White Mountain National Forest

United States
Department of
Agriculture

Forest
Service

Eastern
Region

Stevens Brook Project

Final
Environmental Assessment

Towns of Wentworth & Rumney
Grafton County, NH
Prepared by the
Pemigewasset Ranger District
April 2009

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

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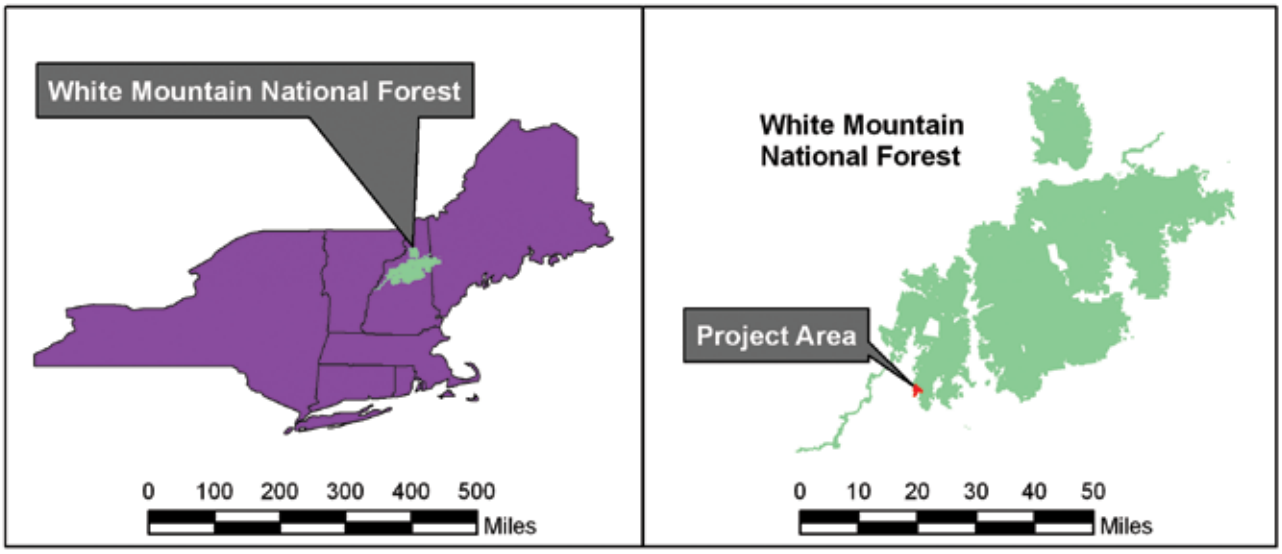
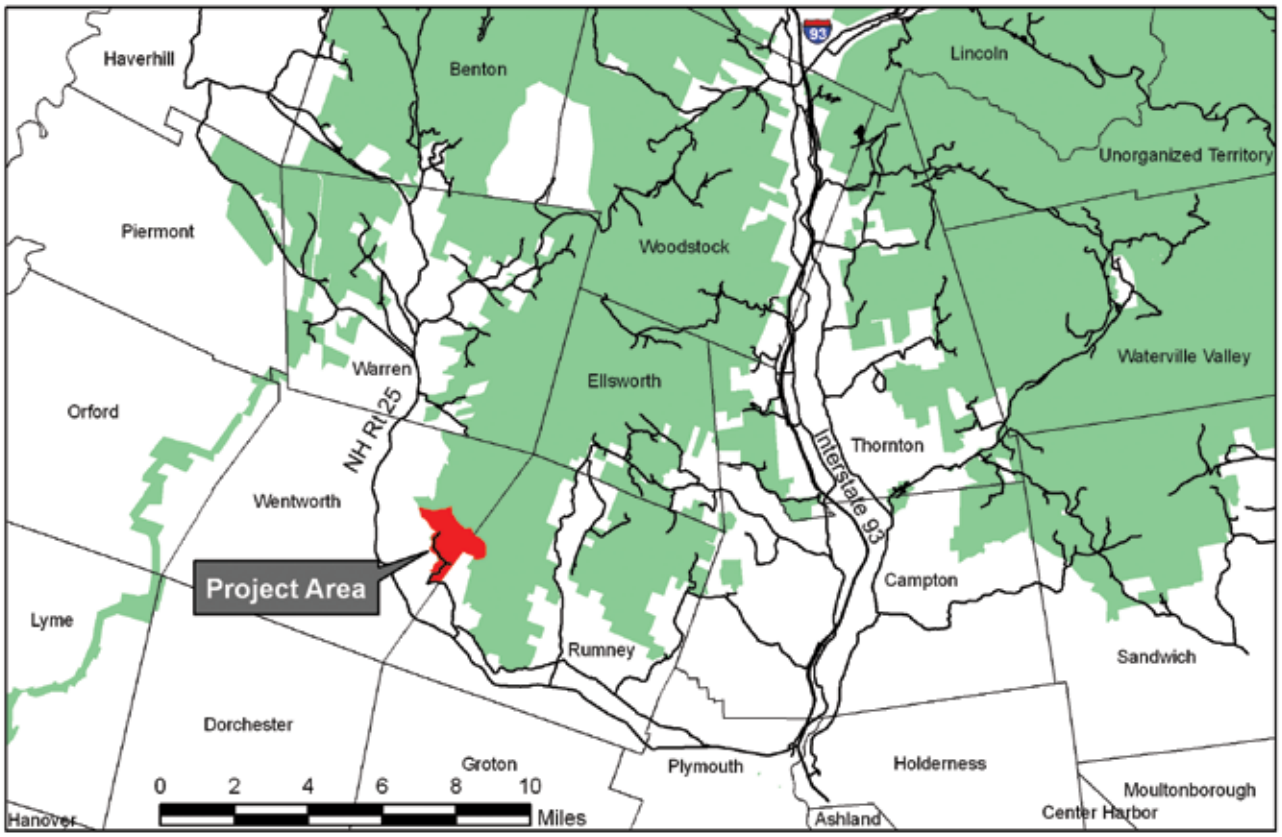




Chapter 1 — Purpose and Need for Change

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 forest products through the harvest of 3.3 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 (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 the north by Ames Mountain, the project area abuts private land on three sides (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.

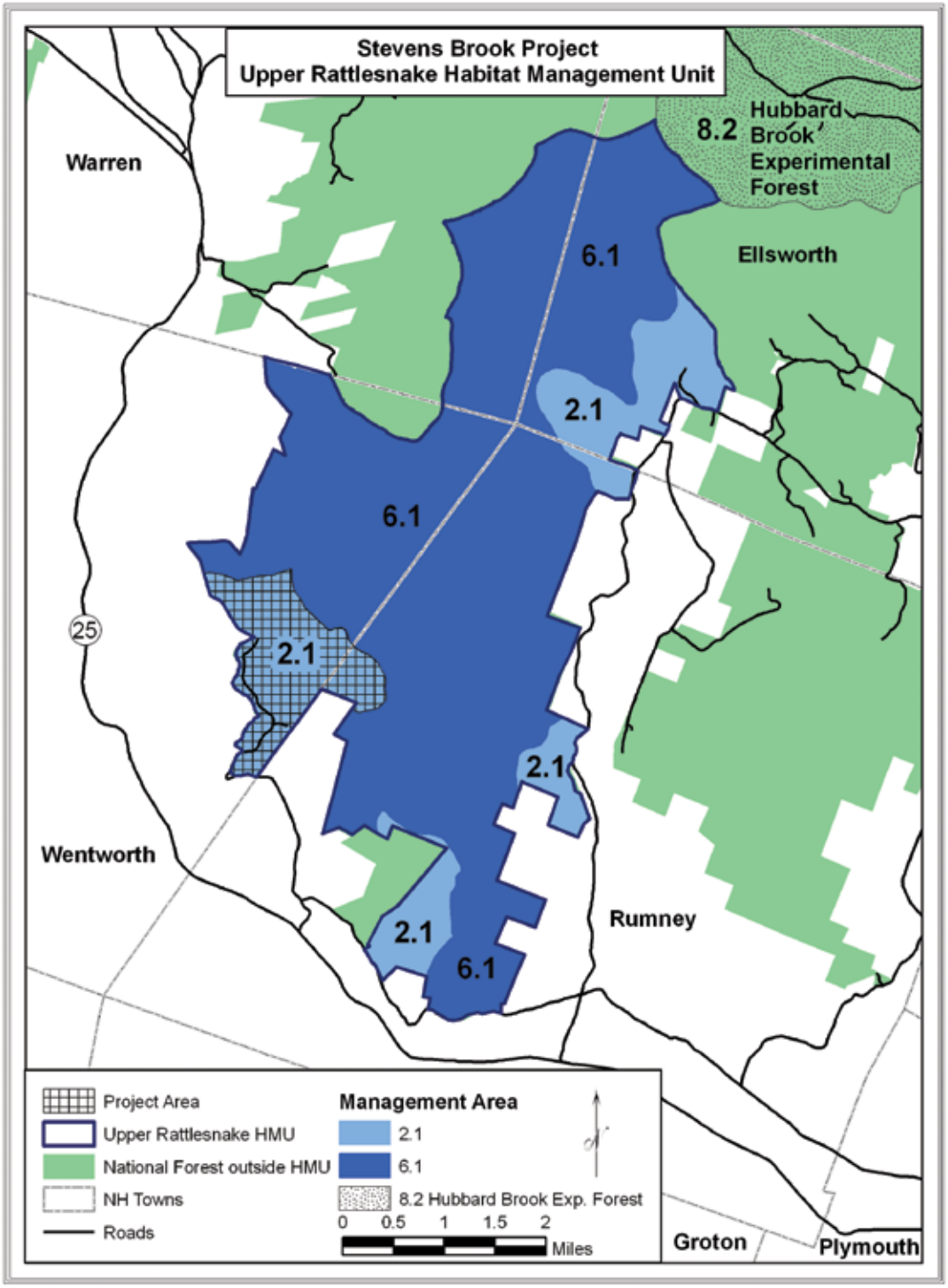
Non-Forested Habitats

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 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 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 saw-timber 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 these roads are now covered with trees and other vegetation and no culverts or other structures need to be removed (see Figure 2).

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

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

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 2).
- How the alternatives were developed.

2.2 Alternatives

Alternative 1: No Action

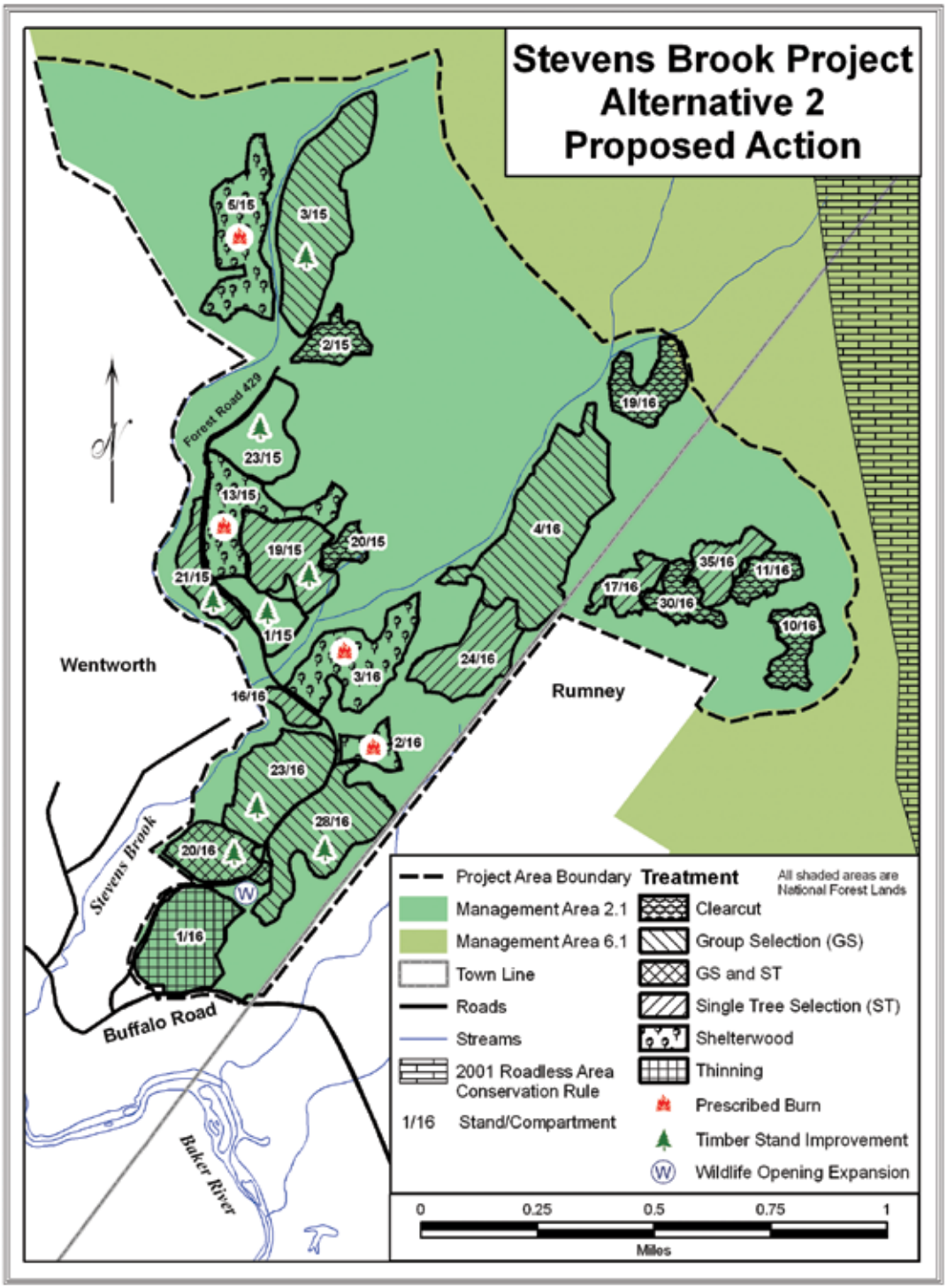
Under this alternative, there would be no change to the existing condition except from natural occurrences: no harvest of trees, no increase in wildlife habitat diversity nor expansion of an orchard opening or use of log landings as temporary wildlife openings after harvesting. While this alternative 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 (Timber Stand Improvement — TSI) 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 3.3 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 mile 1.8. 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

Stand-Compartment	Forest Type	Acres[1]	Age Class / Age in Years[2]	Season of Operation	Treatment Method	Treatment Objectives
30-16	Paper Birch	8	Mature / 103	W	CC	Regenerate aspen, birch and other hardwoods
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 (ie, 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.**

