130 cm of precipitation becomes streamflow, and most of the rest is evapotranspirated (Likens and Bormann 1995). Evapotranspiration has the greatest effect on streamflow from June through September, the growing season. As a result, streamflow is lowest from August to September.

Removal of vegetation through timber harvest can alter evapotranspiration rates, resulting in changes to streamflow. The magnitude of the change to streamflow depends on the extent of change to the vegetation (Hornbeck et al. 1997) within a watershed. Research at Hubbard Brook indicates that as reductions in basal area approach 25 percent of the watershed, a measurable response in annual water yield may be seen (Hornbeck et al. 1993). These increases became greatly reduced 3-4 years after timber harvest and became undetectable 7-9 years after harvest. Most of the increase in water yield occurs during the summer in periods of low flow (Hornbeck et al. 1997). The research at Hubbard Brook is in a forested environment on the White Mountain National Forest similar and close to the one found in the analysis area. Therefore, the results of this research can be applied to the Stevens Brook Project Area and its watersheds.

Direct and Indirect Effects

The analysis area for direct and indirect effects on water quantity is the sub-watersheds of streams in the project area, including Stevens Brook, each tributary of Stevens Brook, and the unnamed tributary to the Baker River. This is because the

potential effects related to the action alternatives would be encompassed within these watersheds. These potential effects to water quantity would occur within the first year of timber removal and be greatly reduced within 5 years (Hornbeck et al. 1997).

Alternative 1

There would be no direct or indirect effects on water quantity from implementation of Alternative 1. No new management activities would be initiated as a result of this proposal.

Alternatives 2-3

No measurable increase in low flows are expected in the channels in the analysis area, because based on the harvest treatment proposed, the Action Alternatives do not exceed the 25 percent basal area reduction threshold within each sub-watershed threshold (Specialist Report). Although there may be small localized effects, no measurable increase in low flows is expected in any of the sub-watersheds (USDA-Forest Service, 2005b, FEIS).

Fire also has the potential to increase water quantity; however, research on prescribed fire indicates that a successful prescribed burn in forests is designed to consume only part of the forest floor fuels. Prescribed burns do not normally consume canopy material, except for some smaller trees in dense stands and possible occasional scorching of larger trees. Thus, understory burns, such as those proposed in the Stevens Brook Project, have little effect on canopy interception, evapotranspiration, soil water storage, and overland flow (Baker 1990). Prescribed fire would occur in less than 1 percent of the any of the sub-watersheds. Although there may be small localized effects due to the small scale of burning, it is unlikely that the proposed underburning would increase water quantity in the watershed.

3.7.3 Water Quality

The analysis area for direct and indirect effects on water quality is the watersheds of Stevens Brook, the Unnamed Tributary to the Baker River and the small intershed slope between them. This is because the proposed units are located within these watersheds and effects from proposed activities would be additive within the watershed area and, at the scale of activities proposed, effects would not extend beyond these watersheds into the Baker River. Direct and indirect effects to water quality could last for up to 10 years as indicated by research at Hubbard Brook. The State of New Hampshire designates these reaches as Class B, the second highest water quality rating, considered acceptable for fishing, swimming and other recreational purposes, and, after adequate treatment, for use as water supplies. Surface waters in the analysis area are not currently used for public water supply purposes.

Under New Hampshire antidegradation provisions, all waters of the National Forest are designated as Outstanding Resource Waters (ORW). Water quality and designated uses shall be maintained and protected in ORWs (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.

Basic water quality data has been collected in 2006 and 2007 on Stevens Brook and the unnamed tributary to the Baker River. Measurements in June 2006 in Stevens Brook varied from pH = 6.5 at the bridge on Buffalo Road, to 6.4 at the lower end of the east tributary and 6.4 on the west tributary. In July, pH at the bridge on Buffalo Road was 6.9, in December 2006 pH was measured at 6.7 and in June 2007, the pH was also 6.7. All conductivity measurements were below 35µS/cm, and turbidity = 0.0 NTUs during these field visits. This conductivity data is similar to that measured by the USGS from the late 1970s through the late 1990s (Hornbeck et al. 2001).There was a gage at the lower end of Stevens Brook at Buffalo Road. Measurements made in June 2007 on the unnamed tributary to the Baker River showed a pH of 6.7, conductivity of 33µS/cm, turbidity of 0 NTUs, and temperature = 57°F. Overall, the values measured in the watersheds are within the range of values typically seen on the White Mountain National Forest (Hornbeck et al. 2001).

Water samples were taken during many of these sample dates and sent to the Forest Service lab for a more complete analysis of cations, anions, and metals, including aluminum components. This data will be used to characterize the water chemistry of the Stevens Brook watershed. It will also be used to monitor the effectiveness of forest standards and guidelines in relation to water quality changes from timber harvest on the White Mountain National Forest as outlined in the monitoring guide of the Forest Plan. Results of this monitoring will be reported in future Monitoring Reports of the WMNF.

Streams in the Stevens Brook and unnamed tributary to the Baker River have not been assessed by the State to determine if water quality supports designated uses including aquatic life (NHDES 2004). However, the Aquatic Resources report shows that Stevens Brook supports a coldwater fishery. It is therefore likely that the aquatic life designated use is supported as described in the Fishery report. There is no bacteria data in the watersheds; however, the Forest Plan FEIS indicates that bacteria counts taken across the Forest were highest at high-use recreation sites (swimming areas). There are no swimming areas in the analysis area, so it is likely that bacteria levels are low and that the designated use of primary and secondary recreation is supported (USDA-Forest Service, 2005b, FEIS, p 3-40). Like all Northeast states, New Hampshire has a fish consumption advisory for fish taken from all freshwaters due to mercury. The source of this mercury is atmospheric deposition (NHDES 2004).

Direct and Indirect Effects

Alternative 1

There would be no direct or indirect effects on water chemistry, temperature, or sediment from implementation of Alternative 1 (No Action). The current condition would remain. Ongoing forest activities would not change water quality or impact existing uses. The effects of atmospheric deposition on water quality would

continue but regional trends as evidenced at Hubbard Brook indicate a slow recovery is occurring to surface water quality (Driscoll et al. 2001).

Alternatives 2-3

Research at Hubbard Brook has indicated that intensive forest harvesting practices, such as clearcutting an entire watershed, have the potential to lower the pH in water (Hornbeck et al. 1997). The relationship between pH and total aluminum concentrations is well known (Sposito, 1989; Lawrence and Driscoll 1988). As pH decreases, total aluminum concentrations increase. Water quality data on the Forest confirms this relationship and with lower pH values associated with higher total aluminum concentrations (see Stevens Brook Project Administrative Record). As shown by the field data collected, the pH of the streams in the project area is already slightly acidic with current values ranging from 6.1 to 6.9. Even though the streams in the project area support aquatic life as described in the Aquatic Species and Habitat Section of this document, further decreases in pH would be a concern. This is because additional metal could be mobilized into surface waters, including aluminum.

Several studies have provided information on timber harvest effects on water chemistry. A Hubbard Brook study concluded that clearcutting about 15 percent of a watershed did not measurably change the basic chemistry of the major 1st and 2nd order perennial streams in the watershed (Martin et al. 1986). Another study compared three levels of harvesting on water quality, including Aluminum and effects to brook trout (Baldigo et al. 2005). In this study, basal area removal varied from 73 percent to 14 percent and 5 percent in the treatment watersheds. Water quality and trout mortality were only changed in the 73 percent basal area removed watershed. Another study showed that when 33 percent of the basal area of a watershed was removed, water quality changed, including increased aluminum levels (Wang et al. 2005). The changes in total aluminum concentrations were approximately proportional to the basal area removed. Other studies confirm that less intensive harvest methods, such as those proposed for the Stevens Brook project, have less impact on stream chemistry (Martin et al. 2000). This research used a threshold of 15 percent basal area removed within perennial watersheds to analyze the potential for water quality changes due to timber harvest.

All perennial streams in the analysis area are 1st order streams. The percent (%) area removed within each watershed was used as an indicator of the potential for changes to water quality from timber harvest activities. The percent (%) basal area reduction in each of these watersheds was calculated for each alternative (see project file). These calculations show that basal area reductions are less than 15 % removal in all alternatives and watersheds. Other calculations show that no more than 7% of any of the perennial watersheds would be treated by even-aged regeneration harvesting methods, including clearcutting, under any action alternative. These metrics show that harvest is proposed at levels which are unlikely to result changes in water quality, including pH and total aluminum should an action alternative be selected.

Since harvesting at the proposed levels is not expected to lower the pH (increase acidity) or otherwise alter the water quality of streams, it is also not expected to increase the aluminum concentrations at this scale. Because of this, even though aluminum concentrations in the watersheds are unknown, these concentrations should not increase as a result of the proposed project. As described previously, a monitoring plan is being implemented in the Stevens Brook watershed to assess water quality parameters during timber harvest. This monitoring would provide information on the effectiveness of BMPs used to protect water quality during timber harvest. The results of the monitoring would indicate whether water quality parameters (such as pH and aluminum) are or are not changing as a result of forest activities when Forest Plan standards and guidelines and BMPs are used.

Research has shown that the usual harvest practices (such as those used on the White Mountain National Forest or proposed for the Stevens Brook Project) do not result in large nutrient losses or sediment movement and do not pose a risk to water quality (Brown 1983). Implementation of the 2005 LRMP Standards and Guidelines would minimize any opportunity for sediment to reach the banks of any perennial streams. No harvest would occur within 25 feet of perennial stream banks and only limited uneven-aged harvest would be allowed within an additional 75-foot Riparian Management zone.

Stream crossings can cause increased sediment inputs to streams during installation and use. A reconstructed haul road crossing is proposed across Stevens Brook under all action alternatives. In accordance with the 2005 LRMP, this bridge would be designed to pass bankfull flows. One skidder crossing would be needed as part of alternative 2 to access units in the upper portions of the west side of Stevens Brook. This crossing would be designed to pass bankfull flows, as determined by a qualified person and be located so as to minimize potential sediment inputs. Following harvest, all temporary crossing structures would be removed. Sediment problems associated with stream crossings can be very persistent (Stafford et al. 1996), so visual inspection by the Sale Administrator would occur at stream crossing sites to catch and rectify any problems in the early stage.

The magnitude of effects caused by sediment transport is related to area of disturbance. Areas which lack vegetation and have disturbed soils become the source for sediment transport, particularly near stream crossings. The area of disturbance associated with the action alternatives is shown in Table 21. Alternatives 2 and 3 would disturb approximately 28 and 17 acres, respectively. As areas of temporary disturbance (landings, skid trails) revegetate, sediment contributions decrease to near zero. Sediment contributions from classified roads would continue; however, they would likely return to pre-project levels over time.

Table 21. Ground Disturbance, by Alternative.