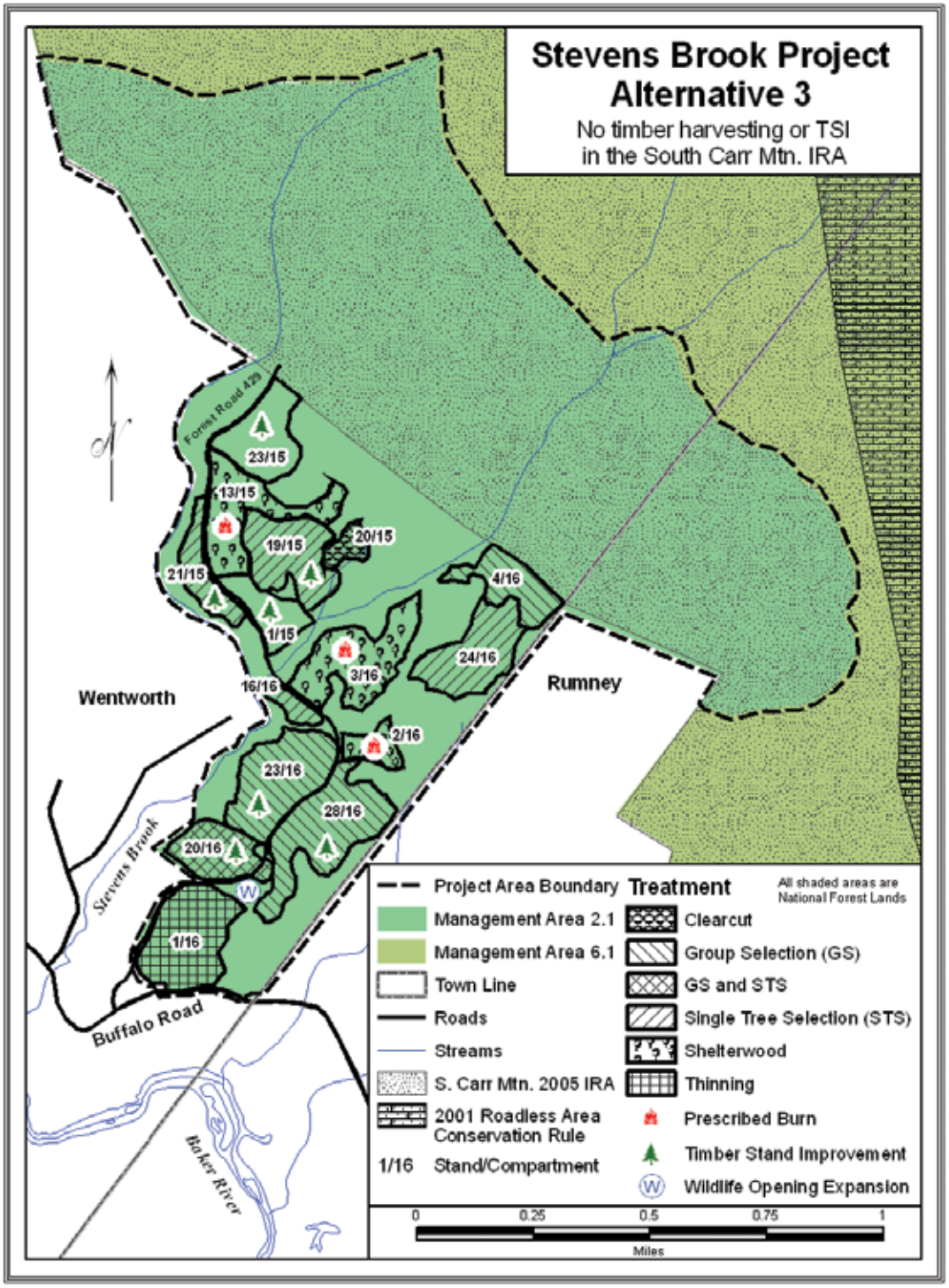
IRAs were delineated during Forest Plan revision for the purpose of evaluating areas having potential for Congressional designation as Wilderness. The evaluation did not recommend this IRA for Wilderness. The Forest Plan subsequently allocated the land to various management areas, including MA 2.1 which allows timber harvest and road work. See Appendix C of the Final Environmental Impact Statement (Forest Plan EIS 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. This alternative proposes harvest on 229 acres to remove an estimated 2.0 million board feet.
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 Alternatives Considered but not Analyzed in Detail

Similar in Scope but Outside the South Carr IRA

A commenter suggested that an alternative be developed that would be more comparable (than Alternative 3) with Alternative 2 in terms of board feet, unit costs, and net value, while still avoiding logging in the South Carr IRA. It was noted that there are 13,225 acres in the Upper Rattlesnake HMU, and as such, there should be ample available acres on which to harvest timber.

In reality, of these 13,225 acres, about 2,700 are in the Management Area 2.1, and of that, only approximately 410 acres outside of the IRA in Stevens Brook Project Area.

An alternative that harvests similar volume as Alternative 2 but outside the IRA in the Upper Rattlesnake HMU is not sustainable forestry. All of the forest stands on MA 2.1 lands in the Stevens Brook Project Area were examined in the early phases of the project development. Most stands with appropriate age class and stocking for harvest were identified and considered as part of the project proposal in 2006. Those stands that have appropriate conditions for harvest but were not proposed for harvest may have access or topography concerns and are deferred at this time. In general, stands may also be deferred because they are adjacent to recent harvests, or may have visual or other resource concerns, or ground-checking identifies them as unsuitable for timber management. As the commenter notes, there are many acres in the HMU outside of the South Carr IRA, but very few support stands of the age and stocking appropriate for harvesting with no other resource concerns that cause them to be deferred at this time.

2.4 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 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	2,000	1,300	3,300	2,000
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	3/5	0/0	3/5	3/5
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

2.5 Design Features

Three types of protective measures are integrated into the Stevens Brook Project design to give specific technical direction for managing resources: Chapters 2 and 3 in the Forest Plan Standards and Guidelines; 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 Compartment 15, Stands 1-3, 5, 13, 19-21 and 23 and Compartment 16, Stands 1-4, 10, 11, 16, 17, 19, 20, 23, 24, 28, 30 and 35, 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, 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 (NCASI 2000 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 season of operation is identified for each stand in Table 1. 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). Excep-

tions 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 (DRED & SPNH, 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.

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 adjacent to the project area 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.

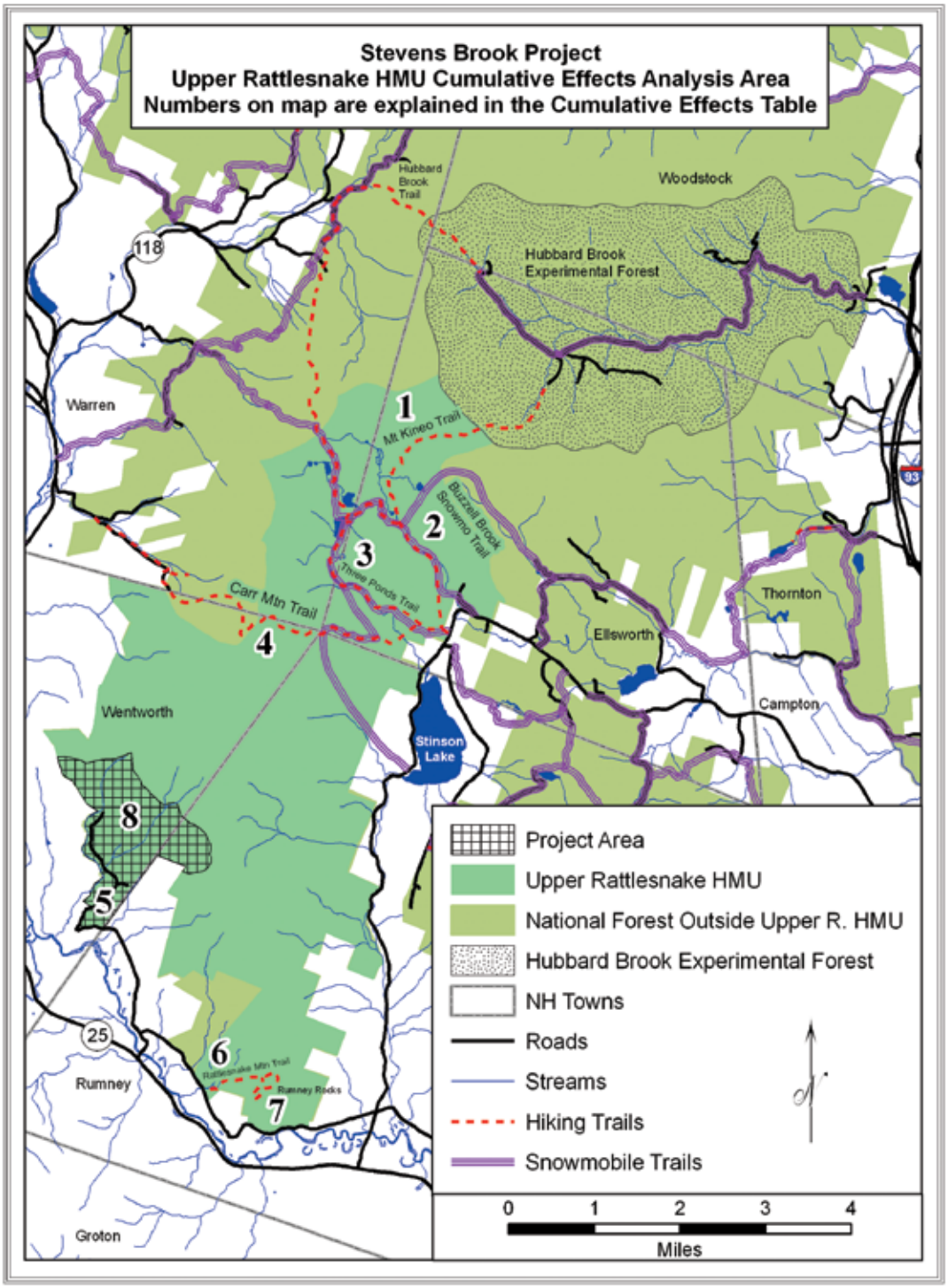
Present Projects: Alternatives analyzed in this EA.

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

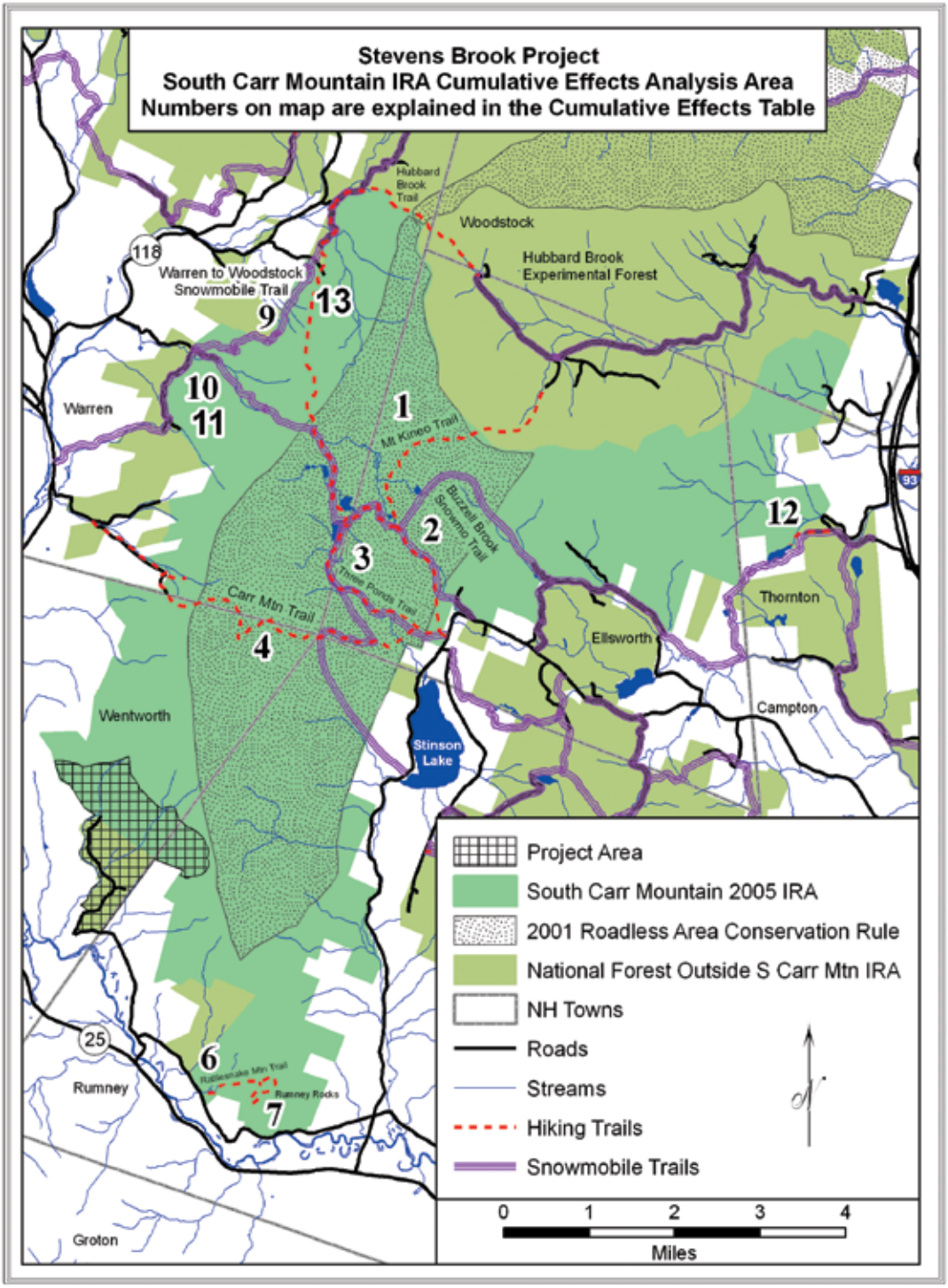
Adjacent Private Lands

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. 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

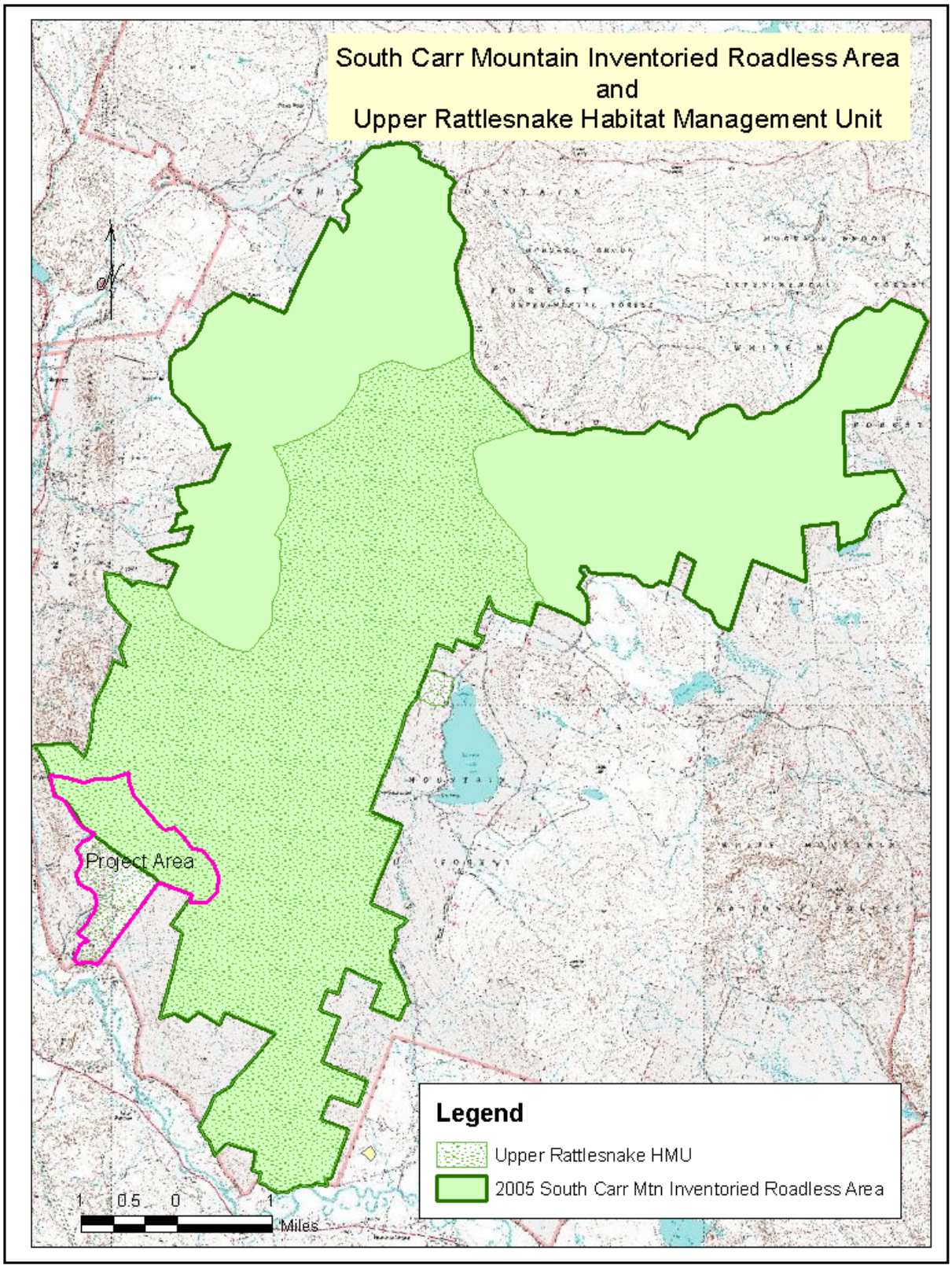
natural ability of these lands to recuperate. The following criteria apply on the White Mountain National Forest.

- 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 (eg, 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, such as the South Carr Mountain IRA, 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 Upper Rattlesnake 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 (FEIS-2005b).

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 (2005b).

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 IRAs has undergone a great deal of legal scrutiny over the years. The RACR and its associated management direction for IRAs was enjoined in a Federal District Court in 2003 before being replaced by the State Petition Rule, an entirely new regulation put into place in 2005. The State Petition Rule

was also challenged, and a 2006 Federal District Court ruling struck it down and re-established the RACR of 2001. In 2008, a Federal District Court again ordered that the RACR be enjoined. All of these court decisions apply only to lands covered under the RACR. On lands that were included in the inventory conducted during Forest Plan revision but were not part of the RACR inventory, management must be consistent with Forest Plan direction for the particular management area into which those lands were allocated.

Analysis Method

This section describes the approach for evaluating the effects of the Stevens Brook Project on the the South Carr IRA's inventoried roadless area criteria and 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 (FSH1909.12, 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. 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 (eg, length of roads built, facilities constructed), and how apparent impacts will be to the visitors in the short and long-term.
2	Opportunities for Experiences Often Unique to WildernessSolitudeChallengePrimitive 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.
3	Special Features	Area has unique or outstanding ecological, geologic, scientific, scenic, educational, historic, or cultural features • Addressed by describing the effect proposed activities would have on identified special values.
4	Description/Boundary Conditions/ Manageability as Wilderness	Ability to manage the area as required by the Wilderness Act, the resulting configuration of the potential wilderness, and the interaction of the other elements listed above • Addressed by evaluating how the proposed activities may affect boundary location, size, shape, and 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 2001). 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. 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. For all effects other than visual, 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. For visual effects on visitors to the South Carr IRA, the temporal scope for analysis is 20 years in the future. This timeframe accounts for the low potential of an off-trail visitor to directly encounter a clearcut within the South Carr IRA. Though clearcuts may be discernible for 20 years, they are "quickly reverting to a natural-appearing forest cover" after ten years (FEIS, 3-447). Aside from these possible effects to the off-trail visitor, direct and indirect effects are of a type that would not be expected to continue once the proposed activities are completed.

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 that one would expect of a 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 criterion 1: Under the No Action alternative, the area would retain the current degree of natural integrity and natural appearance.

Criterion 2: The present opportunities for experiences often unique to wilderness would remain.

Criteria 3 and 4: 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. Thirty-one percent of the IRA is within two miles of the project area. Only small portions of the project would see an increase in noise at any given time, since units are not all harvested at once. This would reduce the percentage of the IRA impacted by noise at any one time. 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. Effects of noise to wildlife resources are discussed in the Wildlife Section of this EA.

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, well below the 0.5 mile per 1,000 acre criterion. 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, 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 anywhere in the area, including within the IRA, as discussed in specific resource analyses within this document. Design features, such as removing logging slash within 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: 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 or otherwise impacted 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. 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). 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). 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 temporarily negatively affected in localized areas during harvest operations.

Criterion 3: 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 4: As previously discussed, this alternative would not affect the ability of this area to meet inventory criteria. Therefore, selection of this alternative would not alter the boundary of the IRA or change access to the area. Management and boundary considerations would remain 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 wilderness 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 criterion 4, capability criterion 2: 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, 3 or 4. 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 Batchelder Brook Project is the only project on this map that would affect inventory or capability criteria.

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 reasonably 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).

Alternative 1

Implementation of Alternative 1 would have no cumulative effects on IRA inventory criteria or wilderness capability characteristics within the South Carr IRA because there are no proposed activities and there are no direct or indirect effects on these criteria.

Alternative 2

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

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 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 boundary of the South Carr IRA would remain the same following implementation of Alternative 2.

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

Capability criteria 1 and 2: If Alternative 2 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 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.

As is discussed in individual resource sections, Alternative 2 will have no cumulative effects to elements described in capability criteria 3. Alternative 2 would have

no cumulative effects to capability criteria 4 because it will not change IRA boundaries or access.

Alternative 3

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

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:

Capability criteria 1, 3 and 4: Because this alternative proposes no activities in the IRA and would have no direct or indirect effects on these criteria, it would have no cumulative effects on these criteria.

Capability criterion 2: The cumulative effect on solitude resulting from noise and air pollution would be similar to, though less 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 Habitat Management Unit (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 hay fields have been intentionally burned by landowners in the past.

Many of the stands within Management Area (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 (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, un-trailed 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.

- New Hampshire Statute [Chapter 79 (Forest Conservation and Taxation), RSA Section 79:3, Normal Yield Tax] directs what is known as the "Timber Yield Tax." Section 79:3 describes the tax as "[a] normal yield tax at the rate of 10 percent on the stumpage value at the time of cutting." The Towns assess and collect the 10% yield tax from harvesting on private and public lands each year.
- 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 noticeable 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 character, 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 noticeable. 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 opportunities would be minimal and are described in the Recreation section. Cumulative effects to public health and safety (ie, changes in traffic patterns) would be noticeable 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 Towns 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.

Figure 4. 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, 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 entire HMU including the project area. The red oak and beech produce food sources for black bear, white-tailed deer and other wildlife. Portions of the spruce-fir habitat in the project area are part of the Stevens Brook deer wintering area. There is a permanent two-acre apple orchard opening in the project area.

Summary of Effects: The No Action alternative would not perpetuate the oak and softwood habitat and would risk loosing the aspen-paper birch in the HMU and the project area. Alternative 1 does not meet the Purpose and Need and would not move the forest towards the desired future condition for regeneration age class or habitat diversity on MA 2.1 lands in the HMU outlined in the Forest Plan.

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

Both action alternatives would cause negative effects on wildlife such as disturbance from noise and human presence, displacement and/or mortality, and reduction of mature habitat from harvesting. Alternative 2 has more potential to perpetuate oak, aspen-birch, and softwood habitats and create hardwood browse adjacent to the Stevens Brook deer yard, and create more 0 to 9 year old regeneration age class for wildlife habitat diversity on MA 2.1 lands in the HMU (including the project area) 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 regeneration 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 lands in the Upper Rattlesnake HMU are displayed in Table 10.

In comparing the Current with Desired Future Condition, the mature age class dominates all of the forest types and there is no 0 to 9 year old regeneration age class and very little young age class habitat in the entire HMU including the project area. The percent of spruce-fir habitat type falls short of the Upper Rattlesnake 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 within the Stevens Brook Project Area) is degenerating and falling apart and even immediate regeneration harvest might not result in stands that are primarily aspen-birch. Implementing only enough regeneration harvest to meet the identified age class objectives for the next 10 years would result in further loss of aspen-birch habitat and greater time and cost to regain that habitat. Therefore, the WMNF FEIS describes an expected deviation from the age class objectives for the first decade to allow the Forest to regenerate higher levels of aspen-birch type (far more than is strictly nec-

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 to 9 years old 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]Lands that are unsuitable for harvest located in MA 2.1 that currently could be in the young or mature age classes.

[2]Non-forest and not identified as a wildlife opening (i.e. wetland, rock, alpine habitat).

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

essary to meet the age-class objectives) before it degenerates further and the Forest risks losing aspen-birch habitat. This approach will return the aspen-birch forest to active management that will eventually allow 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, 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).

Stevens Brook Project Area

The existing condition of habitat and species occurrence in the project area is based on several multi-year, multi-seasonal, and site-specific surveys and database reviews including but not limited to the following: NHNHB 2008; Williams 2007; Costello 2006; Mattrick 2006; NHFG 2006; USDA-FS 2006, 2006c, and 1990; Wingate 2006; Fife 2004; NHNHI 1993; multi-dated FS deer yard compartment records.

The project area is approximately 1,000 acres located in MA 2.1 lands 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 project area and the entire HMU. There is a two-acre orchard opening in Stand 21 of Compartment 16, and three vernal pools in this compartment.

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 the 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 they 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 hard mast 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 2006; FEIS). NH Fish and Game manages black bear as a game species that is harvested annually. Black bear 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 small openings into existing mature softwoods 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 (NHDFL / SFPNF 1997; NHFG 2006).

The documented 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). 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). This moni-

toring and the multi-year and multi seasonal site-specific field reviews cited determined the Project Area contains softwood habitat used by white-tailed deer that is part of the Stevens Brook deer yard. The surveys 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 and Woodland Bats

White-Nose Syndrome (WNS) is a condition recently found in northeast bats. Affected bats may have a white fungus on their noses and occasionally other hairless body parts including arms, wings and ears. The exact cause of WNS is still being investigated, and it is believed the fungi (several genera have been isolated) are symptoms and not the cause of mortality. WNS was first identified in 2006 and has been associated with high mortality rates at some sites. WNS has been confirmed in hibernating bats in New York, Vermont, Connecticut, Massachusetts, Pennsylvania, New Jersey, West Virginia, possibly Virginia, and recently New Hampshire. WNS has been detected in Indiana bats, little brown bats, northern long eared bats, small-footed myotis and eastern pipistrelles (USDI 2008, WMNF Biologist L. Rowse personnel communication with USFWS Biologist S. von Oettingen). The Northeast Region of the USFWS is maintaining a web site on WNS with some of the most recent scientific information on this syndrome: <www.fws.gov/northeast/white_nose.html>.

The vast majority of bats with WNS have been found during the winter in caves where the bats hibernate. No bat hibernacula are known to exist on the WMNF (including the Stevens Brook Project Area), although there are several small caves throughout New Hampshire. Recent winter surveys by bat experts (NHFG 2009) of hibernacula located off forest found evidence of WNS in several caves adjacent to the WMNF. To date, no confirmed cases of WNS have been found on the WMNF. There have been some reports of dead and dying bats in some buildings in New Hampshire summer 2008. Some bats also have been caught summer 2008 that had white spots, holes, and tears in their wings and there are reports of bat pups dying. It is not know if this is caused by WNS that has spread to this area or if these individual were already sick when they left their winter hibernacula. At this time, the only recommendation developed by the USFWS and their partners are aimed at preventing the spread of WNS. Efforts focus on human visitation or research in affected hibernacula, human visitation between affected and unaffected caves and mines, and human handling of affected bats (see above USFWS website for details).

Several woodland bat species have been recorded across the WMNF during bat surveys in the early 1990s and 2000s (Krusic et al. 1996; Sasse 1995; Chenger

2002, 2004). Bats that may forage or roost in or near the Stevens Brook Project Area that may have been affected by WNS in NY and VT include little brown bat, northern long eared bat, eastern pipistrelle, and eastern small-footed myotis (Indiana bat does not occur on the WMNF). Unlike the eastern small-footed myotis, these other bat species commonly roost in trees (most often snags and partially dead trees near foraging habitat) or buildings (see the TEPS Section regarding eastern small-footed myotis).

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 representative habitat present in the analysis area (representative habitat was assumed occupied).

Direct and Indirect Effects

The **analysis area for direct and indirect effects** on wildlife species (including MIS) and their habitats for all alternatives are 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 (1999-2019). 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

Under Alterative 1, there would be no tree or vegetation removal, soil or snow compaction, noise and human presence from TSI, harvesting or stump removal for orchard opening expansion, or smoke from prescribed burning. There would be no effects of disturbance, displacement, mortality, 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 vernal pools, bear-clawed beech trees, deer wintering habitat, summer roosting habitat for woodland bats, or MIS in the project area or the HMU.

Indirect Effects

Under No Action, forest habitat would continue to grow and mature and openings in the forest canopy would likely result from trees dying or from pockets of blow down. Changes in the existing habitat types or age classes would occur through

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

MIS and Representative Habitat Condition	MIS and / or Habitat 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 of regeneration age class hardwood habitat in MA 2.1 lands in the HMU. No chestnut-sided warblers were seen or heard during several field reviews of the project area	WMNF breeding bird monitoring and BBS data show a statistically significant declining trend. The amount of regeneration age class 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 of mature hardwood habitat in MA 2.1 lands in the HMU. Suspect scarlet tanager could occur in the analysis area, but none were 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 (New Hampshire data show declining trends, while Vermont and Maine show increasing trends).
Magnolia warbler Regeneration age softwoods (predominantly spruce-fir, but could include some scattered regeneration age hardwoods).	0 acres of regeneration age class softwood habitat in MA 2.1 lands in the HMU. No magnolia warblers were 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 and ME increasing in southern NH and northern VT).
Blackburnian warbler Mature softwoods (predominantly spruce-fir, but could include some scattered regeneration age hardwoods).	106 acres of mature softwoods present in MA 2.1 lands in the HMU. Suspect blackburnian warbler could occur in the analysis area, but none were 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 lands in the HMU. Grouse were 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 data taken from 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 were 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).

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. 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. 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.

However, the No Action alternative would perpetuate the lack of 0 to 9 year old regeneration age class in all forest types that is absent in the project area and the entire HMU. No Action would risk loosing the aspen-paper birch (early successional forest type) in the 2.1 lands in the HMU (currently there are zero acres of regeneration 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). There would be lost opportunities to increase bat foraging habitat by creating openings in the forest canopy and re-using forest roads and old log landings.

The loss of regeneration and young age classes and oak and aspen-paper birch habitats would cause a long-term, adverse indirect effect. This would result in the decline of habitat diversity for a wide array of wildlife species (including MIS) in the HMU and the project area. MIS chestnut-sided warbler would likely not occur in portions of the project area due to the lack of regeneration age class habitat, as well as MIS ruffed grouse due to loss of aspen-birch type. Alternative 1 would cause an adverse indirect effect of perpetuating the lack of regeneration age class in northern hardwood (a source of browse for wildlife) and lost opportunities to create browse adjacent to a deer yard within the project area. There would be lost opportunities to perpetuate oak as a food source for bear and deer, or to perpetuate or speed conversion of mixedwood into softwood for wildlife habitat diversity (including maintaining important deer yard cover).

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 regeneration age class or maintaining less common aspen-birch and oak types for wildlife habitat diversity (Forest Plan pp 1-20 and 1-21).

Alternatives 2-3

Direct Effects

The action alternatives would cause relatively minor, localized, and short-term increases in human presence and noise in the project area from timber harvesting, stump removal for orchard opening expansion, prescribed burning in oak-pine stands, and timber stand improvement. These activities would not occur all at the same time or over the entire project area. Direct effects would include tree and vegetation removal in treatment units, soil and snow compaction on skid trails, haul routes and landings. Tree and vegetation removal, substrate compaction, and human presence could cause mortality, temporary alteration of travel patterns, disturbance, or displacement of foraging, breeding, nesting, denning, and roosting bats, birds, mammals, amphibians, reptiles, and insects in the project area.

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 disturbed, displaced or killed during any season of operation. Summer harvest could affect species that use trees for roosting, nesting, cover, and foraging (including woodland bats and 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. Winter harvest would not directly affect roosting bats because they would be hibernating elsewhere. Black bears tend to be dormant and there are no known dens in the project area. However, other 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 (NHDFL / 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 (including woodland bats) from the 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 completed Moody Ledge Timber Sale located on the WMNF in Benton, NH (see the project record).

White-Nose Syndrome (WNS) and Woodland Bats: There is potential that WNS could spread to the WMNF in the future and affect bats that forage or roost in or near the Stevens Brook Project Area. The proposed summer/fall timber harvests under both action alternatives for the Stevens Brook Project could create additional stress (mortality, disturbance, displacement) to individual woodland bats if they had WNS and were occupying a roost tree that was harvested. Winter harvests would not disturb roosting bats as they would have left the Forest for their winter hibernacula (usually a cave or old mine site). However, the potential effects of mortality, disturbance or displacement of individual bats from timber harvest proposed under the action alternatives would likely be very minimal for the following reasons. Most of the common woodland bats that summer roost in trees prefer to use snags (Sasse 1995). Forest Plan Standards and Guidelines designed to protect snags and retain wildlife trees (Forest Plan, pp 2-35-36) minimize the potential loss of roost habitat (USFWS letter dated 08/09/2005). Also, bats oftentimes select roost sites in open areas that receive ample solar radiation (Sasse 1995). Some bat species rely on solar radiation to help keep warm (e.g. bats are often found in homes attics or in snags in openings where they are exposed to direct sunlight for much of the day). Much of the forest habitat proposed for harvest in the Stevens Brook Project Area has a closed canopy and would not provide suitable roosting habitat sites for bats seeking a site that is exposed to the sun.

Indirect Effects

Under the action alternatives, indirect effects of tree and vegetation removal from harvest activities, opening expansion, and prescribed burning includes a potential reduction in the amount of roosting, nesting, and denning habitat for wildlife within the harvest, opening, and burn units. Indirect effects also include the potential decrease in the amount of large woody material recruitment onto the forest floor used by wildlife including some birds, small mammals, amphibians, reptiles, and insects.

Even-aged harvest and regeneration age class habitat

Forest-wide, less than one percent of the WMNF is in the 0 to 9 year old regeneration age class (FEIS). In the entire Upper Rattlesnake HMU (including the Stevens Brook Project Area), there are zero acres of regeneration age class compared to a Desired Future Condition of approximately 99 acres in MA 2.1 lands in this HMU.

Alternative 2 would treat approximately 178 stand acres in the HMU using even-aged harvest methods (clearcut, shelterwood, thinning, and timber stand improvement). See Table 6 in the Vegetation Section for harvest method definitions. Thinning and timber stand improvement (TSI) are intermediate harvests that affect the condition of a stand, but would not change the stand age class. Thinning and TSI methods do not create the same structural value for wildlife compared to clearcut and shelterwood treatments that immediately establish regeneration age class habitat.