Activity	Alternative 1	Alternative 2	Alternative 3
Total Disturbed Acres	0	28.1	17.0
Perennial Stream Crossings with bridges	0	2	1
Estimated Culvert Crossings of intermittent channels	0	5	4
Prescribed Fire (acres)	0	70	46

Three stands in the project area are proposed for prescribed fire in alternative 2 and two stands in alternative 3. The most significant water quality response to fire is increased sediment and turbidity (Landsburg and Tiedemann 2000). However, the magnitude of these potential effects after prescribed fire is less than those of wildfires, since the prescribed fire is typically of low severity (Landsburg and Tiedemann 2000). A minimum 25-foot riparian buffer on mapped perennial streams should minimize sediment reaching the banks of perennial streams. Since the stands proposed for prescribed fire would have a riparian buffer and be of small magnitude and low intensity, it is unlikely that any increased erosion from the prescribed fire would cause water quality standards to be exceeded.

Nitrate and nitrite are the primary chemical constituents of concern from forest burning (Landsburg and Tiedemann 2000). This report summarized research that shows that stream nitrate responses for prescribed fire are lower than stream nitrate responses in wildfire. In addition, research shows that unburned buffer strips between the streams and riparian areas and the area proposed for burning could minimize effects of fire on stream chemistry (Landsburg and Tiedemann 2000). All perennial streams in the project area would have at least a 25-foot riparian buffer on mapped perennial streams, which should help filter nutrients.

Any direct and indirect effects on water quality resulting from the action alternatives are anticipated to be short-term and localized. Most studies show that BMPs are very effective at reducing or eliminating the transport of sediment into watercourses (summarized by Stafford et al. 1996). Low turbidity measurements show that there is currently not an issue with sediment movement into surfaces waters in the watersheds.

The Timber Sale Administrator would monitor the project area to ensure the implementation and effectiveness of Standards and Guidelines and BMPs. If conditions are not met, the operator would be shut down until problems were resolved. BMPs are also monitored as part of the Forest-wide monitoring of the 2005 LRMP. Use of 2005 LRMP Standards and Guidelines, site-specific Soil and Water Conservation Practices, and New Hampshire BMPs in every facet of the action alternatives would meet the Outstanding Resource Waters standard by maintaining water quality and protecting designated uses. Additional information on the use, effectiveness, and implementation of standards and guidelines is described in the Aquatic Species and Habitat section of this document.

Timber harvest has the potential to affect stream temperature and water quality at the watershed scale (Scott et al. 2001). Because of this, standards and guide-

lines that mitigate impacts to temperature and water chemistry were incorporated into the 2005 Forest Plan FEIS. These include the use of riparian buffers, partial harvest of watersheds, and staggered harvest (USDA-Forest Service, 2005b, FEIS, p 3-51). I addition, the amount of basal area proposed for removal from 1st and 2nd order perennial watersheds is less than 15% thereby preventing water quality changes from timber harvest activities (Wang, et al 2006, Martin, et al, 1984, Lawrence, 2002). Riparian buffers are considered the most effective factor for preventing nutrients and sediment from reaching a watercourse (Gilliam 1994). By using these practices, measurable effects to stream temperature and water quality are unlikely to occur as the result of the proposed actions.

Cumulative Effects

The **analysis area for cumulative effects** on water resources is the watersheds of Stevens Brook, the unnamed tributary to the Baker River, and the intershed slope between them. These watersheds were selected because they include all the headwaters of the streams which flow through the project area, and, at this scale, the effects of multiple uses within the watersheds could become additive and result in cumulative effects within each perennial stream.

The **temporal scope for cumulative effects** on water resources is 10 years into the past and 10 years into the future. Ten years is adequate for water quantity analysis because research at Hubbard Brook has shown that increases in water quantity following large-scale clearcuts became undetectable 7-9 years after harvest (Hornbeck et al. 1997). Ten years is also adequate for water quality analysis because research at Hubbard Brook has shown that the sum of measured ions (cation-anion summary) had returned to levels found before harvest within 5 years following treatment (Hornbeck et al. 1986).

Past and present activities that occur in the cumulative effects area (CEA) watersheds include timber harvest, recreation, and road maintenance and residential development (see Map 5). There is no indication that future activities will deviate in type or scale from past and present activities. Timber harvest on private lands in the unnamed tributary to the Baker River has been ongoing over the past ten years. Trends of population growth and increased recreation are expected to continue. Atmospheric deposition continues to occur throughout the Northeast, including within watersheds in the cumulative effects area.

Water Quantity

No cumulative effects related to increased water quantity are expected in the analysis area under any alternative. There would be no direct or indirect effects from Alternative 1, so could be no cumulative effects. As discussed previously, the action alternatives are not expected to cause increases in water quantity. Timber harvest has occurred in the CEA watersheds in the last ten years on private lands; however, the projected basal area reductions of past harvest combined with the proposed level of harvest, do not exceed 25 percent of the analysis area (data in project record). While some harvesting may occur on private land, no additional timber

sales are planned on National Forest System land in the CEA watersheds in the next ten years beyond this proposed harvest. It is therefore unlikely that cumulative increases in water quantity would be observable as a result of the proposed project when combined with other past, present, and foreseeable activities on all lands within the CEA watersheds.

Temperature measurements collected in the CEA watersheds indicated cool temperatures, which support the existing uses in the watersheds. The proposed project would not increase stream temperatures because of the design features described earlier. With no project-related effect, a cumulative effect on stream temperature is not anticipated, even when combined with potential activities on private land over the next ten years.

Water Chemistry

As described in the Forest Plan FEIS, and as measured in the streams at the Stevens project area, an existing cumulative effect to water chemistry is atmospheric deposition (FEIS, pp 3-51, 3-52). To protect against the cumulative effects of atmospheric deposition on water quality from past and future timber harvest, the 2005 Plan includes a guideline that limits the amount of even-aged regeneration harvest within the watershed of a first or second order perennial stream to no more than 15 percent of the watershed in a five year period (Forest Plan, p 2-29). In addition, a threshold of 15 percent basal area removed was also used to assess water quality changes as described earlier. Past and proposed even-aged regeneration harvesting in the CEA watersheds accounts for approximately 3 percent of the area. It is anticipated that some harvesting may occur in the CEA watersheds on private land in the next ten years; however, more than half of the private land would have to be treated with even-aged regeneration harvest within a five year period for this guideline to be exceeded. This far exceeds current trends of harvest on private land in the CEA watersheds and, therefore, is unlikely to occur.

Private lands and inholdings constitute less than 30 percent of the CEA watersheds. As mentioned previously, streams in the CEA watersheds have not been assessed by the State to determine if they support designated uses. However, another indicator can be used to assess the effect of private land developments. Research has indicated that watersheds with approximately 10 percent impervious surfaces have surface waters which are degraded (Morse and Kahl 2003). In the CEA watersheds, known landings, roads, skid trails, and hiking and snowmobile trails on public and private land account for less than 2 percent impervious surfaces. Buildings, driveways, and parking areas on private land would increase these impervious surfaces by an unknown amount. Buildings, driveways, and parking areas, as well as new development in the next ten years, would have to cover hundreds of acres to exceed the impervious surfaces threshold. This would exceed current development trends in the CEA watersheds. Therefore, water quality changes related to impervious developed surfaces are not expected to occur.

Sediment

No cumulative effects related to sediment are expected in the analysis area. As discussed previously, any direct or indirect effects are expected to be short-term and localized. Road maintenance should reduce potential sediment inputs of existing roads (NCASI 2000). No major erosion problems related to recreation were observed in the CEA watersheds. No recreation projects are anticipated in the analysis area in the next ten years. The Soils section states that erosion is not significant within the analysis area, and observations in the field show that sediment transport is not causing elevated turbidity including from sources on private land in the watersheds. Combined with the use of BMPs, standards and guidelines, and project design features, sediment transport to streams is prevented and sediment in streams is not a cumulative effect of concern in the CEA.

Although wildland fire occurred historically in the CEA watersheds, no wildland or prescribed fire has occurred in this area during the timeframe analyzed. Stands 5-15, 13-15, 2-16, and 3-16 are proposed for treatment through prescribed fire, and it is possible that these stands could be re-burned within the next ten years. Since the stands proposed for prescribed fire have a vegetative buffer strip along mapped perennial streams, and because only low intensity fire is proposed, it is unlikely that any sediment from the prescribed fire would reach streams. Cumulative effects of prescribed fire on sediment are, therefore, not anticipated.

In summary, the action alternatives are unlikely to add to cumulative effects on water resources in the CEA.

Effectiveness of Best Management Practices, Standards and Guidelines, and Soil and Water Conservation Practices

The effects of the proposed actions on water resources are reduced or avoided through a variety of practices. Standards and guidelines are found in the Forest Plan (2005); they provide direction for Forest management activities and protection for water, riparian, and aquatic resources. In addition, project design features and Best Management Practices (BMPs) are applied to the project in site-specific ways, as described in Chapter 2 and in the Soils and Water Resources effects sections of this chapter.

Whatever the nomenclature, these practices all work to protect water resources and associated designated uses such as "Outstanding Resource Waters." They include administrative practices, such as the timber sale planning process, where the interdisciplinary team was designated to include a hydrologist and a soil scientist to ensure these resources were considered during project planning. Review of existing data and field reviews were carried out to ensure that on-the-ground, site-specific information was used to guide this process (see the project record). Additional information was collected in the field to assess the current condition (Hydrologist Field Notes, project record). This information is summarized in the affected environment section.

Other practices, applied to the layout and operation of activities, are expected to be effective in protecting water resources, including water quality and associated

designated uses as described in the FEIS for the Forest Plan (p 3-54). Maine has published a study confirming the effectiveness of these practices (Maine Forest Service 2005) in protecting water and soil resources. The same BMPs evaluated in the Maine study are used by the WMNF as directed by the Forest Plan in Chapter 2, Vegetation Management, S-4: "State of Maine and State of New Hampshire Best Management Practices must be met or exceeded." In addition, the implementation and effectiveness of these practices continues to be monitored across the Forest as part of the Monitoring Plan for the Forest Plan. Past monitoring results were summarized in the Forest Plan, and in the Analysis of the Management Situation conducted prior to Plan revision. These documents summarized past monitoring results on the Forest and concluded that they were effective in maintaining water and soil quality. In addition, other agencies and researchers have conducted studies on the effectiveness of BMPs in New England (Aust and Blinn 2004); at Hubbard Brook, a research watershed located within the WMNF (Martin and Hornbeck 1994); and nationally in a study EPA is conducting with State and Private Forestry (BMP Inspection Email 2005). The consensus is that where BMPs are practiced, they are effective in mitigating the effects of timber harvest and related activities on other resources. Additional information on the use and effectiveness of these practices used to protect soil and water resources for this project can be found in Chapter 2, and the Soils and Water Resources effects discussions in this chapter.

Several different scales of monitoring are used to ensure that mitigations are effective and, in the case of failure, that changes occur to prevent future failures. On-the-ground monitoring would occur during timber harvest operations by the Timber Sale Administrator. If needed, the hydrologist or soil scientist would become involved and assist in solving problems that might develop to ensure resources are protected. This practice is common on the WMNF and has been successful in solving many issues before they became serious (see example email 2004 in the project record). Other monitoring would occur after harvest activities but before the operator leaves the site. This closeout monitoring would be part of the contract to implement the Stevens Brook project should an action alternative be selected, and ensures that satisfactory conditions are present when the sale is closed out. Vegetation management projects are also monitored across the Forest as part of the Forest Plan monitoring. BMP monitoring and water quality monitoring of the effectiveness of Forest Plan Vegetation Management Standards and Guidelines are both described in the monitoring guide for the Forest Plan. In this way, effectiveness of the mitigations is monitored at several different scales — spatially and temporally — to ensure that water resources and designated uses are protected.

3.8 Aquatic Species and Habitat

Affected Environment

The waters of the White Mountain National Forest are designated as Outstanding Resource Waters (ORW) by the State of New Hampshire. Maintaining the existing cold water fishery is required as part of the ORW status.

Stevens Brook is occupied by common coldwater fishes such as Eastern brook trout *(Salvelinus fontinalis)* and sculpin *(Cottus cognatus)*, and these species are suspected to occur as well in the perennial portions of the unnamed tributaries in the project area. These streams also support common semi-aquatic and aquatic insects and one sensitive mayfly (see TEPS heading in this section). Aquatic species occurrence is based on stream surveys, site-specific field reviews, and salmon and brook trout fish stocking records (USDA-FS 1990, 2006; NHFG Fish Stocking Records, multi-dated, at Pemigewasset Office). There are no aquatic Management Indicator Species (MIS) identified for the WMNF.

Stevens Brook eventually drains into and influences the water quality and quantity of downstream aquatic habitat within the Baker River. Collectively, these aquatic ecosystems are part of the Merrimack River Basin, where interagency efforts are ongoing to re-establish a self-sustaining population of Atlantic salmon *(Salmo salar)*. Annually since 1994, the Baker River (located outside the project area) has been stocked with hatchery-reared Atlantic salmon fry. Although Stevens Brook and unnamed tributaries are not stocked, the salmon fry could migrate from the Baker River upstream into the perennial portions of the headwater streams within the project area. After several years in freshwater, they would migrate downstream to the ocean as smolts. Adult salmon do not return to the upper Pemigewasset River watershed (including the Baker River) due to impassable dams on the lower Merrimack River system.

The existing riparian vegetation in the project area prevents sediment from entering into stream courses, maintains stream bank stability, and provides streamside shade to maintain cooler summer instream water temperatures for aquatic habitat in Stevens Brook and the unnamed tributaries. The riparian vegetation provides a source of food (nuts, berries, fruits, twigs, and leaves) for semi-aquatic and aquatic species. The riparian area provides wood and leaf material into streams suitable as fish habitat diversity and onto the forest floor suitable as amphibian and reptile habitat diversity. The riparian areas, vernal pools, and streams in the project area provide habitat for common amphibians and reptiles.

Threatened, Endangered, Proposed, and Sensitive Species (TEPS)

The Regional Forester-listed Sensitive Species wood turtle *(Clemmys insculpta)* requires slow moving rivers with sandy bottoms and cut banks and exposed gravel areas. The fast flowing perennial streams with rocky substrate (Stevens Brook and the unnamed tributaries), and their wooded riparian zones provide potential marginal habitat for the wood turtle. However, in the project area there are no known

documented occurrences of wood turtle, and none detected during stream/riparian and plant surveys (Fife 2004; Mattrick 2006; USDA-FS 2006, 1990) or Forest Service interdisciplinary team field reviews. There is documented occurrence of one Regional Forester-listed Sensitive mayfly *(Ameletus tertius)* in an unnamed Stevens Brook tributary, and suitable habitat for another RFSS Ameletid mayfly *(Ameletus browni)* within portions of the fast moving headwater streams located within the project area (see the Biological Evaluation in the project record and the TEPS heading in the Wildlife Resource section of this EA for effects determinations to aquatic TEPS species).

Direct and Indirect Effects

Semi-aquatic and aquatic species have very specific habitat requirements, which restrict them to streams and adjacent riparian areas, wetlands, and vernal pools. Therefore, the **analysis area for direct and indirect effects** on semi-aquatic and aquatic species is the aquatic (streams, wetlands, vernal pools) and riparian habitats in the project area.

Alternative 1

There would be no road, skid trail, or landing use, or stream crossings, no tree removal associated with vegetation management or stump removal for orchard opening expansion, and no prescribed burning in the project area at this time. Therefore, Alternative 1 would cause no direct or indirect effects on fishes or other semi or aquatic species, streams, or vernal pools. The riparian habitat would continue to provide food, shade, and streambank stability. Trees adjacent to the streams and vernal pools would mature and eventually die under natural processes and some would fall into the stream courses, creating habitat diversity.

Alternatives 2-3

Direct effects from harvesting, prescribed burning, and orchard opening expansion on semi-aquatic and aquatic species and their habitat could include immediate changes in the water quality parameters of turbidity and instream temperatures. Turbidity caused by suspended fine sediment from surface erosion entering streams can clog breathing gills and intake feeding structures in fishes and aquatic insects. Turbid water can decrease a trout's ability to visually locate food and mates, and can force resident fish and other aquatic species out of their immediate territories until the water clears. An indirect effect of turbidity is sedimentation, which can affect fish populations long-term. The aquatic organisms upon which fish feed can be eliminated from their substrate habitat by scouring sediment, eventually affecting fish distributions and growth, especially during the fry stage. Heavy sedimentation of gravel and cobble substrate can smother bottom-dwelling insects, and the eggs and fry of gravel nesting fish such as trout. Removal of riparian vegetation providing streamside shade can increase instream temperatures, thereby affecting fish populations long-term. Loss of streamside shade can cause warmer instream temperatures, which decreases the amount of dissolved oxygen available in the water. Warmer instream temperatures also increases a trout's demand for this less abundant dissolved oxygen, hence affecting fish and aquatic biota survival. The

effects of harvesting, prescribed fire, and opening expansion on amphibians and reptiles from the action alternatives are similar to those described in the Wildlife Resources section, such as travel impediments or increased forest floor temperatures from solar warmth.

The action alternatives could cause a minor, localized, and short-term direct effect of turbidity on aquatic habitat if soil entered vernal pools and streams during harvesting; road, skid trail and landing use; stump removal for orchard opening expansion; and prescribed burning activities (Alternative 2 has a higher potential compared to Alternative 3 due to greater number of acres affected). However, winter harvest proposed for several stands and Forest Plan Riparian Standards and Guidelines would protect streams, riparian areas, and vernal pools (see Water Resources section) and reduce the potential direct effect of turbidity on aquatic habitat. Over a 16 year period, the district biologist has observed that effective Riparian Standards and Guidelines have protected the riparian areas on numerous vegetation management projects (for example, the Moose Watch Timber Sale, Bethlehem, NH).

The direct and indirect effects of turbidity, sedimentation, and increased instream temperature on semi or aquatic species and their habitat would be minimal for all the action alternatives. The action alternatives would not cause any permanent terrestrial travel barriers (i.e., paved roads) or impassible large ditches, berms, or culverts for frogs, salamanders, snakes, and turtles – including the RFSS wood turtle. The action alternatives would not cause any instream migration barriers or water diversions for Atlantic salmon, Eastern brook trout, sculpin, or RFSS Ameletid mayflies.

Vernal pools provide habitat for rare plants and certain species of amphibians and reptiles, and a source of water for wildlife (Tappan 1997; Taylor 1993; Society for the Protection of New Hampshire Forests 1997). Vernal pools form in low lying areas with compacted sediments or underlying ledge with poor drainage. During site-specific field reviews, forestry technicians mapped vernal pools within the project area (Williams 2006). A Forest Plan guideline provides for a 25-foot no-harvest buffer around naturally-occurring vernal pools (Forest Plan, G-1, p 2-24). Further protection is provided via an additional 75-foot Riparian Management Zone with limited harvest (Forest Plan, G-2, p 2-24), requiring removal of slash and treetops from pools (Forest Plan, G-4, p 2-25). Over a 16 year period, the district biologist has observed that Forest Plan Riparian Standards and Guidelines have been effective in protecting water and soil substrates on numerous timber sales and recreation management projects across the district. The action alternatives would cause no direct or indirect effects to vernal pools within the project area because they are excluded from harvest units and Forest Plan Standards and Guidelines would minimize the potential for impacts.

Cumulative Effects

The **analysis area for cumulative effects** on semi-aquatic and aquatic species for all alternatives are the aquatic (streams, wetlands, vernal pools) and riparian habitats within the HMU (due to the specific and restricted habitat requirements and

because the scale is large enough to include species with wider home ranges). The **temporal scope** includes the past and future 10 years (timeline spans past and current WMNF Forest Plans with standards and guidelines that have protected and would protect aquatic and terrestrial resources). Map 5 shows the past, present, and reasonable foreseeable future Forest Service activities that have occurred or may occur within the Upper Rattlesnake HMU.

Alternative 1

Although Alternative 1 would cause no direct or indirect effects to semi- or aquatic species or their habitat, there would be a lost opportunity to increase the amount of open forest canopy (allows light and solar warmth to reach the forest floor) and to increase the amount of regeneration age class in the analysis area. Alternative 1 would add a cumulative effect to the steady decline in the light and thermal microclimate features and the habitat seral stage that are important to some aquatic (adult stage) and terrestrial invertebrate insect species that use early successional plant hosts for food. In turn, these invertebrate insects become prey base for many wildlife species including cold blooded amphibian and reptiles, which also use these open canopy areas in forested habitat to gain solar warmth (Litvaitis et al. 1999).

Alternatives 2-3

Turn of the century logging practices affected instream habitat conditions in New Hampshire (Likens and Bilby 1982). Past WMNF surveys indicate most streams have suitable cold water temperatures and good hiding cover for trout. However, the WMNF stream surveys indicate a lack of habitat diversity with the percentage of pools below natural occurrence (USDA-FS 1990), likely a cumulative effect from historical logging practices.

The Stevens Brook action alternatives are expected to cause very minor and localized direct and indirect effects. Therefore there would be very minor and localized cumulative effects to Eastern brook trout; Atlantic salmon; RFSS wood turtle or Ameletid mayflies; or amphibian, reptile, vernal pools, or ORW in the project area or HMU. This reasonable conclusion is based on the fact that a relatively minor percentage of the overall Stevens Brook sub-watershed in the Upper Rattlesnake HMU would be treated (see Water Resources section) and Forest Plan Riparian Standareds and Guidelines and soil erosion preventive measures would be implemented. Also, maintaining large trees adjacent to streams would allow for recruitment of large woody material into the streams. This may increase the amount of pool habitat in these aquatic ecosystems in the future, since the presence of large woody material is one of the mechanisms for pool formation (Likens and Bilby 1982).

During site-specific field reviews of the Stevens project area, there was no evidence of active erosion on existing roads, old skid trails, or landings (now stable and revegetated) that were used during past management activities. The action alterna-

tives would add very minor and localized cumulative effects to aquatic resources and the effects are within the scope and range of effects described in the WMNF FEIS for the Forest Plan. Future projects in the HMU would use standards and guidelines similar to those for the Stevens Brook Project to protect soil, water, and riparian resources, thus very minor and localized cumulative effects on semi or aquatic species or their habitat within the HMU are anticipated. Over a 16 year period, the district biologist has observed that Forest Plan Standards and Guidelines have effectively protected streams and riparian areas on numerous vegetation management projects across the district (e.g., Moose Watch Timber Sale). State laws would provide some protection of streams on private land adjacent to the HMU. Timber harvesting, residential development, and road construction may result in impacts to semi-aquatic and aquatic species and their habitat on private lands adjacent to the HMU.