Thus, Alternative 2 would create approximately 129 acres of 0 to 9 year old regeneration age class habitat that would cause long-term beneficial effects to an array of wildlife by increasing habitat diversity across more acres in the HMU and project area. Alternative 3 would treat approximately 111 stand acres with the same even-aged harvest methods, resulting in approximately 62 acres of 0 to 9 year old regeneration age class habitat, but would not meet the age class objective set for this HMU. Not meeting the age class objective would cause negative indirect effects to wildlife including MIS chestnut sided warbler and MIS grouse due to less habitat diversity distributed across the landscape.

Creating aspen-birch regeneration age class habitat

There are zero acres of regeneration age class aspen-birch habitat in the entire HMU (including the project area). There are 4 stands typed as paper birch in the project area that are mature. The action alternatives would create regeneration age class habitat via clearcutting and encourage the aspen-birch to perpetuate. Alternative 2 proposes 49 acres of clearcutting and Alternative 3 approximately 6 acres. 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. The WMNF Forest Plan Standard G-1 (p 2-33) states habitat should be managed according to guidance provided in the Forest's *Terrestrial Habitat Management Reference Document* (see the Stevens Brook project record). This reference document (p 5) states there is an expected deviation from the age class objectives for the first decade to allow the Forest to regenerate higher levels of aspen-birch forest before it degenerates further and is lost.

The clearcuts proposed 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).

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 has observed 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); similar standards and guidelines would apply to the Stevens Brook project as well.

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 (0 to 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 For-

est-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 regeneration age forest and habitat diversity in the HMU and the 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.

Reducing mature northern hardwood age class habitat

The action alternatives would cause a relatively minor decrease in the existing dominant amount of mature forested habitat in the HMU and project area (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 as habitat to MIS scarlet tanager and MIS ruffed grouse and woodland bats.

Uneven-aged harvest

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 6 in Vegetation Section). These harvest treatments would remove some mature trees and 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 mixedwood 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 the mature age class within each habitat type and move stands with softwood ELTs towards a spruce-fir habitat type. After uneven-aged harvest, there would be habitat diversity in the MA 2.1 lands in the HMU (including the project area) for wildlife that use open and closed canopy forest, beech mast, dead trees (roosting & denning), or softwood cover (Alternative 2 more than Alternative 3, based on the amount of proposed acres of uneven-aged harvest).

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 age class 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 and vernal pools

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 left 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 17 years, the district biologist has observed that Forest Plan Standards and Guidelines (pp 2-35 to 2-36) for retaining wildlife trees in harvest units 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 including woodland bats. Riparian and Aquatic Standards and Guidelines (LRMP, pp 2-24 to 26) also would maintain a 25 foot no cut buffer around vernal pools and perennial streams (excluded from harvest and burn units), and retain dead and down logs.

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 maintain the HMU opening objective. TSI would create browse available on the ground for some wildlife including white-tailed deer especially during the winter when deer need nutrition the most. TSI would regen-

erate 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 17-year period 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 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 or travel corridors 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 disturbance or displacement from human presence (including noise) and may adjust their foraging behavior to avoid human activity.

Having worked 17 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. 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.

White-nose Syndrome and Woodland Bats

Although harvesting under the action alternatives would cause the indirect effect of a reduced amount of potential summer roosting habitat for some woodland bats, the potential effect is minor in magnitude due to the large amount of mature

habitat available in the HMU and on the WMNF. Under both action alternatives, mature trees would remain in the stands proposed for uneven-aged harvest which would be available as roosting habitat. Finally, only a portion of the MA 2.1 lands in the Upper Rattlesnake HMU is proposed for treatment at this time leaving a large area of mature habitat available as bat roosting habitat. Upon completion of harvesting, the residual stand condition of most harvest units (except those proposed for clearcuts and wildlife opening expansion) as well as surrounding forest in the HMU would still retain adequate numbers of live and dead trees that could provide roosting habitat for woodland bats.

Activities under both action alternatives (harvesting, opening expansion, prescribed burning, and reconstruction of roads and landings) would benefit woodland bats by increasing and perpetuating forage areas and exposing some foraging and roosting sites to solar warmth. Research on the WMNF found that bats often forage near water bodies, trails, roads, and forest openings (Krusic et al. 1996), presumably because insect prey may be more abundant in more open habitats and maneuvering in the air is easier.

Management Indicator Species

Table 12 shows the effects by alternative 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 age class habitat (chestnut-sided warbler, ruffed grouse, 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, MIS ruffed grouse, chest-sided and magnolia warblers 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 habitat available in the HMU and the project area for these MIS (Alternative 2 more so compared to Alternative 3 due to more acres proposed for treatment).

Summary of Direct and Indirect Effects

The action alternatives would maintain habitat connectivity for wildlife travel 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 determinations 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 water-

Table 12. Effects by Alternative on the Amount & Quality of Habitat 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 analysis area including the project area.	Greatest increase in hardwood regen age class habitat via 49 clearcut; 80 shelterwood. 129 regen acres.	Lesser increase in hardwood regen age class habitat via 6 clearcut; 56 shelterwood. 62 regen acres
Scarlet tanager Mature Northern hardwood	Continued increase in the mature hardwood age class that is already dominating the analysis area and the project area.	Decrease in mature hardwood age class via 178 even-aged acres. However, 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 111 even-aged acres. However, 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 shelterwood and GS treatments on 130 stand acres of pine & mixedwood.	Less amount of softwood regen habitat created via fewer shelterwood and GS treatments on 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 habitat 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 habitat 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 continued decline & long term loss of aspen-birch via no regen harvests.	Increase in aspen-birch habitat via: 49 clearcut; 80 shelterwood. 129 even-aged acres of treatment.	Lesser increase in aspen-birch via 6 clearcut; 56 shelterwood. 62 even-aged acres of treatment.

Acreage figures are approximate.

sheds and HMUs; and 3) the BEs for Stevens Brook and Batchelder Brook Project (located in the adjacent HMU north of the Stevens Brook Project Area).

Alternative 2 has potential to cause more of the negative direct effects to wildlife and their habitat compared to Alternative 3, because more acres would be affected by similar types of treatments. However, the negative direct effects would be relatively minor in magnitude and short-term in duration (except mortality) because winter harvest, designated skid trails, and previously cited Forest Plan standards and guidelines would protect and maintain wildlife habitat. Alternative 2 would cause greater positive indirect and long-term beneficial effects to wildlife habitat diversity because a greater amount of 0 to 9 year old regeneration age class habitat

would be created and better distributed across the project area. Also, Alternative 2 would perpetuate oak, and softwood due to more acres treated across the project area landscape. Alternative 2 best meets the intent of the goals and objectives (Objectives #2 and 4) for wildlife habitat management stated in the Forest Plan (p 1-20). Alternative 3 would not meet the regeneration age class objectives set for the Upper Rattlesnake HMU, nor move the forest towards the wildlife habitat goals and objectives in the Plan compared to Alternative 2.

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.

The **temporal scope for cumulative effects** on wildlife resources (including private land) for all alternatives is the past and future ten years (1999-2019) 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 to 9 years) in all forest types.

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

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 the type.
Sporadic and infrequent natural disturbance may result in small amounts of regeneration and young age class forest.
(*) Land unsuitable for harvest located in MA 2.1 that currently could be in the young or mature age classes.

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 regeneration 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 regeneration 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 to 9 year old regeneration age class habitat. Mature northern hardwood and mixedwood forest would continue to dominate the HMU and 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 steady decline in aspen-birch type in the analysis area affecting an array of wildlife.

Aerial photos indicate the private land adjacent to the HMU does not contain stands of 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. The Forest Service would maintain the designated 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 at this time.

Alternative 1 would not add any cumulative effects to bear clawed beech trees, deer yard habitat, or add stress to woodland bats that summer roost in trees if WNS spreads to the WMNF. 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 (Forest Plan pp 1-20–1-22).

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 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 lands within the Upper Rattlesnake HMU are 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 lands plus the 890 acres of 2.1 lands unsuitable for harvest in the HMU are currently mature and would continue to develop into older forest habitat, and ultimately regenerate very slowly on their own.

Black Bear-clawed Beech Trees: 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 oak-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 some loss of

these trees likely occurred, 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.

White-tailed Deer Wintering Areas: The WMNF LRMP contains guidelines that ensure deer wintering habitat is maintained in the HMU and Forest-wide (Forest Plan p 2-34, 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, Alternative 2 would cause no adverse cumulative effects to deer wintering habitat within the HMU. However under Alternative 2, there are lost opportunities to increase hardwood browse and regenerate aspen-birch adjacent to deer yard habitat. 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.

White-Nose Syndrome and Woodland Bats: There is potential that WNS could spread to the WMNF in the near future. The effects of timber harvest on woodland bats in the cumulative effects analysis area are similar to those described under direct and indirect effects (i.e., disturbance of bats roosting in trees, decrease of roosting habitat, and increase in foraging habitat via canopy openings and opening up of roads and landings). Past timber harvest did not add any additional stress to bats with WNS, as the disease was unknown. Present and future summer/fall timber harvests could potentially add an additional stress via disturbance or displacement of woodland bats that summer roost in trees if WNS spreads to the WMNF. However, the potential disturbance or disturbance of individual bats or reduction of summer roosting habitat from timber harvest would be minimal for the same reasons discussed under direct and indirect effects section. Very few individual bats would likely be disturbed or displaced from summer/fall timber harvests annually as less than 1% of the WMNF is actively harvested each year and only a portion of this occurs during the period of time when bats would be present. While timber harvest would result in some loss of potential roost tees, there are hundreds of potential roost trees in and near the project area that would still be available to bats upon completion of harvesting. Predicting what the potential threats to bat populations on the WMNF might be is difficult and it is impossible to take action to limit the spread of this disease except at hibernacula. The WMNF is in close contact with the USFWS and NH Fish and Game Department to stay informed about this issue and take appropriate actions as needed regarding WNS.

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 (altered habitat, loss of habitat, improved 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 the HMU.

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, opening expansion, prescribed fire, and TSI) would add very minor cumulative effects to wildlife resources in the analysis area. Alternatives 2 and 3 of the Stevens Brook Project would move the forest toward the objective of providing wildlife habitat diversity (especially regeneration age class, early successional aspen birch habitat, opening expansion, and conversion of mixedwood to softwood in the future) within the Upper Rattlesnake HMU (Alternative 2 the most based on the amount and type of harvest proposed, then Alternative 3 but it would not meet age class objectives).

Management Indicator Species: 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. 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.

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** **Blackburnian Warbler** **Ruffed Grouse**	Perpetuates the lack of regen age class and declining trend in aspen-birch and habitat diversity in the analysis area including the project area. Over the long term, MIS that use regen age class and paper birch habitats would decline within the analysis area and would seek these habitats elsewhere. ***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*.**	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 (Alternative 2) and habitat diversity in the analysis area and project area would be maintained. **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. There would be mature habitat available for the MIS scarlet tanager and MIS blackburnian warbler before, during and after the project was implemented.

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 numerous 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 (1999-2019), 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 (Table 4) determined that the federally-listed Indiana bat does not occur on the WMNF or in the Stevens Brook Project Area, thus the no action and action alternatives would cause no effect to the species or

its critical habitat (none present). The BE (Tables 4 and 5) disclosed 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 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 (USDI 2008), forest-wide mist-net surveys on the WMNF (BCM 2002, 2004; Yamasaki 2000), and woodland bat surveys off-Forest in New York and Vermont.

1) There are no caves, mines, or tunnels as overwinter hibernacula; or prominent rock outcrops, talus slopes, or old buildings exposed to sun as roost sites (Forest Plan Appendix G, pp G-224–G-227) within 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 standards and guidelines (Forest Plan pp 2-24–2-26 and 2-33–2-36) would maintain habitat diversity within the project area. Also, MA 6.1, 6.2, and 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) WNS has been found in several NH caves per recent surveys by bat experts. There is potential that WNS could spread to the WMNF, but it is unlikely proposed activities that harvest trees would result in cumulative effects to eastern small-footed myotis, as literature indicates that this species does not favor roosting in trees during the non-hibernation season.

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 (Forest Plan pp 2-24–2-26 and 2-33–2-36). 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) Forest Plan standards and guidelines protect riparian areas and maintain aquatic habitat for mayflies that is well-distributed across the Forest (Forest Plan pp 1-20–1-22, 2-33–2-36).

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. 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 should 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, 2/16, 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 1/15, 11/16, Parts of 21/15, 13/15, 19/15, 21/15, 2/16, 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 suitability 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, and stream crossings. 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 Quality 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, 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 acres of single tree selection/group selection thinning bole-only tree harvest. 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 (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, DRED/SPNH, 1997) 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 20 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 percent 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 (FEIS 2005b).

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 anti-degradation 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 (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. 2006). 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 guidelines 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 (FEIS p 3-51). In addition, the amount of basal area proposed for removal from 1st and 2nd order perennial watersheds is less than 15 percent, 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 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. The temporal scope is the past and future 10 years (1999 to 2019) because this timeline spans past and current WMNF Forest Plans with standards and guidelines that have and would protect aquatic and terrestrial resources.

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 17 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; NHDFL/SPNF 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 17 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 (1999 to 2019). This timeline spans past and current WMNF Forest Plans with standards and guidelines that have 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 (Thompson et al. 2001).

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 Standards 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 alternatives 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 developments, and road construction may result in impacts to semi-aquatic and aquatic species and their habitat on private lands adjacent to the HMU.

3.9 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 and 16 (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 Classes: 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 an attractive 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 by-product 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.

3.10 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 analysis area 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.

3.11 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 ten years into the future. This temporal scope was chosen because some changes in the landscape from timber harvest may affect recreation opportunities for up to ten years. Most effects to recreationists, however, will occur only during project implementation, estimated to be 3-5 years.

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 for approximately ten years during times 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.

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 identi-

fied 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
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.

3.12 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 proposed 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 consideration 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 substantial 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 proposed 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 (eg, 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 consideration 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 significance 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 Environmental 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 characteristics available to wildlife species that use cavities, snags, downed large woody material, fungi, moss, lichens, insects, and closed canopy with sparse understory 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 windthrow 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 — Response to 30-day Comment Period for the Preliminary Environmental Analysis

The interdisciplinary team reviewed each comment received during the 30-day comment period and considered all project-specific comments, questions, and new information. They are listed in this section with Forest Service responses by the interdisciplinary team.

Along with project-specific comments, some respondents sent questions, observations, suggestions, and requests for information that were not relevant to this project-level analysis. This latter group of comments is not responded to in this document. Respondents who have Forest-level questions or concerns should contact the Forest or other resources separately on those topics.

Comments are listed as either direct quotes or paraphrased. Every effort has been made to accurately retain the context and represent the points of view expressed by each commenter. All correspondence is filed and available for public inspection in the Stevens Brook Project File located at the Pemigewasset Ranger Station in Plymouth, New Hampshire.

We appreciate the time all respondents spent reviewing and commenting on the Stevens Brook Project Preliminary EA. Thank you for your thoughtful comments.

Comments and responses are grouped by topic as follows:

1. **Project Support**
2. **Fish and Aquatic Habitats**
3. **Heritage Resources**
4. **Inventoried Roadless Areas**
5. **Socio-Economic Assessment**
6. **Soils**
7. **Transportation System**
8. **Vegetation**
9. **Wildlife**
10. **Climate Change**
11. **Fire**

1. Project Support

Several comments supporting the project were received. The following items were noted:

- **Provides wood to the regional economy which is part of the 24 million board feet annual harvest established in the Forest Plan.**
- **Promotes desirable habitat conditions**
- **Promotes forest health and productivity**

- **Promotes vegetation conditions identified in the Forest Plan**
- **Maintains populations of oak and pine**
- **Improves timber quality**
- **Contributes to the regional and local economy by providing employment**
- **Carbon will be stored in new, replacement trees and growth.**
- **Best way to protect deer yards**
- **Supports working forest**
- **Inventoried Roadless Areas should be managed associated with their assigned Management Areas.**
- **Alternative 3 is inappropriate and not in keeping with the goals, objectives and intents of the 2005 Forest Plan.**

2. Fish and Aquatic Habitat

On page 21 it is stated "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," I don't believe there is a stand 2-30,2-45, 2-59 or 2-34d in the Stevens Brook Project...what stands did you mean?

Most stands in the Stevens Brook sale have streams near or in them. Many units have their boundaries outside of the riparian area (5/15, 3/15, 21/15, 1/15, 19/16, 4/16, 3/16, 16/16, 23/16) while others have riparian buffers inside the unit (19/15, 20/15).

Thank you for bringing this error to our attention.

3. Heritage Resources

Commenter wishes to know why trees will be harvested within 5 feet of a stone wall, within 25 feet of a cellar hole, and if barbed wire is a cultural resource.

During harvest operations the stone wall and cellar hole will be avoided by not skidding over or otherwise disturbing the features. Trees near the stone wall and cellar hole will be directionally felled if necessary to minimize impact to the stone wall and cellar hole.

Remnant barbed wire is a common feature in many areas of the WMNF and would only be considered as a possible cultural resource if it was 50 years or older. The barbed wire in the Stevens Brook project area does not seem to qualify due to the age of the trees it was attached to.

The commenter wishes to know what survey methodologies were used to search for pre-historic sites in the project area. Was shovel testing used and if so how many shovel tests were completed and where did they occur?

Prior to field surveys, State and Forest historical records of the area were reviewed to identify known historic and prehistoric sites. Known sites were revisited to update their condition and re-flag. The project area was then surveyed on foot for

unknown sites. Any previously unidentified sites were flagged, mapped, photographed, and recorded. Site condition and potential impacts of proposed project have been evaluated. Information from the survey was compiled into a Cultural Resource Reconnaissance Report (CRRR) and submitted to the Forest archaeologist and New Hampshire State Historic Preservation Office (SHPO) for concurrence.

Sites assessed in the CRRR included homesteads, maple sugaring sites, a sawmill, stone walls, a mica mine, and logging camps. The topography and the harvest area locations indicate that any sensitive areas for prehistoric use would not be impacted by project activities, and as a result, no shovel testing was undertaken. However, shovel testing was done in a previous vegetation management project along proposed roadways that will be used again in the Steven's Brook project.

We would like a copy of the CRRR, associated field notes, and any programmatic agreements with SHPO regarding survey methods and Section 106 compliance.

Due to the sensitive information contained in the report and in compliance with Forest Plan direction, the Archaeological Resources Protection Act of 1979 (Section 9), and 36 CFR 296.18 (Confidentiality of archaeological resource information), the report will not be released, however it is available for viewing at our Laconia office with arrangements made in advance. We received written concurrence on our survey results and mitigations from NH SHPO on 3/19/2007. Field notes were made on field report and site forms while surveying. Field forms were discarded when all of the information was transferred into the final resource report. No programmatic agreement exists between the NH SHPO and the White Mountain National Forest. Our Forest survey strategy is referenced in the Forest Plan (p. 2-7, G-3) and is located in the project file.

The commenter wishes to receive documentation "of the failure of each of the identified sites in the project area to meet National Register criteria…."

The cultural sites within the study area have been documented, added to the Forest's cultural resource data base, and flagged for avoidance and protection during project activities. We have not evaluated the sites and, in accordance with our Forest Plan, will treat un-evaluated sites in the same manner as cultural sites on Forest which have been Determined Eligible and/or listed on the National Register.

4. Inventoried Roadless Areas

The Forest Service should not damage the roadless character or wilderness characteristics of the South Carr IRA by choosing an alternative that proposes timber harvest in this roadless area. The draft EA does not adequately address effects to these characteristics.

One commenter describes a general list of nine environmental characteristics or qualities (paraphrased from the description of roadless areas values and characteristics in the 2001 Roadless Area Conservation Rule (Federal Register / Vol. 66, No.9 / Friday, January 12, 2001 / Rules and Regulations / p. 3245)) which broadly describe certain aspects of land conditions found in many different roadless areas

nation-wide. These characteristics were specifically developed for a national evaluation and rulemaking effort, and are not part of any current regulation governing project-level environmental analyses. While instructive, these characteristics do not control or govern site specific environmental analyses.

A key part of understanding this environmental analysis involves distinguishing between RACR and the inventoried roadless analysis process undertaken as part of Forest planning. The 157 acre portion of the South Carr IRA involved here is not a RACR roadless area. A detailed discussion of the critical differences between the RACR process (a nationwide rulemaking effort to identify roadless areas) and the subsequent forest plan revision process (FEIS Appendix C) for identifying roadless areas is in the project record. The RACR process has concluded with the identification of RACR areas based on certain factors identified in the national rule. The roadless area identification process undertaken during Plan revision is likewise concluded. As this project is not located within a RACR area, there is no purpose in using the RACR factors (en lieu of FEIS Appendix C) in evaluating site specific environmental effects.

The eight IRA inventory criteria from the Forest Service Handbook (1909.12 chapter 71) and four wilderness evaluation criteria from the 2005 FEIS for the Forest Plan (Appendix C) in Chapter 3 of the project EA provide a foundation to determine whether proposed activities would be of the intensity or duration to preclude meeting baseline criteria for inclusion in a future direct the determination of whether proposed activities would be of the intensity or duration to preclude meeting baseline criteria for roadless inventory, as well as whether activities would preclude lands from possible future recommendation as wilderness or other allocation. Additionally, the EA discloses the effects on other resources such as wildlife habitat, recreation, water quality, invasive species, and diversity of plant and animal communities in a multiple use context. Specific comments regarding these resources have been sufficiently addressed in the resource sections of Chapter 3.

The environmental trade-offs associated with the proposal are clearly set forth in the record: as requested by one commenter, the Forest took a hard look at implementation of the project outside of the IRA (Alternative 3 proposed no harvest in the South Carr IRA). The project's predicted effects to resources in the South Carr IRA are described in detail in Chapter 3 of the EA.

A legal case referenced by a commenter was a 1982 Circuit court decision concerning a nation-wide environmental impact statement (EIS) prepared in 1979 for the Roadless Area Review Evaluation ("RARE II"). This national EIS sought to allocate 62 million acres of National Forest System lands across the country into three planning categories: Wilderness, Further Planning, or Non-wilderness. For areas designated non-wilderness, the Forest Service could consider development proposals for which subsequent NEPA would be done. In this national EIS, the agency did not look at the detailed Forest-level effects analysis of the non-wilderness designation. The Circuit's decision rests upon a lack of specificity in the analysis and the concern that the national EIS constrained the agency from subsequently considering wilderness preservation as an alternative to development.

California v. Block involved a nation-wide land evaluation and was not related to site specific analyses such as Stevens Brook Project. As described below, the potential of the project area for study as wilderness was completed in the 2005 FEIS (see Appendix C). The Circuit did not hold in California v. Block that the IDT must revisit the land allocations made during Plan revision every time it proposes a project. Instead, Block involved an attempt to evaluate and designate land for development at the national level so that this issue would not have to be considered during the forest planning process. The Ninth Circuit clearly expected that consideration of potential wilderness designation would occur as part of the development of the Forest-level land and resource management plans. Indeed, the White Mountain National Forest recently completed the inventory and analysis process contemplated in Block as a part of Plan revision. California v. Block does not require the re-evaluation of Forest lands for recommended wilderness study areas or non-wilderness at the site specific level of decision-making.

The requirement to consider the effects of wilderness versus non-wilderness recommendations is found in the Forest Service Handbook (FSH 1909.12 Chapter 74 (5.)) and is inherently a part of programmatic land allocation planning, i.e. Forest-level planning. This section of the FSH describes the process for documenting the evaluation of wilderness recommendations resulting from either land management planning or from legislatively mandated studies. This consideration was made during the 2005 revision of the Forest Plan and the results were documented in the FEIS consistent with that direction. The FEIS analyzed the effects of various land allocations, including potential wilderness recommendations across the Forest. The effects of each alternative on social, economic, and biological resources and values were studied and disclosed in the FEIS, and the rationale for the selected alternative captured in the Record of Decision. The FSH requirement to consider the effects of wilderness versus non-wilderness designation was an integral part of the FEIS for the plan revision, which identified "Management Emphasis through Land Allocation" as one of three central issues around which alternatives were developed.

The Stevens Brook project is designed to address site-specific resource conditions in an effort to manage the Forest toward its Desired Condition and is entirely consistent with direction for Management Area 2.1, the MA into which lands within the project area were allocated in the 2005 Forest Plan. The comment presumes that there is a loss of characteristics and values for land that was not allocated in the Plan as recommended for wilderness. This is not the case, as indicated by current favorable resource conditions (e.g., recreation, visual resources, see FEIS pp 3-310, 3-445), in the light of the long history of active management on the Forest.

Protection of the South Carr IRA's roadless character and availability for wilderness designation are sufficient reasons for the FS to forego logging or road building in this IRA.

As described in the EA in Chapter 1, the Stevens Brook project addresses site-specific resource conditions related to vegetation, wildlife habitat, riparian and aquatic habitat, water resources, and transportation in the project area. The purpose and need for this proposal is grounded in field work by local resource specialists, moni-

toring data, professional experience with similar actions, and the best available science. One commenter is correct in stating that the Management Area designation in the programmatic land management plan does not authorize site specific action in this area. The Plan does, however, set forth a broad framework to guide future actions, including the desired future condition. This desired outcome was result of years of collaborative effort from a diverse group individuals, organizations, and government entities. The Stevens Brook Project was designed to be consistent with the Plan's articulation of the desired condition for this Forest during this planning cycle. See September 2005 ROD, pp 8-15; Plan, Preface at page v).

The characteristics of the South Carr Inventoried Roadless Area are summarized in the Affected Environment section of the EA (EA, Chapter 3). This description of the Area is based on site specific field work. This site specific analysis tiers to the evaluations described fully in Appendix C of the 2005 FEIS for the Forest Plan (pp C-25 – C-33). Together, Plan and project documentation provides a description of the action in the context of the broader Forest landscape. The EA describes how proposed site specific actions would affect the land in terms of pertinent inventory and evaluation criteria.

In response to comments during the project's scoping period and presented in the Preliminary EA (Chapter 2), the IDT developed and analyzed Alternative 3 in which no timber harvest would occur in the South Carr IRA. The analysis also evaluates the effects of deferring all activities at this time (Alternative 1, No Action). As a whole the range of alternatives considered by the IDT provides the basis for informing the public and the decision-maker regarding the environmental trade-offs associated with taking action at this time. Additionally, analysis showed that any effects to the IRA under both action alternatives would be short-term and the IRA would continue to meet inventory criteria and wilderness capability criteria and characteristics. There is no difference between the two alternatives in terms of affects to the South Carr IRA.

Analysis of the effects of the project on the South Carr IRA is inadequate: the temporal scope of 2-5 years does not adequately address direct and indirect effects, and other impacts to specific resources are not sufficiently analyzed.

We agree that some visual effects of this project, though temporary, will extend beyond the 2-5 year duration of project implementation. The direct and indirect effects section of the Roadless and Recreation sections of Chapter 3 have been amended to reflect that the direct and indirect visual effects of certain harvest treatments may extend up to 20 years, though the temporal scope of other direct and indirect effects analyzed in these sections remains 2-5 years . The Forest Plan FEIS acknowledges that the visual effects of clearcuts may exist for up to 20 years, though after ten years these effects diminish rapidly. The cumulative effects section already utilized a temporal scope extending 20 years into the future.

Effects to other resources (soil, water, wildlife, invasive species, etc.) were analyzed in their individual resource sections in Chapter 3 of the EA. These analyses apply to the entire project area, including the South Carr IRA. As described in the Road-

less section of the EA, effects analyses concluded that lands would continue to meet roadless inventory criteria and no future land use option would be precluded due to project implementation.

The EA in Chapter 3 considers the effect of timber harvest, skidding, and maintenance of existing roads on specific wilderness evaluation criteria including natural appearance, natural integrity, and opportunities for experiences often unique to wilderness including solitude. The analysis documents the hard look taken by the IDT in their analysis of potential environmental effects upon the resource conditions of the South Carr IRA. The EA (Chapter 1) recognizes the character of the IRA as a key issue in the analysis. The IDT examined existing conditions and the effects of vegetation management and associated activities upon various attributes of the IRA.

The context here is very important to understanding effects. More than half (53 percent) of this 796,800 acre Forest is allocated to providing for non-motorized, backcountry experiences. These lands are managed to protect the primitive, semi-primitive, and non-motorized attributes and experiences. The IRA encompasses 22,265 acres in total, with just 157 acres – less than 1%–of the IRA proposed for management under Alternative 2. The comment concerns significance of effects on a very small portion of the Forest.

Equally important, the effects on resources in the IRA are relatively short-lived. The application of standards and guidelines, Best Management Practices, and project design features insures that the effects on soil, water, air, and wildlife associated with harvesting and road maintenance are not significant. Regeneration occurs rapidly on these sites. The lands that comprise the White Mountain National Forest (even those recently designated as Wilderness) have a long history of active vegetation management. Past harvesting in the IRA has not diminished its character or the quality of recreation experience. There is no information provided in this comment to show that any "unique" characteristic of the IRA will be irreparably harmed or lost. Although there will be some short-term effects (EA, Chapter 3), the magnitude and duration of these effects will be limited by mitigation. The long term benefits to forest health and wildlife habitat diversity exceed the short term effects. There is no evidence given that any effects on the characteristics of the IRA are significant. These lands have been subject to active management in the past and recovered. The concern that the proposed management will affect the unique quality of the IRA so that the opportunity of the entire IRA to be recommended as wilderness will be forever lost is without foundation.

All skid roads and skid trails are temporary in nature and used, maintained, and closed using best management practices to protect resources. The soils and water resources sections analyzed the effects of all project components, including skidding, timber harvesting, and road work on those resources. The IDT specifically considered the potential effects on the naturalness and water quality associated with skidding logs (EA Chapter 3). It is important to remember that the roads proposed to be used for vegetation management in this project already exist, i.e. they were constructed in the past. These roads have seen periodic use over many years

for logging, recreation, and other activities. Road maintenance (removal of brush, cleaning of ditches) will be performed prior to use. There is no road construction or reconstruction proposed under any of the alternatives.

This project will have a significant effect on the roadless character of the South Carr IRA and the human environment, therefore an EIS must be prepared.

The Stevens Brook EA documents our thorough analysis of environmental effects on the South Carr IRA (Chapter 3). As stated in the EA, this analysis was based on specific, pertinent criteria found in the Forest Service Handbook (FSH 1909.12, Chapter 71.12) and the FEIS for the Forest Plan. The EA clearly displays the direct, indirect, and cumulative effects of each alternative against these criteria (Chapter 3). Results of the analysis show that lands in the IRA affected by this project would continue to meet inventory criteria and could be considered for any land use option–including recommendation for wilderness–in the future. None of the proposed alternatives would substantially alter the undeveloped character of a roadless area, nor would they constitute a major federal action that would result in significant effects to the human environment; therefore an EIS is not required.

The environmental analysis is informed by field data and observation from local resource specialists, as well as monitoring data and experience with similar projects. Effects specifically mentioned by the commenter have been discussed in individual resource sections of the EA. The Team assessed the existing resource conditions (based on field work), examined various alternatives for moving the project area towards the desired future condition, and disclosed the environmental effects and trade-offs of those alternatives and formulated mitigation of adverse effects. Public involvement was a key part of project development. Based on the analysis documented in the project record, the IDT reasonably concluded that none of the alternatives would have significant environmental effects, particularly with regard to a possible future wilderness recommendation.

One commenter suggests that the effects are significant because they are "highly controversial," 40 CFR 1508.27(b) (4). Controversy as used in the context of the NEPA regulation refers to a substantial dispute concerning the size or nature of a project's environmental effects, not simply public opposition to a proposal. The project record must be viewed as a whole; simply focusing on certain narrow aspects of the effects disclosure is inappropriate.

The comment presents no evidence for the existence of a substantial dispute concerning effects. There is no indication of a disagreement with the relevant technical, scientific, or other communities so that the IDT could not rationally analyze environmental effects. The scope of the environmental analysis, the methodology used, the data and field work underlying the decision are all carefully documented in the record. The evaluation of resources in this circumstance is based in large part upon local resource specialists – agency experts – and their work on the ground in the project area. The reliance upon this information is woven throughout the disclosure of effects in Chapter 3 of the EA. NEPA does not demand unanimity regarding effects in order to support a FONSI. Regardless, there is simply no

information provided to support the allegation of a dispute concerning the size, nature, or effect of the project. This is particularly true with regard to the effects on the South Carr IRA. The IDT has listened to the public, considered alternatives suggested, developed mitigation and explained or clarified the discussion of effects. The effects of this proposal are not highly controversial within the meaning and context of the NEPA regulation.

Additionally, the nine 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 criteria in the Forest Service Handbook used in the EA 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 such as water and wildlife not directly evaluated in Chapter 3.5 of the EA were analyzed in the pertinent resource sections of the document.