3.11 Scenic Resource

Executive Summary

Alternatives 2 and 3 both propose some level of clearcutting that would meet the Forest Plan standards and guidelines for visual quality for all viewpoints. The direct visual impacts would be short term textural changes in the existing tree canopy as seen from the viewpoints. Alternative 2 produces the greatest amount of visible openings (16.3 acres) compared to Alternative 3 (12.3 acres). Applying Forest Plan standards and guidelines as well as design features would minimize overall visual impacts. Additional harvesting on private land may occur in the future, but the cumulative impacts to scenic resources are expected to be within Forest Plan thresholds for individual viewpoints and allowable observed openings.

Affected Environment

The 2005 Forest Plan states that the goal of Scenery Management on the Forest is to "conduct all management activities to be consistent with assigned Scenic Integrity Objectives, realizing the importance to local communities and Forest users of a natural-appearing landscape, distinct from the human-made environment dominant in the East." (Forest Plan, p 1-16).

The Scenery Management System (SMS) develops Scenic Integrity Objectives (SIOs) that indicate the level of alteration allowed in the landscape. These objectives range from unaltered (Very High SIO) to heavily altered (Very Low SIO). As part of the Plan revision, the Forest Service conducted an inventory using the SMS process to establish and assign Scenic Integrity Objectives to the Forest land base, and developed standards and guidelines that incorporate past experience and research on the perceptions of Forest visitors.

Part of the process of developing Scenic Integrity Objectives was to first establish "Concern Levels," a relative scale used to compare the degree of public importance placed on landscapes viewed from travel corridors and use areas. These are identified as Levels 1, 2, and 3 (with 1 the highest level).

The two classified roads abutting and adjacent to Compartments 15 and 16 are NH Route 25 and Buffalo Road; both have a Concern Level of 2 (USDA-Forest Service, 2005d, Scenery Management System). The only other classified road in the project area is FR 429, which runs through Compartments 15 and 16 and has a Concern Level of 3.

The Forest Plan establishes a MA 2.1 guideline for evaluating cumulative effects for viewed landscapes from established "Concern Level 1 open, higher elevation viewpoints affording expansive or large scale views." (G-1, p 3-6) For the analysis area, there are no viewpoints that provide these large scale views. There are also no hiking, snow machine trails, or recreation use areas within Compartments 15 and16 (see the Recreation section for further information regarding trails, use type, use levels, and trends.

The SMS system culminates its Inventory Phase with the assignment of a "Scenic Class" to landscape areas on the Forest. This measures the relative importance, or value, of discrete landscape areas having similar characteristics of scenic attractiveness, user concern, and distance zone (USDA-Forest Service, 2005d). Compartments 15 and 16 actually have two Scenic ClassesP: 2 and 4.

Scenic Class 1 typically speaks to the foreground viewshed (the detailed landscape generally found from the observer to a half-mile away), and does not pertain to this analysis. Nearly all of the project area is Scenic Class 2 , falling in the middleground viewsheds (the zone between the foreground and the background in a landscape. It is the area located from a half-mile to four miles from the observer). The exception is in Compartment 16, Stands 19 and a small section of Stand 4, and in Compartment 15, approximately a quarter of Stand 3, as they are within Scenic Class 4.

The SMS system moves into the Planning Phase by refining the Scenic Classes and creating Scenic Integrity Objectives. The Forest Plan ranks Scenic Class 2 and 4 areas as having "Moderate Scenic Integrity Objectives." (Forest Plan, pp 2-26 and 2-27)

The project area is entirely within the "Moderate Integrity," and Integrity assignment does not change based on alternatives. Within MA 2.1, lands with a Moderate Scenic Integrity Objective are areas "viewed from superior viewpoints." Where "clearcuts and other noticeable openings" occur, they "should be informal in distribution and designed to be in scale with the observed landscape." The guidelines further state that, "as a starting point, observed acreages of 10 acres normally achieve a Moderate Scenic Integrity Objective." (Forest Plan, p 3-8) There are no superior viewsheds within or defined by the analysis area.

Direct and Indirect Effects

Alternative 1

No harvesting is proposed under Alternative 1. Any changes in the existing forested landscape would result from natural causes. As areas harvested during earlier sales reach maturity, the existing mosaic pattern resulting from those activities would be replaced by a consistent vegetative texture with few naturally-occurring openings. Without new openings in the canopy, either through human manipulation of the canopy or natural occurrences, the vegetation would not offer as much diversity of tree species, such as paper birch and aspen, or age classes, as there would be if openings where present. There would be no direct and indirect effects on scenic resources.

Alternative 2

There would be evidence of management activities along a less than .25 mile section of Buffalo Road and portions of Forest Road 429 under Alternative 2. The guidelines for managing the scenic resource along a road with a Moderate Scenic Integrity Objective limit the size and shape of openings. The views seen from Buffalo Road will be restricted to the immediate area, and would be very minimal or non-existent due to the remaining overstory in Compartment 16, Stand 1, and the

surrounding areas that do not have activity. The views along Forest Road 429 will also be limited for the same reason. The variety of treatments along Forest Road 429 will offer the traveler alterations to the sense of enclosure and create viewing opportunities into the stands for observing wildlife. From the distant views (2+ miles away, looking northeast on NH Route 118), the variations in treatments, particularly those at the higher more visible elevations, will offer more moderate visual changes to texture, shadow, and color. These minimized changes in the overall view will produce a not unattractive mosaic appearance, blending with the existing conditions seen in the viewshed.

The shelterwood seed cuts in Stands 2, 3, 13, and 5 will retain about 50-100 square feet of basal area of overstory within the stand. All except Stand 5 will be visible from Forest Road 429; however, they will not be clearly visible from any of the distant viewpoints due to foreground topography, the location of the stands and how they lie on the ground, and surrounding vegetation obscuring potential views. Stand 5 may be partially visible from more distant, middleground viewpoints along NH Route 118. Views into the lower section of the treatment area from NH Route 25 are not easily seen due to the foreground topography and vegetation blocking them out.

Site preparation, whether it is with prescribed burning or mechanical treatment, would open the understory considerably for a few years after the treatment. Group selection activity throughout the project area would appear as small openings in the forest. Over time, there would be a variety of sizes and textures as these areas regenerate several types of tree species. The site preparation and harvest activities in these stands is consistent with Forest Plan guidelines.

The 2005 FEIS states that, for "High Scenic Integrity" areas of the Forest, "they exhibit some level of vegetation management activity that has occurred, but where the characteristic landscape fully dominates when viewed." "Moderate Scenic Integrity" is indicative of those compartments where vegetation management is occurring, the existing landscape character still dominates within these compartments, and deviation from the existing landscape character is minimal." "Low Scenic Integrity" is where management activities dominate the view. (FEIS, p 3-445)

There would be short term effects on scenic resources from the potential use of prescribed burning in 5/15 in Alternative 2. The proposal is for a low-intensity ground burn to promote advance regeneration in these stands. If the burn is done in the spring, vegetation would cover the visual effects of the burn within a month or two. There may some charring of tree trunks at their base, but this, too, should not be noticeable after a season or two, nor from the NH Route 118 middleground viewpoints. If the burn is done in the fall, it would be covered by snow in the winter, and advance regeneration should be established in the following growing season.

Within the analysis area, Stands 5 and 20 in Compartment 15 and Stands 19, 30, 11, and 10 in Compartment 16 are proposed as clearcuts. They are irregular-shaped, and probably have no clearly viewed position other than from directly

overhead, where 4 to 12 acre openings would be observed. Further, to meet wildlife reserve standards, 5 percent of each stand (0.5 acre) would be retained in uncut patches at least 0.25 acres in size that would interrupt the larger opening (Forest Plan, p 2-35). This reduces the actual visible acreage from middleground viewpoints due to the angles from which each stand is viewed. Views into the lower section of the treatment area (Stand 20) from NH Route 25 are not easily seen due to the foreground topography and vegetation blocking them out. The remaining clearcuts would be partially visible from more distant, middleground viewpoints along NH Route 118.

The observed acreage guideline would apply to any treated stand within the analysis area. Compartment 16, Stand 19 is the only opening greater than 10 acres (12 acres) but less than the allowable 10 acres will be in any view from the analysis area, keeping within the stated guideline.

The proposed treatment in the Alternative 2 analysis area is consistent with Forest Plan guidelines, and the treatment anticipated by the analysis in the 2005 FEIS, which states that "Moderate Integrity is indicative of those compartments where vegetation (habitat) management is occurring." (p 3-445)

Alternative 2 would show the most evidence of management activities.

Alternative 3

Alternative 3 varies from Alternative 2 only in that there would be no treatment within the 2005 Roadless area. The visual and aesthetic impacts would be the same for the remaining area proposed for treatment.

Because the 2005 Inventoried Roadless Area boundary lies on lower elevations, the visibility of the prescribed treatments to the distant casual observer would be greatly minimized than under Alternative 2. The roadside observer on NH Route 25 or Buffalo Road would still not have a foreground view beyond the forest at the edge of the road.

Although there would be some evidence of management activities from the more distant views (2+ miles away) found while traveling northeast on NH Route 118, the limited area that is visible, would offer moderate visual changes to texture, shadow and color.

Alternative 3 would show the least evidence of management activities of the two action alternatives.

Cumulative Effects

The **analysis area for cumulative effects** on scenic resources includes those National Forest lands within Compartments 15 and 16, potential viewpoints within or outside the compartment, and the adjacent private lands that may be viewed from these same viewpoints. This area was selected because it encompasses not only the project area and surrounding National Forest lands, but the adjoining private lands. It allows consideration of how the National Forest lands contrast with or

complement the adjoining private lands, and it considers how this contrast or complement appears from set viewpoints.

The **temporal scope for cumulative effects** on scenic resources is 16 years past and 20 years into the future (1991-2027). The last vegetation management and ground disturbing activities in Compartments 15 and 16 took place in the early 1990s. This timeframe allows consideration of whether and how much, these activities are still evident on the landscape. The analysis looks 20 years into the future because the FEIS states that it takes about 20 years for signs of timber harvest activities to "become essentially unnoticed by the casual visitor." (p 3-312). This allows consideration of the additive effect of foreseeable activities on the scenic resource.

Alternative 1

Minimal visual evidence remains in the analysis area of the timber harvest operations from the 1990s timber sale. With this alternative, the compartment would continue to have this unmanaged appearance. There may be timber harvest proposed in the future, either in the compartment or on adjacent private lands. For now and the foreseeable future, the textures, shadows, and colors noticeable from Forest Road 429, and the views from NH Route 118 and 25, would remain the same. The adjacent ridgelines and low elevation summits would continue to have no open viewpoints into the analysis area, and the roads would remain wooded with short sightlines and no view of the adjacent ridgelines. Minor and slow changes would be noticed during the aging process. The only significant changes would come from any naturally-occurring events.

This alternative would have no cumulative effect on the scenic resources within the analysis area.

Alternative 2

Of the three choices, Alternative 2 would have the greatest visible impact on the land. The short term effects would include new visible openings and changes to the viewed textures, colors, and shadowing as they lay upon the landform. Openings and areas treated with a heavier prescription will begin blending into the existing mosaic after the first few seasons of regrowth. The visible change in height would allow for new shadowing to fall into these areas for many years to come. However, this would not be out of character, as the visible slopes are angled to the viewable spaces such that a minor or minimized disturbance would be experienced. After approximately 20 years, the landscape would appear to be blended with the surrounding areas. Minor shadow lines would remain after this time, textures would seem similar enough to the surroundings that the casual observer would not take much notice, and the colors would be darkened and more a part of the shadows.

From the ground, on Forest Road 429 or off of it, the visual effects would be longer lasting, but not unattractive for a length of time. There would be an increase in diversity to the landscape. Trees, woody shrubs, plants, and animals would be more diverse and interesting to those seeking a viewing experience. Wildlife viewing would become an attractive byproduct of openings for those that trek off the road.

Light entering or filtering into the area would offer a new and different feel and sense of space to the landscape.

This alternative would have the most effect on the scenic resources within the analysis area for years to come.

Alternative 3

This alternative would have only a minor visible impact on the land, because the harvest area would be reduced and located at a much lower elevation on the landscape than under Alternative 2. Without entering the 2005 Inventoried Roadless Area, the visible area becomes greatly diminished and would be nearly out of sight from the few existing viewable locations as the years progress. The area would begin blending into the existing mosaic much sooner from the few viewable locations in this alternative.

Visible changes from Forest Road 429 would be same as in Alternative 2. This alternative has a much lighter visible touch on the landscape than the Proposed Action. Unlike Alternative 1, however, Alternative 3 would still have evidence of management activity in years to come.

The changes being proposed work well with the visible past activities, and they are marginally evident from the viewpoints mentioned earlier. Should there be more changes made to the landscape on private lands adjacent or abutting the Forest in the future, the overall visible acres seen may be greater. Depending upon where they are located and the shape and size of the action, they may detract from the quality of the current and projected mosaic.

3.11 Air Resources

Affected Environment

The proposed Stevens Brook Vegetative Management Project is located within the White Mountains airshed, which is the air over the Forest. The project area is located on the eastern slope of the predominately north-south trending valley of the headwaters of the Baker River. Regional winds move from west to east. Local winds are dominated by mountain valley dynamics interacting with large-scale atmospheric movements (Keim in AIRMAP, 2004).

In the White Mountain National Forest, the Class I air quality areas are located in the Presidential Range-Dry River Wilderness and the Great Gulf Wilderness Area. The project area is about 30 miles south of the Presidential Range-Dry River Wilderness Area, the nearest Class I air quality area.

EPA has set National Ambient Air Quality Standards (NAAQS) for six major pollutants called 'criteria' pollutants. They are ozone, carbon monoxide, nitrogen dioxide, particulate matter, sulfur dioxide, and lead. Areas of the country where air pollution levels persistently exceed the national ambient air quality standards may be designated "nonattainment" (EPA, 2007). The project area is not located in a nonattainment area for any of the NAAQS. Ozone reaches the White Mountains from large urban centers to the south, migrating north during times of high temperature and high levels of solar radiation. Ozone levels are expected to decrease as the New England states comply with lower 8-hour ozone standards beginning in 2009 (AIRMAP, 2008).

Existing levels of air pollution in the project area are mostly related to regional and industrial sources. The New Hampshire Department of Environmental Services has reported that there are no stationary sources of air pollution within the cumulative effects analysis area (NHDES, 2006). Local sources include vehicle emissions, roads dust, and fire. Fire contributes particulates and carbon monoxide. Wildland fire is rare and most prescribed fires in the White Mountain National Forest are smaller than 5 acres. Except for larger wildland fires and short periods during prescribed fires, these sources generally do not result in air quality exceedences. Vehicle emissions are associated with carbon monoxide, hydrocarbons, nitrogen dioxide, and lead. Sunlight causes some of these pollutants to combine, forming ozone. Ground-level ozone data from south of Gorham, NH rarely exceeds air quality standards and is due mostly to summer weather and air flow, although it is not frequent enough to reach nonattainment status (Murray, 2006). This same pattern is expected at the Stevens Brook area since it is not located near large emission sources and has the same regional air flow patterns.

Direct and Indirect Effects

The analysis area for direct/indirect effects on air resources is the air over the Stevens Brook watershed. This airshed was selected because the potential effects to air quality generated by the proposed activities are likely limited to those areas of

operation within the airshed, and they are not expected to extend much further. This is due to the small extent of proposed burning activities, location, and wind patterns. Outside the valley, air pollution enters the larger air mass and is diluted. The ridges within this airshed form a boundary to local air pollution effects by blocking movement of pollutants, keeping the pollutants within the valleys.

The major pollutants of concern for direct and indirect effects to health are mostly related to the amount of fine particulate matter (PM) in smoke from the fire (USDA Forest Service, 2002). This includes PM10 (less than 10 microns in diameter) and PM2.5, (less than 2.5 microns in diameter). Other pollutants include carbon monoxide (CO) and carbon dioxide (CO_2) concentrations which are part of smoke emissions (US Environmental Protection Agency, 2001). Potential health effects of high exposure to PM2.5 and PM10 emissions include respiratory symptoms and aggravation of heart or lung disease (USDA Forest Service, 2002). Potential health effects of high exposure to CO include reduced blood-oxygen levels (US Environmental Protection Agency, 2001).

Alternative 1

No activities are proposed and no additional emissions are expected to take place in the project area, beyond what occurs now. Forest Service roads will continue to receive their scheduled level of maintenance. Vehicle use will continue in the project area. These existing emissions are currently contributing to the air quality condition described in the affected environment as well as the larger scale air quality issues discussed in the cumulative effects section of this report. In summary, air quality will continue to meet NAAQS and air pollutants from distant sources will continue to affect Forest resources as described in the cumulative effects section.

Alternatives 2-3

The proposed activities which have the potential to effect air quality are the prescribed burns proposed in 4 units. Alternative 2 proposes to treat 4 units with prescribed fire. These units are, by stand-compartment designation, 5-15 (24 acres), 13-15 (24 acres), 2-16 (5 acres), and 3-16 (27 acres) for a total of 80 acres. Alternative 3 does not include 5-15 (24 acres) so the total acres proposed for prescribed burning is 56.

Table 22. Comparison of Alternatives for Air Quality.

Alternative	Acres of Prescribed Fire	Total PM10 tons	Total PM2.5 tons	Total CO tons	Total CO_2 tons
1	0	0	0	0	0
2	80	7.1	6.0	72.9	750.8
3	56	5.0	4.2	51.0	525.6

For Alternatives 2 and 3, the Forest First Order Fire Effects model was run to predict smoke emissions for the proposed prescribed fire. This program considers the region, vegetation type, and the season of burn. Table 18 shows the predicted amounts of the four emissions of interest. The model predicted 72.9 tons of carbon monoxide from the 80 acres proposed for burning in alternative 2 compared to

51.0 tons from 56 acres in alternative 3. All other emissions followed a similar pattern with the emissions from the 80 acres proposed in alternative 2 proportionately higher than the amount of emissions from alternative 3. The total duration of flaming and smoldering of the fire was predicted to be an average of 20 minutes for each acre. As of 2002, prescribed fires were not considered to be a major cause of nonattainment of NAAQS (USDA Forest Service, 2002). It is therefore unlikely that prescribed fire proposed for 80 acres in Alternative 2 or the 56 acres in Alternative 3 would cause nonattainment of NAAQS for these parameters, particularly since not all stands would be burned at once and best management practices would be used.

Best management practices are used to reduce the effects of the proposed actions on air quality and public health. Public notification of the proposed prescribed burn would be given prior to the start of a proposed burn (see design features, Chapter 2). In addition, the increases in emissions are expected to be short-term and localized to the airshed and last less than a day. Smoke plumes may degrade air quality in an area for just a few hours before moving and dispersing. No more than two units would be burned at any one time, thereby reducing the total amount of emissions for each burning event.

An additional potential emission is from use of heavy equipment and gas-operated tools during timber harvest and road maintenance operations. Ground level ozone is worst during summer months, so fall or winter harvest would minimize this effect so that ozone is unlikely to form at elevated levels as a result of the proposed activities. Approximately 47% of the stand acreage would be harvested in the fall or winter. Because of the limited duration of operation, season of operation, and the relative amount of this emission-generating equipment, it is unlikely that the proposed operations would cause the NAAQS to be exceeded.

Cumulative Effects

The cumulative effects area (CEA) for air quality is the same as was described in the direct/indirect effects section of this report. This was selected because at this scale the effects of multiple uses within the airshed could become additive and result in cumulative effects. The timeframe analyzed includes past emissions which have contributed to the large scale atmospheric pollution leading to the current condition and extends to the next ten years - 2018. This timeframe was selected in order to include those activities in the past which have contributed to existing cumulative effects, as well as looking far enough into the future so that the effects of the project and any known future activities are fully considered.

Many of the cumulative effects to air quality occurring in the White Mountain National Forest come from upwind, thousands of miles away in the Midwest. Large coal burning plants and other industrial emission sources contribute oxides of sulfur and nitrogen that have resulted in acid rain. This in turn has led to the acidification of ponds and streams across the forest where the buffering capacity is low. This is discussed further in the water resources report. Some large sources within the state and region also contribute to these effects.

As described in the affected environment section of this report, ground-level ozone in the project area occasionally exceeds air quality standards, but not frequently enough to be considered in nonattainment. All of the New England states, except Maine, will have a compliance deadline for 8-hour ozone of June 2010 (US Environmental Protection Agency, 2004). Maine will be in compliance by June 2009 (US Environmental Protection Agency, 2004).

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

Alternative 1

No local emissions related to the proposed action would occur. The existing condition and trends as described in the affected environment would remain much the same. The same activities that currently are occurring on the Cumulative Effects Area would continue to occur. Future vehicle emissions are likely to increase as more visitors come to the White Mountain National Forest. This would contribute to ground level ozone when conditions are suitable. Cumulative effects from regional, industrial, and local sources would continue to occur with the same trends.

Alternatives 2-3

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

3.12 Recreation

Executive Summary

The Stevens Brook Project Area contains few recreation opportunities compared with most of the White Mountain National Forest, and recreation use in this area is low. There are no trails, trailheads, or developed recreation facilities in the project area, though part of Forest Road 4194 is also the beginning of the Carr Mountain Trail. The No Action alternative will have no effect on recreation opportunities. Alternatives 2 and 3 will both have temporary, short-term impacts on recreation opportunities due primarily to the hauling of timber on Forest Road 429 and other disturbances created by harvesting activities and prescribed fire. None of the alternatives is expected to have any cumulative effects on recreation.

Affected Environment

This project area is not well known for its recreation opportunities. It includes no trailheads, no hiking or snowmobile trails, and no features that draw attention from the recreation community. Recreation facilities within the project area are limited to one forest road (FR 429) and one small spur road off FR 429. These roads are used for walking and mountain biking. The project area may also be used by hunters, anglers, and others. The intensity of use for all of these users is low (0-6 people per day in any one location).