Chapter 3 of the EA shows that the proposed action does not establish precedent for a future action with significant effects, or represent a decision in principle about a future consideration with regard to the IRA or other areas of the Forest. See 40 CFR 1508.27(b) (6). The purpose of and need for action in any project are determined by site-specific resource conditions for the project area, which includes 157 acres (0.7 percent) of the 22,265 acre South Carr IRA. As noted previously, the purpose and need was developed following Plan revision by resource specialists based upon monitoring information, field data, and professional expertise concerning local resource conditions. The specialists walked the ground to understand the particular resource attributes and conditions within the project area, and consulted with other resource experts within the agency as needed. Their work was guided by Forest Plan Management Area allocation, goals and objectives, and standards and guidelines in an effort to achieve the desired condition of the land developed with the public during the Plan revision process (EA, Chapter 1; see also September 2005 ROD, pp 8-13).

Our 2005 evaluations of the overall existing resource condition of the South Carr IRA (FEIS p. C-32) found that the area "has nominal Wilderness value because the Inventoried Roadless Area is extremely narrow…there are no opportunities for expansion of the Inventoried Roadless Area" because "nearly all of the boundaries on the south and east of the IRA are coincident with the WMNF boundary". This area contains numerous snowmobile trails critical for connecting the state-wide trail system and Rumney Rocks, a high use recreation area. There is significant public opposition to closure of these snowmobile trails or severe use restrictions at Rumney Rocks. Equally important, the past harvest activities in this IRA did not preclude its consideration as wilderness, nor were these activities the reason that the Area was not recommended for wilderness. Other areas on the Forest (e.g. Wild River, Pemigewasset and Sandwich Wildernesses), have experienced harvesting similar to that proposed here and later been designated as wilderness. This fact provides strong evidence that the environmental effects of the actions proposed

here are short term, limited in scope, and non-significant. As illustrated by past activity, with mitigation and careful project implementation, effects soon fade into the landscape. The South Carr IRA will retain its potential to be recommended as wilderness.

One commenter stated that this project would "substantially alter the undeveloped character by 'nibbling away at the edges' of the IRA". The EA analyzed the future viability of this IRA as a whole, concluding that no portion of the IRA would fail to meet roadless characteristics or standards for potential wilderness designation due to the effects of this project (or due to the cumulative effects of all projects analyzed in the cumulative effects section). The roadless inventory process was not described in exact detail in the EA because identification of roadless areas is part of programmatic land planning and not a component of project-level planning for site-specific activities such as the Stevens Brook project. That said, the analysis in the EA is based on the exact criteria used to identify roadless areas and additionally considers project-level effects to lands regarding their capability for possible future wilderness recommendation. This analysis method provides a clear, direct, means of evaluating effects on these lands.

As discussed above and in previous responses, the EA tiered appropriately to the Forest Plan FEIS and Record of Decision, and fully analyzed the proposed activities on lands in the South Carr IRA to determine whether significant effects would occur. The analysis concluded that lands would continue to meet roadless inventory criteria and no future land use option would be precluded due to project implementation. As described in the EA, this project will not substantially alter the undeveloped character of the IRA, nor does it impact a substantial part of the IRA. As stated earlier, the project involves only 157 acres (0.7 percent) of the 22,265 acre IRA. Consequently, the EA is the appropriate level of site-specific analysis for this project, and is entirely consistent with the Forest-wide analysis and land allocation decisions made in the Record of Decision and FEIS for the Forest Plan.

The cumulative effects analysis area should include all WMNF projects currently or soon to be proposing timber harvest in IRAs.

The rationale behind the selection of the geographic and temporal boundaries for the cumulative effects analysis area is set forth in the EA (Chapter 3). The scope of the Stevens Brook project is such that the direct, indirect, and cumulative effects do not extend into any other IRA on this or any other National Forest. Furthermore, because the project is based on site-specific purpose and needs and does not follow or establish precedent to take similar action in any other IRA on the Forest, the selection of the South Carr IRA for cumulative effects analysis area is an appropriate spatial area of consideration. Stated differently, the proposal has independent utility or purpose apart from other actions that may be proposed on the Forest. As noted in the EA (Chapter 1), the Upper Rattlesnake HMU has a present need for vegetation management to improve forest health and wildlife habitat within this HMU. Regardless of other actions that may occur on the Forest, this action is designed to respond to the site specific need. The purpose and need for

this local action is supported by field observation of existing conditions within the HMU, as set forth in the EA.

The evaluation of timber harvest activity on inventoried roadless areas across the entire Forest land base is a programmatic/land allocation analysis. This Forest underwent this effort in 2005 with the revision of our Forest Plan, and the effects of these allocations are fully described in the FEIS. The commenter seeks to re-open the Forest-wide programmatic analysis and inventory process for roadless areas. The planning process produced a roadless area inventory or list, which is not the same as a designated management area prescription. The planning process involved an extraordinary degree of public participation. This comment is based upon the presumption or view that the inventory itself has a meaning apart from the allocation decisions made in the Plan. However, the inventory process has long been completed, and the lands allocated to various management prescriptions as set forth in the Plan. There is no reason to re-open the programmatic decision making process at this time. It is important to note that our revised Forest Plan provides a balance of public interests and uses supported by numerous organizations representing local and regional governments, timber interests, and environmental groups. The Forest Plan was not administratively appealed by any group or individual – one of the few times in 25 years across 155 national forests that a Forest Plan as not been appealed.

The White Mountain National Forest added more than 160,000 acres of land that were determined to meet baseline roadless inventory criteria during the 2005Forest Plan revision than were included in 1986 Plan. This represents a 67% increase, from 241,000 to 403,000 acres during a period of active management on the Forest, including projects similar to the Stevens Brook proposal.

Regarding other projects in IRAs on the White Mountain National Forest, on June 6, 2008, the United States District Court for New Hampshire ruled in favor of the U.S. Forest Service in the case of Sierra Club v. Wagner which challenged the Than and Batchelder Brook management projects, both in part due to proposed activities in IRAs with allegations regarding the need to do EISs. The court disagreed, ruling that the Forest Service appropriately analyzed the proposed activities, including the analysis of effects to IRAs.

A commenter requested clarification on how the Forest Service intends to access and haul 1.1 million board feet from the IRA if it not going to use roads.

Response: All roads systems are in place and therefore no additional roads will be constructed or reconstructed regardless of alternative selected. All roads and landings are located outside the IRA. Logs would be skidded to the landings and trucked from there. Skid trails are not constructed to the road standard necessary for trucks. The effects of skid trails are discussed in the 3.6 section of the Environmental Assessment.

5. Socio-economic Assessment

The EA does not describe any costs that are likely to be absorbed by the County and the Towns of Rumney and Wentworth, such as road and highway maintenance. Are road maintenance activities carried out and paid for by the county or the local town government? What are the estimated costs the towns and / or county would have to absorb?

There are no county roads associated with the Stevens Brook Project, and so no road maintenance activities will be carried out or paid for by the County government. The Buffalo Road is a town road maintained by the towns of Rumney and Wentworth. No additional road maintenance costs are expected due to the timber sale.

The commenter notes that we describe the NH Timber Yield Tax as averaging "about 10% of the value harvested," and would like to know the actual percentage over the last 5 years.

The wording in the Preliminary EA has been corrected in the Final EA to reflect the NH Statute [Chapter 79 (Forest Conservation and Taxation), Section 79:3, Normal Yield Tax]. The statute describes the tax as a straight 10% and not an average. The Towns assess and collect the Timber Yield Tax from harvesting on private and National Forest lands each year. Generally the landowner is responsible for the payment of the tax, however, on National Forest, the timber purchaser must file and pay the assessed tax. This information is available from the towns where harvesting occurs.

Questions regarding the collection and dispersal of the 25% Funds were received.

As the commenter recognizes, we displayed the predicted 25% Fund payment to the State, rather than to the towns. This is because the payment from the Forest Service goes directly to the State which then disburses funds to counties and towns.* The payment from the Forest Service to the State is comprised of revenue produced from a variety of activities across the national forest in any given year, not just timber harvest. The payment cannot be attributed to one activity or one timber harvest project. Therefore we cannot determine the payment to the towns of Rumney and Wentworth.

The State of New Hampshire designates the funds only for the purpose of schools. The funds cannot be used for road work. (Note: As stated above, there will be no road costs to Rumney and Wentworth as a result of the Stevens Brook Project.) The 25% Payment is not affected by Knutson-Vandenberg (KV) funds collected after timber harvests. Stewardship Contracting is not proposed for this project.

*The total 25% Fund payment to the State is divided by the total national forest acreage in the state, providing a per-acre dollar amount. Towns (or counties for areas with no town governments) then receive a disbursement based on the national forest acreage in the town.

The commenter asks questions regarding specific data used to calculate numbers presented in the Socio-economic Section.

The analysis gave the Responsible Official the meaningful information required to understand the social and economic effects of the Steven Brook Project in order to make a reasoned decision when choosing a course of action. Copies of the information requested will provided.

The commenter is concerned with the accuracy of the Spectrum modeling results and the data presented in the FEAST for the Forest Plan analysis that showed a lack of cost-efficient harvest across the forest for the foreseeable future.

The Spectrum modeling results and the data presented in the FEAST (Forest Economic Analysis Spreadsheet Tool) for the Forest Plan analysis go beyond the scope of the analysis for the Stevens Brook Project. The Stevens Brook economic analysis discloses estimated costs and revenues based on historical data and legal requirements, and is intended to provide the District Ranger with the information needed to make a reasoned decision about the project.

We are also concerned that the calculation of stumpage receipts does not reflect the effect that the high cost of diesel fuel and the collapsing housing construction market will have on stumpage prices.

The estimated stumpage receipts displayed in the EA, Table 9, are based on contract awards for recent timber sales in the area. Those prices do account for operating costs and market conditions. We used the best information available when calculating estimated stumpage receipts for the Stevens Brook Project. When the timber is cruised and appraised in the sale preparation phase of the project, operating costs and markets will be factored into the stumpage calculations.

Recent analysis of hardwood lumber production has determined that there continues to be demand for custom products using a variety of species. The low-grade markets also continue to be strong for fuel and energy.

6. Soils

Commenter believes not all stands were reviewed by the soil scientist and asks if a shovel test performed.

All stands for this sale were reviewed by the soil scientist.

The Soil Scientists rational for determining which units to review is based on discussions as an IDT team and identifying concerns. He looked at the ELT layer of the soils mapped in this area, a slope layer, aerial photos and finally his professional opinion of looking at representative sites on this project. The Soil Scientist used these resources because that is all that is available to him and gives the most accurate information of the project area to pinpoint looking at areas that might have slope issues, wetness issues and regeneration issues. He chose the soil testing methods because they are proven for this area and allowed in the regional soil quality standards. Prior use of the soil pentatromenter test for soil compaction found it

does not work very well here because the soil is too rocky and the rocks will give a false compaction reading.

Commenter believes not all defined skid trails are assessed for BMP's effectiveness.

Forest Plan Standards and Guidelines, required Best Management Practices outlined by the State of New Hampshire, and the proposed design features for this project will be applied to protect soils. The rationale for the effectiveness of these measures is in the project file (Colter 2007). The conclusions reached in the soils analysis (Section 3.6) are based on a thorough analysis that considers the best available science regarding minimizing erosion and compaction and protecting soil productivity, as well as knowledge gained from monitoring prior timber projects, including sticking surveys which show successful regeneration of trees in the first 3-5 years after harvest. In addition, the timber sale contract requires all ground-disturbing activity be followed by "closure" work once operations have ceased. Closure work includes the application of erosion control measures that stabilize soils, direct surface water, and promote revegetation.

Skid trails are defined as temporary trails receiving more then three passes with equipment. Under three passes with logging equipment produces non detrimental measurable results based on past monitoring, an extensive review of the best available science and regeneration exams of previous clearcuts with a no loss in biomass accumulation on this forest (see project recorded). Lull 1959 reported generally the greater the number of passes over an area, the greater the compaction up to a point of maximum density. At first pass the contact area depends on the deformation of the soil: the deeper the rut, the greater the area over which the pressure is exerted and the less pressure per unit area. At the second pass, the wheels roll in the track made during the first pass, so the contact area is smaller and the pressure in the contact area is higher. Donnelly et.al 1991 studied bulk density on two similar harvest practices on similar soils in Vermont for total disturbance and found no determinatial disturbance on any of the harvesting skid trails including 1 to 3 pass skid trails

Bark damage is kept to a minimum by proper placement of skid trails and close interaction between the Forest Service timber sale administrator and the operators.

7. Transportation System

A comment was received regarding the Roads Analysis and the use of terms.

The commenter requested and received a copy of the Draft Roads Analysis for the Stevens Brook Vegetation Management Project. The purpose of this document is to provide information needed to ensure the Forest transportation system will:

- provide safe access and meet the needs of communities and forest users,
- facilitated the implementation of the Forest Plan
- allow for economical and effiecient management within the budget levels
- meet current and future management objectives

- where practical, begin to reverse adverse ecological impact.

Over the past few years, Forest Service Manuals have been updated to reflect new terminology and definitions. While definitions may have stayed the same, the term used to describe them have changed. The term "classified" road is now referred to as "forest" road. This change in terminology also occurred with "unclassified" road and "unauthorized" road. In order to reduce confusion, since different documents use these different terms, a statement in the Roads Analysis was made that classified and forest road, and unclassified and unauthorized road are used interchangeably. These are terminology changes, not acceptance of "illegally" user-created roads. Reclassifying roads as proposed in the Stevens Brook Project amounts to administrative adjustments in our database. Unauthorized roads are defined in the Glossary (Appendix C) as those which exist on the ground but are not currently Forest Roads. They were previously referred to as unclassified roads. Unauthorized roads are recorded in White Mountain National Forest Service travel databases. They have been used in the past to haul timber.

All roads in the project area were examined and proposals made for classification changes as needed. The full roads analysis is in the project file and the need for change is summarized in Section 1.1 of the EA.

The plan to decommission what are currently known as "unauthorized roads" leaves the commenter questioning "how can you decommission something that technically (in an officially recognized sense) doesn't exist?"

There is no plan to decommission any unauthorized roads. The Stevens Brook Project only proposes database changes to reflect already decommissioned roads.

The commenter is concerned about the "excessive number of road miles on the White Mountain NF" and the small amount of proposed decommissioning, and would like a more "aggressive approach given budgetary limits and the potential adverse effects of roads."

We conduct project-level roads analyses in conjunction with environmental analyses to determine the road system needed for long-term management. Part of that process includes deciding the final classification of the remaining miles of unclassified roads on the Forest (FEIS, Appendix D, p. D-12). The Forest Service recognizes the maintenance burden presented by existing roads and is working at the project level to refine the road system to retain the minimum miles of roads into the future. On the other hand, we must also efficiently retain access for land management and public needs. The Purpose and Need for Change and the Proposed Action sections located in Chapters 1 and 2 of the EA identify the minimum road system needed in the Stevens Brook project area.

Road maintenance to protect resources will be conducted as the Stevens Brook project is implemented. In addition, the Forest conducts annual road maintenance to ensure safety and resource protection.

The commenter feels the Forest Service failed to identify the long-term needs and the minimum road system needed, as required by 36 CFR 212.5(b), which

states "the minimum system is the road system determined to be needed to meet resource and other management objectives adopted in the relevant land and resource management plan, to meet applicable statutory and regulatory requirements, to reflect long-term funding expectations, to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance."

From 36 CFR 212.5(b): "In determining the minimum road system, the responsible official must incorporate a science-based roads analysis at the appropriate scale…" The Stevens Brook roads analysis identified the minimum road system needed to meet resource and other management objectives for the project area, as directed by the Forest Plan (FEIS p. D-12). Compliance with statutory and regulatory requirements is ensured through the use of and adherence to the Goals, Objectives, Standards and Guidelines as listed in the Forest Plan (pp 1-16 – 1-17, and 2-27 – 2-28).

Funding for road maintenance activities comes from varied sources and has traditionally been difficult to predict. This does not mean that needed actions on the ground have gone unfulfilled. Road activities needed as part of timber sales are funded and undertaken as the sales occur. Funding for needed road maintenance activities that are not connected to timber harvest activities can come from other sources as appropriate. The environmental impacts associated with various road maintenance activities are discussed as part of the effects analysis for each resource in Chapter 3 of the EA. As noted, there is no transportation section in the EA as there will be no additional road construction.

8. Vegetation

The cumulative effects area for vegetation and the early successional acreage should include adjacent private lands.