Recreation settings for this recreation analysis area are described by the Recreation Opportunity Spectrum (ROS). The ROS defines a range of unique recreation experiences as: Primitive, Semi-Primitive Non-motorized, Semi-Primitive Motorized, Roaded Natural, and Rural (Forest Plan, p 1-10 and Map 1-01). The lands within the project area fall into Management Area (MA) 2.1, General Forest Management. The ROS goal for MA 2.1 is to offer a full mix of ROS objectives. All of the MA 2.1 lands in the project area are identified as Semi-Primitive Motorized, which is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is generally low, but there is often evidence of other users. Motorized use may be evident (FEIS, p H-2).

Direct and Indirect Effects

The analysis area for direct and indirect effects on recreation is defined as the Stevens Brook watershed, which includes the entire project area as well as adjacent private and WMNF lands within the watershed. The analysis area also includes FR 4194, which is proposed to be decommissioned under the action alternatives, because a portion of it is also the beginning of the Carr Mountain Trail. The analysis area was chosen because it encompasses all locations where project implementation may affect recreation opportunities. The timeframe is the actual duration of the Stevens Brook Project, expected to be 3-5 years depending on the alternative selected. This temporal scope was chosen because the types of direct and indirect effects to recreation expected from this project are limited to where and when management actions occur.

Alternative 1

Alternative 1 would neither alter nor enhance current recreation opportunities. FR 429 would not be open to any logging traffic. There would be no harvest units adjacent to trails or roads. There would be no prescribed burning in the project area and no change to FR 4194.

Alternative 2

This alternative would have the most short-term direct and indirect effects on the recreation opportunities and experiences in the Analysis Area of all the action alternatives. Short-term effects of timber harvesting activity may impact walkers, hikers, snowshoers, and other users along FS Roads 429 and elsewhere in the project area.

All Recreation Uses

Throughout the year, the analysis area is used for walking, hiking, snowmobiling, and mountain biking. Signs would be posted at FR 429 to alert recreationists to the presence of logging operations. Noise associated with harvest activity may be audible to visitors in the vicinity of logging operations.

The analysis area is also regularly used by hunters. The effect of proposed harvest on hunting depends on timing of the logging. If harvest occurs during hunting seasons, it could displace animals (see Wildlife Resources section) and reduce the quality of the hunting experience. This alternative would, however, establish the most early-successional forest stands. While these stands remained young, they would provide additional habitat and browse for game species. This habitat change could improve hunting opportunities in the area when logging and the hunting season don't overlap.

There are a total of four prescribed burn units proposed in this alternative. Each burn would be implemented in one day during the spring or the fall and could potentially impact recreationists during this time period. The presence of Forest Service vehicles, firefighters, smoke, and noise would all impact the recreation experience on the day of a burn. If a burn occurs during hunting season, it would temporarily displace wildlife, and smoke, noise, and fire personnel would disrupt hunting in the vicinity of the burn. The public would be restricted from traveling through the unit on burn day until mop-up is complete and the controlled burn is declared extinguished.

Alternatives 2 and 3 propose decommissioning of FR 4194. The eastern portion of this forest road is also the beginning of the Carr Mountain Trail. Decommissioning the road in the section where the trail occurs would not involve actual disturbance to the road or trail and would have no impact on hikers. Part of the decommissioning process may include placing rock barriers at the beginning of the trail to discourage unauthorized motorized vehicle use along the trail. This would help to protect the trail surface from erosion and would improve the hiking experience.

Alternative 3

Of the two action alternatives, Alternative 3 would have the least direct and indirect affect on recreation. There are no harvest units within the South Carr Mountain IRA under this alternative, which reduces the scale of the project and therefore all potential effects to recreation. Harvest would still occur along or near roads identified in Alternative 2, and the level of potential interaction between recreationists and harvest equipment would not change substantially.

All Recreation Uses

The effects on most recreation uses in Alternative 3 would be similar to the effects described under Alternative 2, but of shorter duration due to fewer stands being harvested.

Alternative 3 proposes fewer acres of early-successional habitat creation than Alternative 2. This alternative provides less browse and habitat for game species utilizing early-successional habitat, and therefore would provide fewer improvements to hunting opportunities for these species than would Alternative 2.

Prescribed burning is proposed in three units under Alternative 3. Fewer burn units would result in fewer direct and indirect impacts to recreationists in the vicinity of these areas on burn days.

Road decommissioning effects are the same as in Alternative 2.

Summary of Direct and Indirect Effects

Table 23 summarizes the direct and indirect effects of all alternatives on recreation in the project area.

Table 23. Summary of Direct & Indirect Effects on Recreation.

Alternative	Summary of Direct and Indirect Effects
1	• Would not alter current recreation opportunities
2	• Increased noise and traffic associated with harvesting and prescribed burns may impact recreation experience • Short-term changes to forest landscape along FR 429 may be visible to recreationists • Highest amount of improved opening habitat and browse for some game species; most improved hunting opportunities • Decommissioning of FR 4194 will slightly enhance Carr Mountain Trail hiking experience
Direct and indirect effects for Alternative 3 are the same as for Alternative 2 except for the following:	
3	• No activities in northern portion of project area; less noise and traffic to impact recreation • Less regeneration harvest than Alternative 2, greatly reducing the number of new openings and amount of browse for certain game species and associated hunting opportunities

Cumulative Effects

The analysis area for cumulative effects on recreation is the portion of the Middle Baker River sub-watershed north of Buffalo Road. Beginning at the summit of Carr Mountain, this watershed boundary follows the ridgeline southwest toward

the village of Wentworth and southeast toward the village of Rumney. The analysis area encompasses approximately 5,500 acres, including the entire project area and access to most recreational opportunities (primarily off Buffalo Road) in the general area of the project. This area was chosen because it incorporates the area in which the project might be visible or audible to recreationists. The timeframe begins ten years in the past and extends ten years in the future (1997-2017). This temporal scope was chosen because the benefits of regeneration age class for the hunting of many game species diminish after approximately ten years (DeGraaf and Yamasaki 2001) and it is the longest timeframe in which this project would affect primary recreation in the area. This timeframe also acknowledges past actions and anticipates reasonably foreseeable future actions that may cumulatively impact the recreation experience in the analysis area over a reasonable period of time.

Recreation resources within the cumulative effects analysis area include, in addition to those in the project area, the summit of Carr Mountain (accessible by hiking trail), the Rattlesnake Mountain Trail, and a portion of the Rumney Rocks Climbing Area.

Alternative 1

Since Alternative 1 would not alter recreation opportunities or experiences, there would be no cumulative effects.

Alternatives 2-3

None of the action alternatives considered in this document would negatively affect the long-term recreation opportunities described in the Forest Plan for the analysis area. Timber harvest occurred in the analysis area in the past, and people continue to use the area for recreation. In fact, roads constructed for timber removal are now used for recreation purposes. Creation of early-successional habitat in the analysis area would likely improve hunting opportunities for the next decade, but beyond this timeframe, this effect would no longer be discernible.

Cumulative effects on Forest System roads, the summit of Carr Mountain, the Rattlesnake Mountain hiking trail, and other recreation opportunities are not anticipated. Other activities included in the cumulative effects analysis are listed in Chapter 2. These past, current or foreseeable future activities have not impacted, nor are they expected to impact, recreational use in the area. Therefore no additional cumulative effects from any action alternative are expected.

3.13 Cultural Heritage Resources

Executive Summary

The Steven's Brook project area contains examples of a variety of past land use activities. Old homesteads, logging camps, a mica mine, and a sawmill, as well as maple sugaring operations, orchards, and former pastures, were recorded or revisited during the cultural heritage survey. The amount of cultural heritage sites in the project area is fairly typical for the WMNF and reflects the long land use history of New Hampshire. The no action alternative will neither alter nor enhance cultural resources in the project area. Alternatives 2 and 3 will both have temporary, short-term impacts on cultural resources, due primarily to the increased visibility of sites to visitors and possible disturbances created by harvesting activities and prescribed fire. None of the alternatives are expected to have any cumulative effects on cultural resources.

Affected Environment

A Cultural Resource Reconnaissance Report (CRRR#07-4-1) was completed for the project area. Four new cultural resource sites and four previously identified cultural resource sites were located and will be avoided during project activities. A clause is included in the timber sale contract stating that if any previously unknown cultural resources are discovered during project activities, work will cease in that area and the Forest archaeologist or District cultural heritage paraprofessional will make an assessment of the finds and offer suggestions for line officer consideration to protect or mitigate for the loss of any cultural values present.

On March 19, 2007, the NH State Historic Preservation Officer (SHPO) concurred in writing with the No Effect finding through site avoidance.

There are no known cultural heritage resource sites in the project area or within one mile of the project area boundary that are eligible for, or being considered for, the National Register of Historic Places. No pre-historic cultural resource sites were identified.

Direct and Indirect Effects

The **analysis area for direct and indirect effects** on cultural resources is the project area. This analysis area was chosen because it encompasses all locations where project implementation may affect cultural resources. Effects of project implementation may include vandalism or looting of cultural resources and ground disturbance of cultural resources. Effects may also include discovery and protection of previously unknown cultural resources. Because there are no known sites within one mile of the project area boundary that are eligible for or being considered for the National Register of Historic Places, effects of logging truck traffic outside the project area were not analyzed.

A design feature implementing the 2005 Forest Plan Standards and Guidelines requires that known sites be flagged and avoided and that operations cease when

new sites are discovered until an archaeologist or paraprofessional can evaluate the findings and determine how to proceed (see Chapter 2, Design Features).

The temporal scope for direct and indirect effects on cultural resources is fifteen years. This temporal scope was chosen to account for the time period from project implementation (3-5 years) to the time period when increased recreation use (hunting, hiking) diminishes (10 years).

Alternative 1

This alternative would neither alter nor enhance cultural resources in the project area.

Alternatives 2-3

All known sites within the project area have been identified and will be avoided during harvest operations. Skidding across stone walls would be permitted at designated crossings only. Possible direct and indirect effects to undiscovered sites could include destruction of artifacts and degradation of human-made alterations such as logging camp berms. Design features for the action alternatives would lessen or eliminate any impacts to undiscovered sites caused by timber harvesting, road restoration, log landing restoration, or prescribed burning. The timber sale contract also provides protection to cultural resources through cancellation or modification of the contract if cultural resources are identified during harvest operations.

Implementation of the action alternatives will change forested environment and may temporarily increase recreation use around known and unknown cultural resources. Additional impacts to these sites are expected to be low but may occur.

Cumulative Effects

The **analysis area for cumulative effects** on cultural resources is the MA 2.1 land within the Stevens Brook watershed. This analysis area was used because MA 2.1 lands are the National Forest lands within the HMU where vegetation management is allowed and where the majority of impacts to cultural resources will occur during the temporal scope of the analysis. The **temporal scope for cumulative effects** on cultural resources is twenty years past and twenty years into the future from when proposed actions will occur (1988-2028). This timeframe was chosen to account for the last earth disturbing activity that took place in the project area (Stevens Brook Timber Sale, 1988) and to anticipate future earth disturbing actions.

Alternative 1

Alternative 1 would have no known cumulative effects on cultural resource sites.

Alternatives 2-3

Neither of the action alternatives considered in this document would negatively affect heritage resources in the long term. White Mountain National Forest land management activities have occurred in the analysis area since the 1950s. The majority of the sites described in CRRR#07-4-1 have been present since the mid 1800s. The cumulative effects of action alternatives allow known and unknown heritage resources to be identified, evaluated, preserved, protected, stabilized, interpreted, and, when necessary, mitigated for loss.

Chapter 4 — Preparation and Consultation

Interdisciplinary Team and Forest Service Contacts

The following individuals participated in development of the proposed action, connected actions, and other proposed activities and all alternatives, and the subsequent analysis necessary to prepare the environmental assessment.

Interdisciplinary Team:

Molly Fuller	District Ranger
John Serfass	District Ranger (retired)
Janice Mulherin	Forester, IDT Leader
Dave Batchelder	Biologist, IDT Leader
Clara Weloth	District Fisheries/Wildlife Biologist
Steve Wingate	District Silviculturist (retired)
Robert A. Colter	Forest Soil Scientist
Livia Crowley	Forest Hydrologist
Tracy Weddle	Forest Hydro Tech
Ken Allen	Landscape Architect
Stacy Lemieux	NEPA Coordinator
Richard Dow	Writer/Editor

Forest Service Personnel consulted for professional and technical assistance

Chris Mattrick	Forest Botanist
Karl Roenke	Forest Archeologist
John Williams	District Timber Sale Administrator (retired)
Jason Walker	District Forest Technician
John Neely	District Heritage Paraprofessional/Fire
Jim Hill	District Heritage Paraprofessional
Steve Jones	GIS Support
Jay Sylvester	Forest Engineering Technician

Other Agencies and Individuals Contacted for Professional and Technical Assistance

Karen Bordeau	2006. New Hampshire Fish and Game Biologist. NHFG Region 2, Hampton, NH.
	New Hampshire State Historic Preservation Office
Costello, Christine.	2007. FS Research Biologist. Forest Service, Bartlett Experimental Forest, Bartlett, NH.
Fife, Kathie	2004. Field Botanist. WMNF, Laconia, NH
Hagan, Frank	2003. Forester. Ammonoosuc Ranger District, Bethlehem, NH
Mattrick, Chris	2008. Forest Botanist.WMNF, Laconia, NH.
Martin, Chris	2007. Senior Biologist. Audubon Society, Concord, NH.
Prout, Leighlan	2008. Forest Wildlife Biologist. WMNF, Laconia, NH.
Prout, Mark.	2008. Forest Fish Biologist. WMNF, Laconia, NH
Rowse, Lesley	2008. District Biologist. Androscoggin RD, Gorham, NH.
Starke, Kathleen	2008. District Biologist. Saco Ranger District, Conway, NH.
Williams, John	2006. Forestry Tech/Hobbyist Botanist (retired). Pemigewasset Ranger District, Plymouth, NH.
Wingate, Steven	2006. Forester/Silviculturalist (retired). Pemigewasset Ranger District, Holderness, NH.
Yamasaki, Mariko	2007. FS Research Biologist. USDA-FS, Durham, NH.

Appendix A — Response to Scoping Comments

The process of "scoping" is intended to seek information that will help us refine the proposed action, identify significant issues, develop alternatives that meet the stated Purpose and Need, and otherwise address potential site-specific resource effects. Scoping is usually done early in the environmental analysis.

Each comment received during the scoping period was reviewed to identify issues and concerns related to this project. Those comments are listed in bold type in this section, with a response in regular type indicating how the comment was addressed by the interdisciplinary team and, if appropriate, where supporting information can be located in the EA.

Many comments were received suggesting that certain information be included in the effects analysis or that the analysis be conducted in a certain way. Some respondents included questions, observations, suggestions, and requests for information that were not relevant to this project-level analysis. This later group of comments did not meet the scoping request for "site specific comments about the Stevens Brook Vegetation Project, along with supporting information you believe will help me identify issues, develop alternatives, or predict environmental effects of our proposal." Many appeared to be rhetorical or were requests for information at a Forest-wide scale. The comments, questions, and suggestions that did not apply to this project are not responded to in this document. Respondents who have Forest-level questions or concerns should contact the Forest separately on those topics.

We believe this project would substantially alter the undeveloped character by reducing the size of the area that qualifies as roadless through the acres of harvest. An EIS is clearly required. We believe that this proposal will have a significant effect on the quality of the human environment and that an EIS should be produced, because there will be a significant effect on an inventoried roadless area (IRA).

FSH 1909.15, Chapter 20.6 states that an EIS is required if a proposed action "would substantially alter the undeveloped character of a roadless area of 5000 acres or more". The Environmental Assessment examines the pro¬posed action and alternatives in light of possible effects on the 8 criteria from FSH 1909.12, Ch. 7.11 used for determining eligibility for roadless consideration. The environmental analysis discloses that the Batchelder Brook project would not reduce the area's eligibility for roadless consider¬ation or wilderness designation in the future (EA Section 3.2). As detailed in Table 20 of the EA, the cumulative effects on the South Carr Mountain roadless and wilderness characteristics would not compromise the ability of the area to continue to meet Forest Service roadless criteria. The Stevens Brook Project is not expected to have any lasting or sub¬stantial direct, indirect, or cumulative effects on the South Carr Mountain IRA or its potential to be recommended for wilderness during the next Forest Plan Revision process.

IRAs provide "provide *unique opportunities* for dispersed recreation, sources of clean drinking water, and large undisturbed landscapes that offer privacy and seclusion. In addition, these areas provide a bulwark against the spread of nonnative invasive

plant species, support a diversity of habitats for native plant and animal species, conserve biological diversity, and provide opportunities for study, research, and education." Roadless Conservation Rule FEIS, p. S-1. (emphasis added).

66 Fed. Reg. 3244, 3272 (January 12, 2001). Most of these unique characteristics are present in the portion of the South Carr Mountain IRA where the Stevens Brook Project is proposed. The Stevens Brook Project will affect high quality soils by skidding logs, compacting soils and removing biomass that would eventually enrich the soil. Soil movement from skidding in turn will adversely affect high quality waters. Diversity of plant and animal communities will be adversely affected because logging inherently simplifies forest structure and the clearcutting proposed will cause forest fragmentation. This simplification and fragmentation has the potential to adversely affect habitats for rare species such as the Indiana Bat and many other sensitive species that benefit from undisturbed areas of land. Portions of the project are in a semi-primitive class of recreation opportunity and recreationists will be adversely affected by the Stevens Brook Project activities. Most of the stands that are proposed for logging have not been entered for many decades and represent the reference landscapes that are unique and rare in IRAs of the White Mountains and the eastern United States.

The values or features paraphrased from the Roadless Area Conservation Rule are descriptions that "often characterize inventoried roadless areas" (Federal Register / Vol. 66, No.9 / Friday, January 12, 2001 / Rules and Regulations / p. 3245) rather than components of a required evaluative process. The Environmental Assessment examines the pro¬posed action and alternatives in light of possible effects on the 8 criteria from FSH 1909.12, Ch. 7.11 used for determining eligibility for roadless consideration. These criteria provide a clear foundation for the evaluation of effects, and in several cases are not substantially different from the values or features described above. Resources not directly evaluated in Chapter 3.5 of the EA (e.g. soil disturbance, fragmentation) were analyzed in the related resource sections of Chapter 3. The environmental analysis discloses that the Stevens Brook project would not reduce the area's eligibility for roadless consider¬ation or wilderness designation in the future (EA Section 3.2).

The proposed logging will impact unique characteristics that are provided by the South Carr Mountain IRA. This action is highly controversial. For these reasons, the Stevens Brook Project constitutes a major federal action requiring the preparation of an EIS. 40 CFR § 1508.27.

The National Environmental Policy Act of 1969, or NEPA, is promulgated through regulations found in 40 CFR 1500-1508. Projects likely to have "significant" effects on the quality of the human environment require an EIS (40 CFR 1502.3). Among the factors to be evaluated in determining signifi¬cance are "the degree to which effects are likely to be highly controversial" (1508.27[b]4) and "the degree to which the action may establish a precedent for future actions with significant effects" (1508.27[b]6) "Controversy" in NEPA refers to scientific controversy over effects, and the effects of the proposed action on forest resources and the roadless area inventory criteria are well-established and not controversial (see Environmen-

tal Assessment 3). Likewise, "precedent-setting" in NEPA refers to decision that may apply to future decisions or lead to additional actions.

Unless the Forest Service wisely chooses to do an EIS, we urge you to provide a draft EA for the official 30-day comment period under 36 CFR § 215.6.

A substantially complete EA will be made available during the official 30-day comment period.

The proposed entry into an IRA is among the first such proposals in the country. It is a significant issue in this project proposal. We believe at least one alternative (besides the no action alternative) must be proposed that does not include any logging (or road building) in the South Carr Mountain IRA.

Alternative 3 was developed in response to this concern. It proposes no timber harvest in the South Carr Mountain IRA.

The proposed action did not address natural disturbance. The description fails to discuss natural disturbance events that have affected the landscape. Please describe the disturbance events that have affected the forest and the role they have played and likely will continue to play in diversifying forest age-class percentages, distribution across habitat types and forest health conditions.

Neither stand inventory nor additional field visits identified areas of natural disturbance large enough to be mapped and classified (details available in project record). In the past, the Forest has experienced wind storms, ice damage and insect outbreaks. It is rare that these events are large enough to affect age-class percentages. See additional information under the next response to comment.

We understand the Forest Service's desired future condition for the project, outlined in the forest plan is meant to create a mix of successional habitats; however, the White Mountain National Forest (WMNF) should serve as a refuge for late-successional species because early-successional habitat is abundant in areas outside the national forests. We generally do not support the artificial creation of early successional habitat, because natural disturbances frequently occur. These include wind throw and ice storms.

The Environmental Assessment discloses that early successional habitat is not abundant in areas outside the White Mountain National Forest (Forest Statistics for NH: 1983-1997). In fact, there is a declining trend in early successional habitat region-wide in New England. Also, there is no guarantee that any early successional habitat located outside the WMNF would remain forested due to the increasing development surrounding the WMNF. The natural disturbance regime on the WMNF is often localized and infrequent and often creates only a small portion of early successional habitat. Land unsuitable for harvest in the MA 2.1 portion of the Upper Rattlesnake HMU (approximately 890 acres) would be left for development of older stands. Furthermore, MAs 6.1, within the HMU and entire Wilderness Areas located outside of the HMU provide a large, contiguous area of uneven-age, contiguous forested habitat. At the landscape level, this habitat is left to the natural process of forest succession for development of old-growth charac-

teristics available to wildlife species that use cavities, snags, downed large woody material, fungi, moss, lichens, insects, and closed canopy with sparse under-story conditions. There are no stands specifically identified as old growth forest within the project area.