Section 3.3 of the EA describes private lands adjacent in the towns of Rumney and Wentworth as part of the analysis area for cumulative effects. Past activities were reviewed from aerial photography and future harvests were expected to remain similar. While the state of New Hampshire does require Intent to Cut forms to be filed with town officials, this only indicates that a landowner proposes to harvest in a given year. The Report of Cut is filed to reflect actual volumes removed each year. These forms only require volumes of timber, not type of harvest activity such as clearcut, thinning or shelterwood harvest. Future harvest plans by private landowners are based on numerous factors such as forest conditions, market conditions or financial needs, and are not readily available.

Please define "overmature"

Response: Overmature trees or stands have reached that stage of development when it is declining in vigor and health and reaching the end of its natural life span. It also includes even-aged stands that have begun to decrease in commercial value because of size, age, decay, or other factors.

Commenters requested the development of an alternative that would be comparable to Alternative 2 in terms of board feet, unit costs, and net value but does not harvest timber in the South Carr IRA, thereby harvesting similar volumes on a smaller landbase.

See Section 2.3 Alternatives Considered but Not Analyzed in Detail. All forest stands in MA 2.1 lands within the Stevens Brook project area, whether in the IRA or not, were examined in the early phases of project development. Stands with appropriate conditions for harvest were identified and considered as part of the Stevens Brook project.

Considering additional stands, or increasing acreage of stands being treated may exceed accepted silvicultural guidelines. In general, mature stands not proposed for harvest were deferred because they are adjacent to recent harvests, may have visual or other resource concerns, or ground-checking identifies them as unsuitable for timber management.

The commenter notes that law and regulations require the Forest Service to protect soils, watersheds, streams, fish, and wildlife and to insure that even-aged harvests are determined to be the optimum (for clearcutting) or appropriate (for other harvests) to meet the Forest Plan's objectives and requirements.

Choosing the optimum harvest method for regenerating a particular stand is influenced by the silvicultural requirements of the species on the site, existing stand conditions, issues raised during the analysis, prior experiences in the area, and direction from the Forest Plan. The first step is to assign a silvicultural prescription to each stand after a field examination. This prescription is based primarily on the biological requirements of the stand and the objectives of Management Area (MA) 2.1 lands. This prescription is then subject to interdisciplinary analysis, with special consideration given to the issues raised during scoping and the alternatives developed. In some cases, prescriptions may be modified in order to mitigate other resource concerns such as visual quality, water quality, or composition guidelines. Regardless of the alternative, the proposed harvest method is always sufficient to ensure adequate regeneration stocking of the stand. The use of clearcutting is the optimum method for promoting the regeneration of certain species in the project area. These activities are consistent with the Forest Plan, in particular for regeneration of the paper birch, northern hardwood, red maple, and balsam fir/paper birch/aspen forest types. Likewise the use of even-aged management through overstory removals is consistent with the direction for MA 2.1 lands in the project area. Potential environmental, biological, aesthetic, and economic impacts have been assessed and are disclosed in Chapter 3 of the Environmental Assessment. Stand prescriptions are confirmed as being appropriate to meet silvicultural optimality as well. The Decision Notice/FONSI documents these conclusions.

The commenter doesn't understand the Timber Stand Improvement (TSI) proposed for several of the stands.

The TSI proposed is located in the groups that were harvested in the early 1990's. These groups have regenerated and are fully stocked with a variety of species. At

this point in the stand development, it can be desirable to select which trees and which species we would like to see through to maturity. The purpose is to release enough of the favored species to ensure its rapid dominance of the site. Only crop trees of the favored species are released, since eradication of undesirable of the poorer species is not the objective (Principals of Silviculture). Should we allow "nature to take its course", growth rates and tree quality may be lower than if we reduce the number of competing, poor quality stems.

The commenter believes the process used in the Forest Plan for determining the suitability of lands for timber management was flawed, and that land in the project area was improperly allocated to MA 2.1, which allows commercial timber harvest. The commenter requests reconsideration of the suitability determinations at this time.

At the programmatic level, the process of determining suitable forest lands (lands managed for timber production on a sustained yield basis, see 16 U.S.C. 1604(k)) was completed as part of the recent Forest Plan revision process. (See FEIS Tables 3-27 and 3-28, pp 3-124, 3-125,, and Appendix B.) The process used to determine suitable forestland is described in 36 CFR 219. Following that identified process; the Forest identified tentatively suited lands, which were further reduced by land allocation decisions properly made during the planning process. Management area allocation decisions and resulting suitability determinations were based on current conditions, desired conditions, review by resource specialists, and public input. These decisions were not appealed during the Forest Plan appeal period.

As part of the site specific analysis, the suitability of the acres proposed for harvest as part of the Stevens Brook Project was confirmed. Lands identified as suited for timber production were considered during the Stevens Brook project analysis. Project-level analysis includes on-the-ground field examinations to verify suitability for timber production; essentially field-checking the Forest Plan-level analysis. In the case of the Stevens Brook project, the IDT confirmed the suitability determinations from the Plan.

The commenter believes that early tree-marking indicates "a decision has already been reached for the Stevens Brook Project since it would never go back and put black paint over all that orange and blue paint."

Response: The marking of unit boundaries and harvest trees does not indicate that a decision has been reached prior to the completion of the analysis. The marking of trees does not represent an irretrievable or irreversible action.

The decision for the Stevens Brook Project will be based on consideration of the environmental, social, and economic effects disclosed in the Preliminary EA as well as the public comments received during its formal 30-day review period in July–August 2008.

Please see Section 1.4 of the EA for a description of the public involvement efforts conducted as part of the analysis, how the public contributed to the development of the proposed action and alternatives, and how public comments were used in the environmental analysis.

9. Wildlife

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 sensitive species that benefit from undisturbed areas of land. Most of the stands 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 Vegetation and Wildlife Sections of the Stevens Brook EA and the Stevens Brook Project Biological Evaluation (BE) describe the existing condition of the landscape. Some of the vegetation, and the plant and wildlife communities (none of which are unique or rare in the WMNF or the eastern US) located in and around the Stevens Brook Project Area were last harvested several decades ago, while others were logged more recently. There is evidence of numerous old logging roads in the Project Area, indicating past harvest activity. These documents also disclosed that there are no stands specifically identified as old growth in the project area.

Most of the wildlife habitat on the White Mountain National Forest is mature, with some regeneration age habitat created either naturally or from timber harvest. These habitats support a certain suite of plant and animal species while the unmanaged portions of the Forest and the mature forest provide habitat for a different suite of plant and animal species (DeGraaf and Yamasaki 2001). This strategy of managing for a variety of habitat types and age classes results in a wider variety of plants and animals across the landscape. In the case of rare species of plants and animals, habitat management focuses on conservation to protect the site and population (Forest Plan p. 2-15).

Research has found no evidence of the negative aspects of forest fragmentation exhibited in isolated forest environments in large forested areas where active timber harvesting occurs (Askins et al. 1990, Askins 1993, DeGraaf and Healy 1988, Thompson et al. 1992, DeGraaf et al. 2006, page 8). Therefore clearcutting in a heavily forested landscape such as the White Mountain National Forest is generally not considered forest fragmentation (Forest Plan p. 3-196 through 3-197; Wildlife Section of the EA). Extensive suitable habitat for wildlife species using mature habitat would still be available within the Project Area, the Upper Rattlesnake HMU, and Forest-wide after the proposed harvest treatments.

The Stevens Brook Biological Evaluation (BE) analyzed the potential effects of vegetation management including clearcutting on Regional Forester Sensitive Species (RFSS) having probability of occurrence within the Project Area. The BE determined the Proposed Action and all alternatives would cause "no impact" to 3 RFSS species and "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) and 3 RFSS plants. The BE determined there would be no impact to all other RFSS and no effect to all other TEPS species due to no probability of occurrence in the project area.

The EA on p 82 states that individual eastern small-footed myotis may be affected by this project. Since scientists currently have no idea what is causing white-nose syndrome or the extent of how this is going to affect the bat populations in the Northeast can we afford to lose any bats? This project should be put on hold until a cause is determined and mitigation measures can be put in place to ensure the viability of this species.

The FS must evaluate cumulative impacts of the project on bat species affected by white-nose syndrome.

The White Mountain National Forest (WMNF) is very concerned about White-Nose Syndrome (WNS) in bats. There are many questions about what is causing WNS, however scientists and researchers are learning more information. The WMNF is in close communication with the U.S. Fish and Wildlife Service (USFWS), who is the lead agency for WNS because of the potential effects to federally listed bats elsewhere. The USFWS is working in close cooperation with States and many university and research laboratories to learn more about the cause and possible spread of WNS. They maintain a web site containing some of the most recent scientific information on this syndrome at: <www.fws.gov/northeast/white_nose.html>. The WMNF will follow the lead of the USFWS and take appropriate action as needed.

Currently, there are no known bat hibernacula on the WMNF. Recent surveys of New Hampshire hibernacula by two bat experts found evidence of WNS in several caves in New Hampshire located off the WMNF. To date no confirmed cases of WNS have been found on or near the WMNF. At this time, the only recommendations developed by the USFWS and their partners to prevent the spread of WNS focus on human visitation or research in affected hibernacula, human visitation between affected and unaffected caves and mines, and human handling of affected bats.

The Stevens Brook Project Biological Evaluation (BE Table 4) disclosed that there is no probability and no documented occurrence of Federally-listed bats such as Indiana bat occurring in the Project Area. This determination is further supported by the current USFWS list of Federally-listed and/or proposed endangered or threatened species in the WMNF (letter dated 08/25/08). The probability of occurrence and effects determinations for TEPS species from the BE are summarized in EA.

WNS potentially could affect other woodland bat species that do occur on the WMNF. Of concern is the Eastern small footed myotis, a Regional Forester-listed sensitive species (RFSS). The Stevens Brook Project BE rendered a "may impact individuals, but would not likely contribute to a trend towards Federal listing or cause a loss of viability of the population or species of Eastern small-footed myotis (Myotis leibii). The BE considered that timber harvesting could affect bat forage habitat: The BE and EA disclose that timber harvesting (which opens the canopy and allows sunlight into stands and adjacent areas), could improve open foraging conditions for woodland bats, However, it is unlikely that proposed activities that harvest trees would result in cumulative effects to Eastern small-footed myotis as

current scientific literature indicates that this species does not favor roosting in trees during the non-hibernation season (Kiser et al. 2001, 2002, Veilleux 2005, 2006, 2007).

Several other woodland bat species are known to occur on the WMNF. They are not currently considered rare (despite losses from WNS over the past 2 winters), but they do roost in trees. As described in the Wildlife Section of the EA, tree removal from timber harvest has potential to add cumulatively to negative effects produced by WNS. However, winter harvests would have no cumulative effect because bats would not be roosting in trees during winter. Summer harvests, potentially could impact bats by removing occupied roost trees. These effects are considered minor because: 1) Forest Plan standards and guidelines exist to protect and retain wildlife reserve trees which could provide roost tree habitat; 2) the amount of annual timber harvest planned in the Stevens Brook Project Area or even Forest-wide is small in relation to the total forested area on the White Mountain National Forest; 3) suitable roost tree habitat is abundant across the Forest; and 4) some harvests can result in beneficial effects by allowing solar radiation to improve roosting habitat and improve canopy conditions for foraging bats.

On a Forest-wide basis, we have taken some additional steps to manage the WNS issue. We have informed all Forest Service employees to report any dead bats found on the Forest, as well as any sightings of unusual bat behavior. In addition, the WMNF plans to complete acoustical bat monitoring in the future, which will help provide useful data on general bat numbers at various locations. We will continue to maintain close communication and share information with the USFWS and state wildlife agencies and will follow recommendations as they develop.

The Stevens Brook EA evaluates cumulative impacts of the project on bat species affected by white-nose syndrome.

There is no need for the creation of more early successional habitat in the WMNF. The commenter further states that the trend data and statements in the Assessment of Terrestrial Biodiversity in the White Mountain National Forest Region (Cline et al. 1999) contradict one of the purposes of the Stevens Brook Project, causing a flawed analysis and casting doubt on the purpose and need for the project and the Forest Service's entire premise that it must increase early successional habitats in the White Mountain National Forest because it is declining in the region.

Many sources of information were used to develop the wildlife habitat goals for the White Mountain National Forest. The Assessment of Terrestrial Biodiversity in the WWNF Region (Cline et al. 1999) was used during the planning process as it was originally intended – as a compilation of information and scientific resources. It was not intended to be a piece of scientific literature in its own right, or as a guidance document to help steer future management on the White Mountain National Forest. A review of the Assessment of Terrestrial Biodiversity by Forest Service staff and other peers identified relevant information that was not included in the assessment (Lemieux 2007), and some reviewers expressed concern about the data

analysis methods used by Cline et al. (see Peer Reviews in Project File). The fact that the peer reviews identified inadequacies and potential bias in the document by Cline et al. further necessitated use of the Assessment of Terrestrial Biodiversity in the WMNF as just one source of literature to be considered in developing wildlife habitat goals for the WMNF.

A recent study on scrub/shrub birds in New England provides compelling evidence as to the importance of early successional habitat (Schlossberg and King 2007). This best available science discussed the value of early successional habitats for 41 bird species in New England including American woodcock, chestnut-sided warbler, magnolia warbler, and mourning warbler. Approximately 21 of these 41 bird species are declining, some at an alarming rate. Many of these birds are habitat specialists that occupy areas with a certain vegetative structure–shrubby open habitat–that occurs on the landscape for a very short time frame. Of note is that 78% of habitat currently used by these species is created through logging. Other habitats important to this suite of species include shrubby wetlands, permanent wildlife openings, and old fields. Without some type of repeated natural or man-made disturbance this habitat disappears quickly. This recent publication analyzed how abundant early successional habitat is across New England including acres created by forest management on privately owned lands. This is based on 2006 Forest Inventory Data and Gap Analysis data in New England. Another recent publication by the Northeastern Forest Research biologists also discusses the critical need for early successional habitat for certain species of wildlife (DeGraaf et al. 2006, page 19).

The Stevens Brook EA discloses that analysis of the Upper Rattlesnake HMU indicates there is a lack of regeneration forest habitat. Also, the cumulative effects analysis area used for wildlife resources included adjacent private land and described the current and likely future land use practices. Based on the goals of the Forest Plan and the scientific evidence as to the importance of regeneration forest habitat (sometimes referred to as early successional habitat), there is a need to increase early successional habitat in this HMU.

The commenter wonders why the Forest Service continues to propose early successional habitat when the NH Big Game Plan recommends keeping the moose population steady and decreasing the bear population in the White Mountain region. There are no lynx in the project area so snowshoe hare shouldn't be the requirement. The commenter included the following link to the State's report: <www.wildlife.state.nh.us/Hunting/Hunting_PDFs/NH_Big_Game_Plan05DRAFT.pdf>

The WMNF's wildlife habitat management goals, including managing for early successional habitat, are based on the habitat needs of the full array of wildlife species that occur on the Forest for all or part of the year. Moose and bear are just two of the many species that use early successional habitat on the White Mountain National Forest (DeGraaf and Yamasaki 2001).

The population goals in the NH Big Game Plan 2006-2015 are used as a basis for setting annual hunting seasons and the number of permits for each big game species in the State. The State's goals for moose and bear populations are based on a variety of factors including social, economic, ecological conditions, and public safety and ecological (New Hampshire Fish and Game Department Big Game Plan, Project File). The Stevens Brook Project Area is located in the State's Management Region (White Mountains Region, Unit F), where the objective is to reduce the population density to 3.0 moose seen per 100 hunter hours. This reduction will help reduce vehicle collision rates without causing a serious reduction in viewing or hunting opportunities. The black bear population objective for the White Mountains Region, Unit F is a modest (16%) reduction in the current estimated density.

10. Climate Change

Multiple commenters believe we haven't addressed the effects climate change in the EA as it relates to global warming, carbon storage, regeneration and species retention, and one commenter believes this should be addressed as an EIS.

Comments touch on two aspects of climate change: adaptation (for example, "How will logging affect or alter community composition?"), and mitigation (for example, "there is now considerable scientific evidence that retention of older forests allows for greater carbon storage than logged or young forests"). Our response to this set of comments will emphasize mitigation, specifically sequestration; our response to additional comments below will emphasize adaptation.

CEQ's implementing regulations of the NEPA provide guidance on ensuring that environmental information is of high quality and available to the citizens and public officials before decisions are made and actions taken. 40 CFR 1500.1 (b) states, "… NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail." 40 CFR 1500.4 (g) further directs use of the scoping process to identify significant issues while deemphasizing insignificant issues thus narrowing the scope of analysis (also 40 CFR 1501.7 (3)). 40 CFR 1502.2 (b) states, "Impacts shall be discussed in proportion to their significance. There shall be only brief discussion of other than significant issues. As in a finding of no significant impact, there should be only enough discussion to show why more study is not warranted."