The WMNF Forest Plan goal for wildlife habitat management is to provide habitat diversity across the Forest, including forest types, age classes, and non-forested habitats. Objectives include maintaining high quality mature forest and old forest habitats on a majority of the Forest, and provide regeneration age forest and open habitats to sustain biological diversity and support species that prefer those habitats (LRMP 2005, I-20). Habitat Management Units were established forest-wide (watershed based) to apply the forest-wide habitat composition and age class objectives on the ground. The Proposed Action (and action alternatives at various degrees) would move the project area towards the Upper Rattlesnake HMU DFC.

In New England, catastrophic disturbances from wind-throw and fire occur at intervals of about 1,150 and 800 years, respectively (Lorimer 1977 cited in DeGraaf and Yamasaki 2001). Some localized, mid- to large-size natural disturbances (some severe) do occur in the Northeast (including the WMNF), but they are infrequent, sporadic, and unpredictable. Past field reviews and over-flights of the WMNF documented that the 1998 ice storm event affected mostly the hardwood forest type in other parts of the Forest (such as the Kilkenny Range) located outside of the Stevens Brook Project Area. The 1998 ice storm did not create early successional habitat within the project area (multi-FS field reviews) or the HMU. Although wind has a dramatic effect on overstories, it has little impact upon successional trends and overall species composition. The majority of wildlife on the WMNF (approximately 150 species) use northern hardwood regeneration habitat for all or part of their life cycle (DeGraaf et al. 1992, DeGraaf and Yamasaki 2001).

Stand Regeneration: the scoping letter mentions the use of prescribed burning to promote white pine and red oak regeneration. Would other types of regeneration activities could be used besides prescribed burning? What other activities might be used to aid natural regeneration or directly result in regeneration (planting).

We considered summer harvesting these areas in order to provide the scarification needed. However, the soils did not support summer harvest.

The scoping letter is lacking in failing to show the boundaries of the Upper Rattlesnake HMU in relation to the project area boundary. This information is especially important when HMU conditions play such a prominent role in determining the project proposal and assessing the cumulative effects of the project. Please correct this oversight in the 30-Day Comment Report.

Please see Map 2.

Overall, we believe a thorough assessment of cumulative effects must be completed. This includes examining the connected actions taking place in and around the forest as well as an assessment of the reasonably foreseeable future actions

likely. …The use of a single (or even a couple of) HMUs does not constitute a sufficient area for analysis of cumulative effects.

Please see Chapter 3 and the cumulative effects analysis for each resource for analysis regarding private land within and adjacent to the Stevens Brook Project Area

Stands 4/16 and 17/16 (the most westerly stand) are typed as northern hardwood in the Stevens Brook area. These stands have healthy bear clawed beech trees that were included in the preliminary lay out. The recommendation for stand 4/16 is to locate 1 to 2 acre groups where there are concentrations of aspen, paper birch, avoiding the healthy bear clawed beech trees. It is my understanding that adjustments would be considered to retain this important food source. These marked trees are usually the best producers of mast and should be retained for future food source. Stand 17/16 (the most westerly stand) also had many healthy bear clawed beech trees. The single tree selection prescription for this stand should retain as many healthy beech trees as possible.

Bear clawed beech trees will be retained whenever possible.

Stand 3/16 (oak/pine) is also an important mast source for a number of wildlife species. The desired condition vs. the existing condition should define the best strategy for this stand. An alternative to the shelterwood cut would be to allow a light cut, beat up the beech in the understory and retain a mix of species, leaving scattered pines for raptor perches. If the shelterwood cut in implemented it is very important to follow up with the prescribed fire to release oak seedlings and establish new oak forest.

We agree that prescribed fire is needed to ensure the desired outcome, which is why it is part of the proposed action for this stand (See Chapter 2).

I have a question about the 4 acres of paper birch that is to be clearcut. Is this to eliminate birch from the area? Or are they all mature trees? Will these areas come back into birch or what is the plan?

The proposal to clearcut birch is to encourage regeneration of the paper birch. Paper birch is a species that requires sunlight to grow; clearcutting is the most effective method of regeneration. The plan is for the area to come back to birch.

I am in support of the project as planned.

Comments noted, thank you for your support.

The only thing that concerns me is the 56 acres of prescribe burn. I do not think burning necessary wise.

We understand the concern of fire to our neighbors. If either Alternative 2 or 3 is selected, a burn plan will be prepared describing the conditions under which a burn may take place. Town officials will be notified as part of the burning operation.

I support the Stevens Brook Project.

Thank you.

Appendix B — Glossary and Acronyms

Abiotic factors – Those non-living physical and chemical factors which affect the ability of organisms to survive and reproduce

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.

Biotic factors – All the living things or their materials that directly or indirectly affect an organism in its environment.

**. (http://www.regentsprep.org/Regents/biology/units/ecology/biotic.cfm)

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

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

Crop Tree – Any tree selected to become a component of a future commercial harvest.

Ecological Land Type (ELT) – An area of land 100s to low 1,000s of acres in size with a well known succession of forest species on unique soil materials. Ecological Land Type classification is based on geomorphic history, nature of soil substrata, and potential natural vegetation.

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

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

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

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

Shelterwood – A harvest method that provides a source of seed and shade protection for regeneration. The original stand is removed down to a prescribed basal area, in two or more successive harvests. The first harvest is ordinarily the seed cutting (some-

times called the regeneration cut). A second harvest often follows a number of years later once regeneration is well established, and is referred to as a final harvest or shelterwood removal harvest. An even-aged stand results.

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

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

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

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

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

Forest Road – Road needed for long-term management needs or public access which may be opened year-round or intermittently as needed.

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 in a given climatic mineralogical zone and supporting a distinct successional sequence of vegetation growing on a unique type of soil material.

Inholding – A parcel of private land surrounded by national forest.

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

Land Capability – Inclination of an area to grow a particular broad community due to soil, climate and geology, if management were not applied. In many places on the Forest, the current community is different from land capability for the same area because past management altered the vegetation on the site. Given enough time without additional management, the vegetation will revert to the community indicated by land capability.

Mature Forest Habitat – Stands in which the overstory is in the mature age class. Mature forest habitat is typically made up of trees that are eight inches or more in diameter. Mortality is just beginning in these stands, resulting in a few scattered canopy gaps and a small number of snags and cavities in the overstory. Most snags and down logs are small in diameter and within the intermediate or understory layers. Depending on site conditions, thinning and uneven-aged harvest methods can be used in this habitat without negatively impacting habitat quality. Some uneven-aged harvest may enhance vegetative and structural diversity.

Management 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.

Permanent Wildlife Opening – Terrestrial opening dominated by native grasses, forbs (e.g., goldenrod, ferns, meadowsweet), and/or shrubs (e.g., blackberries, raspberries, blueberries, alder) that is maintained in an non-forested condition naturally or through stumping, mowing, prescribed burning, brushing, or other means to benefit wildlife. It must remain in shrubby or herbaceous vegetation and have minimal (<15%) overstory canopy conditions. Only areas that are maintained primarily for wildlife benefits are considered wildlife openings; other herbaceous openings exist on the Forest and may provide wildlife habitat, but they are not considered wildlife openings for the purposes of the Forest Plan.

Pole timber – A tree of a size (5"-9" in diameter) between a sapling and a mature tree.

Prescription – a planned series of treatments designed to change current stand structure to one that meets management goals.

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

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

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

Road construction – Building new road.

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

Sapling – A young tree larger than a seedling and smaller than a pole.

Sawtimber – Trees suitable for in size and quality for producing logs that can be processed into dimension lumber.

Scenery Management System – Refers to the acceptable degree of alteration of the characteristic landscape:

- Very High (Unaltered) – the valued landscape character "is intact" with only minute if any deviations.
- High (Appears Unaltered) – the valued landscape character "appears intact". Deviations may be present, but must repeat the form, line, color, texture and

pattern common to the landscape character so completely and at such scale that they are not evident.

- Moderate (Slightly Altered) – the valued landscape character "appears slightly altered". Noticeable deviations must remain visually subordinate to the landscape character being viewed.
- Low (Moderately Altered) – the valued landscape character "appears moderately altered". Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetation type changes from outside the landscape being viewed.
- Very Low (Heavily Altered) – the valued landscape character "appears heavily altered". Deviations may strongly dominate the valued landscape character. Deviations must be shaped and blended with the natural terrain so that elements such as unnatural edges, roads, landing and structures do not dominate the composition.

Seep – Woodland seeps are small areas, usually less than a ¼ acre, on headwall slopes where groundwater flows to the surface and saturates the soil for some or all of the growing season. Drainage from these areas may create small streams or may return underground. (Flatebo, et al. 1999)

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

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

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

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

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

Unauthorized Road – A road that exists on the ground but is not currently Forest Roads. Previously referred to as an unclassified road.

Uneven-aged management – The application of a combination of actions needed to maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Harvesting is usually regu-

lated by specifying the number or proportion of trees of particular sizes to retain in each area, thereby maintaining a planned distribution of size classes. Harvest methods that develop and maintain uneven-aged stands are individual selection, improvement, and group selection, and salvage.

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

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

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

Vernal Pool – Naturally occurring, depressional wetlands that temporarily hold water in the spring and early summer, drying up typically in mid to early summer. They are isolated without an inlet or outlet. They are fishless and allow for successful breeding of certain amphibians and invertebrates.

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

Young Forest Habitat – Results from growth of regenerating forest habitat. It also is created when the overstory is removed from a shelterwood harvest more than 10 years after the original harvest. Canopy trees are typically shorter than at maturity and small in diameter, usually less than eight inches.

Acronyms

AQRV	Air Quality Related Value
BE	Biological Evaluation
BMP	Best Management Practice
CEA	Cumulative Effects Area
DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement
DES	Division of Environmental Services (New Hampshire)
DFC	Desired Future Condition
EIS	Environmental Impact Statement
EJ	Environmental Justice
ELT	Ecological Land Type
EPA	Environmental Protection Agency
ESA	Endangered Species Act

FEIS	Final Environmental Impact Statement
FR	Forest Road
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
FY	Fiscal Year
GIS	Geographic Information System
HMU	Habitat Management Unit
IDT	Interdisciplinary Team
LAU	Lynx Analysis Unit
LCAS	Lynx Conservation and Strategy
LRMP	Land and Resource Management Plan ("Forest Plan")
MA	Management Area
MBF	Thousand Board Feet
ME	Maine
MIS	Management Indicator Species
MBF	Thousand Board Feet
MMBF	Million Board Feet
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NH	New Hampshire
NNIS	Non-Native Invasive Species
ORV	Outstandingly Remarkable Value
PWO	Permanent Wildlife Opening
RARE	Roadless Area Review and Evaluation
RFSS	Regional Forester Sensitive Species
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
S&G	Standards and Guidelines
SHPO	State Historic Preservation Office
SMS	Scenery Management System
SPNHF	Society for the Protection of New Hampshire Forests
TEPS	Threatened, Endangered, Proposed, and Sensitive
TES	Threatened, Endangered, and Sensitive
USDA	United States Department of Agriculture

USFS	United States Forest Service
USFWS	USDI Fish and Wildlife Service
VQO	Visual Quality Objective
WMNF	White Mountain National Forest
WSR	Wild and Scenic River

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