In relation to both mitigation and adaptation, federal court decisions to date are consistent with NEPA principles that call for the scope of analysis to be commensurate with the impacts of a proposal (40 CFR 1500.4(c), 40 CFR 1502.2(b)). The cited cases pertain to major sources of greenhouse gas emissions (coal-fired power generation and automotive fuel economy standards). Our analysis focuses on those issues raised during scoping that are significant to the actions we proposed; the scope of the analysis is commensurate with the effects of our proposal. The proposal is for sustainable forestry, which is considered to contribute to carbon sequestration and substitute for fossil fuels. See Union of Concerned Scientists (2004); "Recent estimates show that U.S. forests, grasslands, and agricultural lands form a sizable carbon sink. Even a forest that undergoes regular harvesting can act as a

carbon sink as long as early growth exceeds the amount of carbon removed during harvest. The U.S. carbon sink absorbs 1.1 to 2.6 million metric tons of CO2 each year, which is equivalent to 20 to 46 percent of total U.S. global warming emissions." Also see Salwasser (2006: 13-15) and Krankina and Harmon (2006). In conformance with the Forest Plan, our proposal and alternatives are based on rotations that are longer than typical of other ownerships, and will provide for increased resilience to insects and disease. Most of our forest stands that are on MA 2.1 lands and available for timber harvest are managed under uneven-aged systems which do not have particular rotation ages, but instead have periodic partial harvests that perpetuate stands of diverse age classes and species. For those stands managed with even-aged management, our rotations are typically longer than private timberlands, which tend to change ownership regularly and thus it is unusual for forest stands to have long rotations.

At the stand level, the best available science shows that harvesting results in carbon emissions over the short term, followed by longer-term sequestration (See Krankina and Harmon 2006: Figure 2). Literature cited by commenters describes old growth forests as carbon sinks, but also indicates that young forests tend to be faster carbon accumulators. Carbon storage in trees is proportional to tree biomass weight; traditional silviculture practices intended to increase volume for wood products are compatible with increasing carbon storage capacity of trees. As such, managed stands will store carbon at a faster rate than slower growing natural stands of the same species (Birdsey 1992). Clearly the effects of harvesting, or not, on carbon levels depends on a lot of variables. Carbon accounting at the stand or project level is still at a conceptual stage (for example, see Cathcart and Delaney 2007), and a subject of on-going research.

Landscape-scale (or larger) analyses may be more meaningful. For example, see IPCC (2007: 549; 551), "Landscape-level carbon stock changes are the sum of stand level changes, and the impacts of forest management on carbon stocks ultimately need to be evaluated at landscape level. Increasing harvest rotation lengths will increase some carbon pools (e.g., tree boles) and decrease others (e.g., harvested wood products [citation omitted]."). The White Mountain National Forest is currently working with the University of New Hampshire to identify the carbon storage from, and establish a carbon budget based on, the activities approved in the 2005 Forest Plan, but this larger-scale analysis is not complete.

At this time, what we do have are national data on sequestration. As required by the cited section of the U.S. Code, the Forest Service has prepared regular summaries of the effects of global climate change on forest and rangeland conditions. The most recent (2007) summary is available in the Interim Update of the 2000 Renewable Resource Planning Act Assessment (see especially pages 69-72, 74, 77 and 83-85; with the latter summarizing forest sequestration of carbon and avoidance of emissions through the use of wood products). The assessment and related studies underlie EPA greenhouse gas inventories for the forestry sector, which conclude that improved forest management practices, afforestation, and timber harvesting and use have resulted in net sequestration of carbon each year from 1990

through 2005. In 2005, land use, land-use change, and forestry activities resulted in a net carbon sequestration of 828.5 Tg CO2 equivalents. This represents an offset of approximately 14 percent of total U.S. CO2 emissions. Total land use, land-use change, and forestry net carbon sequestration increased by approximately 16 percent between 1990 and 2005, primarily due to an increase in the rate of net carbon accumulation in forest stocks (United States Environmental Protection Agency 2007: 7-1 to 7-2). These estimates include consideration of above- and below-ground biomass, dead wood, litter and soil organic carbon, and include the effects of forest fires (United States Environmental Protection Agency 2007: 7-2 to 7-4). The Forest Service's Northern Research Station is investigating soil carbon storage and carbon litter cycling on the White Mountain National Forest. The pattern of net sequestration reflected in the EPA inventory is expected to continue for the foreseeable future, although at a reduced rate because of factors such as forest maturation and clearance of private land for development (United States Department of Agriculture, Forest Service 2007: 84; Union of Concerned Scientists 2004).

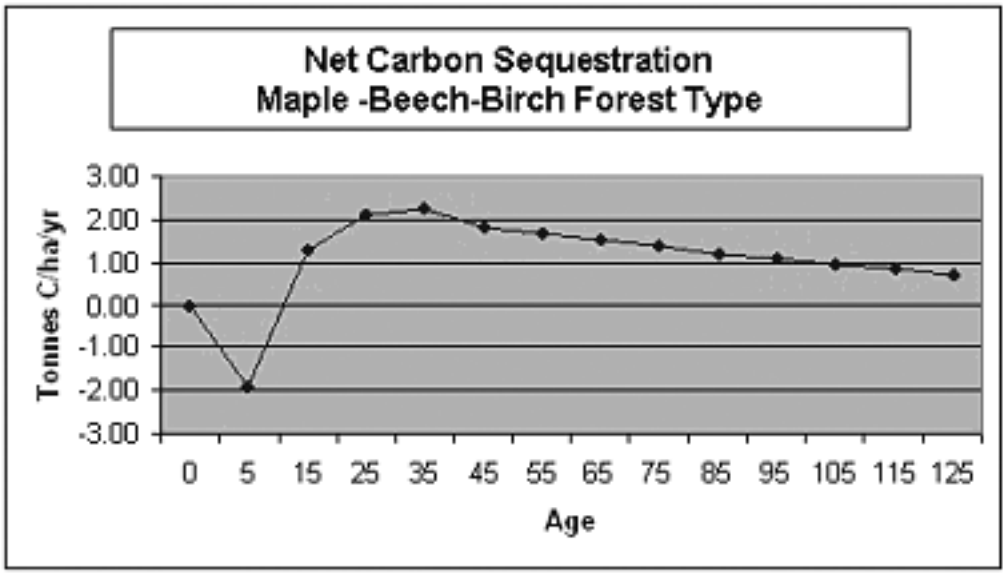
We do not believe it is realistic or necessary to pursue a carbon accounting at the project level for two reasons. First, the best available science indicates that sustainable harvest practices result in net sequestration of carbon over time, even when harvest operations, transportation, stand-tending and manufacturing are taken into account. Markewitz (2006) concluded that a high-intensity pulpwood management scheme would result in little or no long-term sequestration, while carbon storage in wood products due to accelerated growth of trees to a saw log category might exceed the incurred emissions by 3-fold (i.e., 35 Mg ha–1). His calculations showed that there is a net carbon benefit to all but the most intense, shortest-rotation management systems. The Forest Plan does not support pulpwood rotations or high-intensity pulpwood management schemes. Our management is based on longer rotations than those modeled by Markewitz. Gower and Ahl (2006) concluded that whether forest management results in a net source or sink of carbon is dependent on many factors, especially the size of the area examined. At the harvest site level, there was a net loss of CO2 over 1-5 years because of decomposition of harvest residuals (slash, etc.). Over the longer term, the extent of the area used in the calculations influenced whether the area was a source or sink. The National Forest studied (the Chequamegon-Nicolet) was a net carbon sink. They concluded that "The normal harvest with climate change had the largest net biological and industrial carbon sequestration (p. 46)."

Scientific evidence is quite solid that when forests are clearcut, carbon is lost from the ecosystem and it will take some decades for the ecosystem carbon stocks to recover to the pre-harvest level. The time it takes to recover is highly variable, depending on site productivity, regeneration success, species, climate, and other factors, but the forest will eventually recover the emitted carbon. Smith et al. (2006 p. 49 and 152) estimate that recovery of non-soil carbon to pre-harvest levels after clearcut harvest of a 65-year old maple-beech-birch forest in the Northeast with 158 metric tonnes carbon/hectare (MtC/ha) of non-soil carbon would take between 55

and 65 years. After clearcut harvest, the regenerating forest increases in biomass which offsets the emissions from forest floor and down dead wood pools. The following graphic (Smith et al. 2006) shows that the rate of carbon sequestration after clearcut harvest is negative for about a decade, then increases to a maximum rate at about 35 years of age, followed by a long period of slow reduction.

Recent scientific literature is leading to a consensus that old forests continue to sequester carbon indefinitely (Luyssaert et al. 2008),[1] though available inventory data for forests of the Northeast is very sparse for stands older than 120 years of age. There is little evidence that, in general, Northeastern forest ecosystems become net carbon emitters for more than 5-10 years after harvest (e.g., Smith et al. 2006 Table C1), though exceptions may exist depending on local factors.

Figure C-1. Net Carbon Sequestration: Maple-Beach-Birch Forest Type.



The second reason project level carbon accounting is not appropriate is because there is no reason to believe that the carbon benefits from the selection of any alternative (including no action) would be realized. Wood from other sources, or products that are more carbon-intensive, could readily be substituted for products that would be made available through implementation of the proposal (leakage, see Cathcart and Delaney 2006: 160). For example, if the pulp products were obtained from industrial forestlands with shorter rotations, carbon sequestration potential would be less. The potential carbon benefits of foregoing action, or choosing a particular action alternative, are too tenuous to be useful in decision-making. All in all, we believe that the information presented and cited in our response to scoping comments (Appendix B) remains relevant and accurate. We would add, however, that the Forest Service is continuing and expanding its activities in the area of climate change and carbon sequestration. Summaries are available from http://www.fs.fed.us/kidsclimatechange/climate.shtml, and http://www.fs.fed.us/ecosystem-

services/carbon.shtml. Also as stated above, the White Mountain National Forest itself is examining the carbon balances associated with the Forest Plan.

Overall we agree with the NERA report: the most effective approach for coping with change will be to anticipate the likely effects of that change and initiate adaptation strategies. That reflects the best available science (for example, Millar and others 2007). The Stevens Brook Project emphasizes creating healthy, resilient ecosystems, as described in Section 3 of the EA (environmental effects to vegetation), which will facilitate adaptation.

Leaving the Forest untouched will not automatically guarantee a more resilient forest. In fact, the Forest may be put under other stresses due to the effects of climate changes such as the rapid spread of disease and/or pests (2007 RPA Program Assessment). The Forest Service has the goal of creating and maintaining healthy forests. The objective of the Stevens Brook Project is to improve the health of the forest through sustainable forestry management practices. The need for change within the project area is documented in the EA.

Information pertaining to the effects of climate change on community composition is provided by Iverson and others (2007) and Shugart and others (2003: 13, 21). Iverson, Prasad and Matthews, authors of the Northeast Climate Impacts Assessment research on potential tree habitat, are contributors to the Climate Change Tree Atlas, where one may get a sense of what may happen to individual tree species. Their work generally agrees with Case Study 4 in the NERA report (2001).

In general, spruce-fir habitat is expected to decline and oak-hickory and oak-pine habitat to increase in future decades (Iverson and others 2007: 2, 9, 13, 15-16). Iverson and others (2007: 17) do provide one important caveat, namely that they model suitable habitat, and not species range. We would not expect the changes presented here to be realized by 2100 unless the disturbance agents cited exert a profound acceleration effect on the changes. We would expect that it is more likely that disturbance agents would hasten declines to a greater degree than they would accelerate the prominence of new species entering the region. We are confident that, through the emphasis on forest health, the proposed actions improve the chance of retaining desired species. See the Purpose and Need (Section 1.1) and the Environmental Consequences (Vegetation Resources Section 3.11) for discussion on forest health and the effects of timber harvest. Ongoing research projects in the White Mountain National Forest by the University of Vermont, the University of Massachusetts, the University of New Brunswick, and the USFS Northern Research Station are investigating various aspects of climate change. These studies relate to climate change effects on timberline and alpine species, environmental change on genetic variation in tree species to help predict climate change, and a carbon budget of the Forest.

We expect that we will be successful in regenerating the treated stands. The time scale for regeneration is shorter than the time scale over which species distributions change in response to climate (5-10 years, vs. the 90-year endpoint of the tree distribution models; Shugart and others 2003: 9). Regeneration data from stock-

ing surveys of timber harvests in the Stevens Brook timber sales of the early 1990s indicates that we can establish the desired species, after which they will be relatively resilient to longer-term trends, especially if stands are maintained and insect and disease outbreaks are treated. The research of which we are aware (Rhoads and others 2002; Millward and Kraft 2004; Takahashi Arii and Lechowicz 2007) indicates that the ice storm of 1998 did not greatly alter species composition or tree diversity, although over the long-term beech might increase in proportion to sugar maple. Although there is slightly greater damage along roads (and by inference, harvest unit boundaries), canopy damage did not decrease with distance from the edge. However, monitoring of regeneration as required by NFMA, at the project and Plan level, would certainly lead to reconsideration of harvest techniques if climate-related (e.g. increased ice storm frequency) influences are detected.

Similarly, we are not aware of research specifically modeling soil health or water body temperatures in response climate change and timber harvest but we currently have research being conducted on the Forest by the University of Delaware addressing soil temperature and plants. Laj (2008) reported increases in the soil carbon pool, through adoption of recommended management practices, impact numerous ecosystem services and functions of interest to humans. There is little scientific consensus that harvesting reduces soil carbon. There are studies that show impacts on soil carbon and studies that don t show impacts. A literature syntheses (e.g. Johnson and Curtis, 2001) shows that harvesting effects on soil carbon may be positive or negative depending on many environmental factors. Notable among these are improvements in soil quality, enhancement of microbial processes, strengthening of nutrient/elemental cycling, and increases in net primary productivity. Riparian guidelines and Best Management Practices in the Forest Plan are designed to preclude undesirable changes resulting from timber harvest, as discussed in the Fish and Aquatic Habitat, Water Resource and Soil sections of the EA. Following Forest Plan guidance should ensure resiliency of streams, wetlands and soil.

The Forest Service addresses global climate change nationally through the Resources Planning Act (RPA). The Global Climate Change Prevention Act amended the RPA to require the Secretary of Agriculture to consider the potential effects of global climate change on the condition of the renewable resources on the forests and rangelands of the United States, and to analyze opportunities to mitigate the buildup of atmospheric carbon dioxide and reduce the risk of global climate change. The agency analyzed the global climate change issue in the 2007 RPA Program (USDA Forest Service. 2007. Interim Update of the 2000 Renewable Resource Planning Act Assessment.)

The potential for change at the regional scale is not yet well-understood. For instance, in relation to climate, the IPCC Working Group II Fourth Assessment Report, Chapter 14 points out that regional modeling is still an uncertain science:

> Projections of climate changes still have important uncertainties; especially on a regional scale (Christensen et al., 2007: Section 11.5.3). For North America, the greater uncertainty about future precipitation than

about future temperature substantially expands the uncertainty of a broad range of impacts on ecosystems (see Section 14.4.2), hydrology and water resources (see Sections 14.4.1, 14.4.7), and on industries (see Sections 14.4.6, 14.4.7).

These regional uncertainties must be better understood, as background for making projections at the project scale. Until that time and until interactions with local conditions such as topography and soils receive more scientific attention, additional project-level analysis will not be useful. A national Forest Service policy document on addressing climate change in NEPA analyses (USDA 2009) acknowledges that Forests should not ignore this important topic, but also states that, (i)t is not currently feasible to quantify the indirect effects of individual or multiple projects on global climate change and therefore determining significant effects of those projects or project alternatives on global climate change cannot be made at any scale. Recent regeneration experience, coupled with science-based actions oriented toward resistance, response and resilience, is the best predictor of outcomes.

11. Fire

Please explain how you arrived at the conclusion that the decline of oaks (in the East) is due to interruption of natural fire regime. I would like to see evidence that using fire in the Northeast is useful for oak regeneration.

Evidence that a decline in oak species in the east is due in part to years of fire suppression and that fire can aid in perpetuation of these stands is addressed in such publications as Abrams 2005, Sperduto and Nichols 2004, Desmarais 1998, Dey and Parker 1996, Van Lear, Brose and Keyser 2000. Past prescribed burns on the White and Green Mt National Forests and at New Boston Air Force base in New Boston, NH resulted in good conditions for oak regeneration with aggressive stump sprouting of oak and a reduction in competing understory vegetation

Appendix C — Glossary and Acronyms

Glossary

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

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

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

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

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

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

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 (eg, goldenrod, ferns, meadowsweet), and/or shrubs (eg, 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 regulated 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 fish-less 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

Appendix D — Literature Cited

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